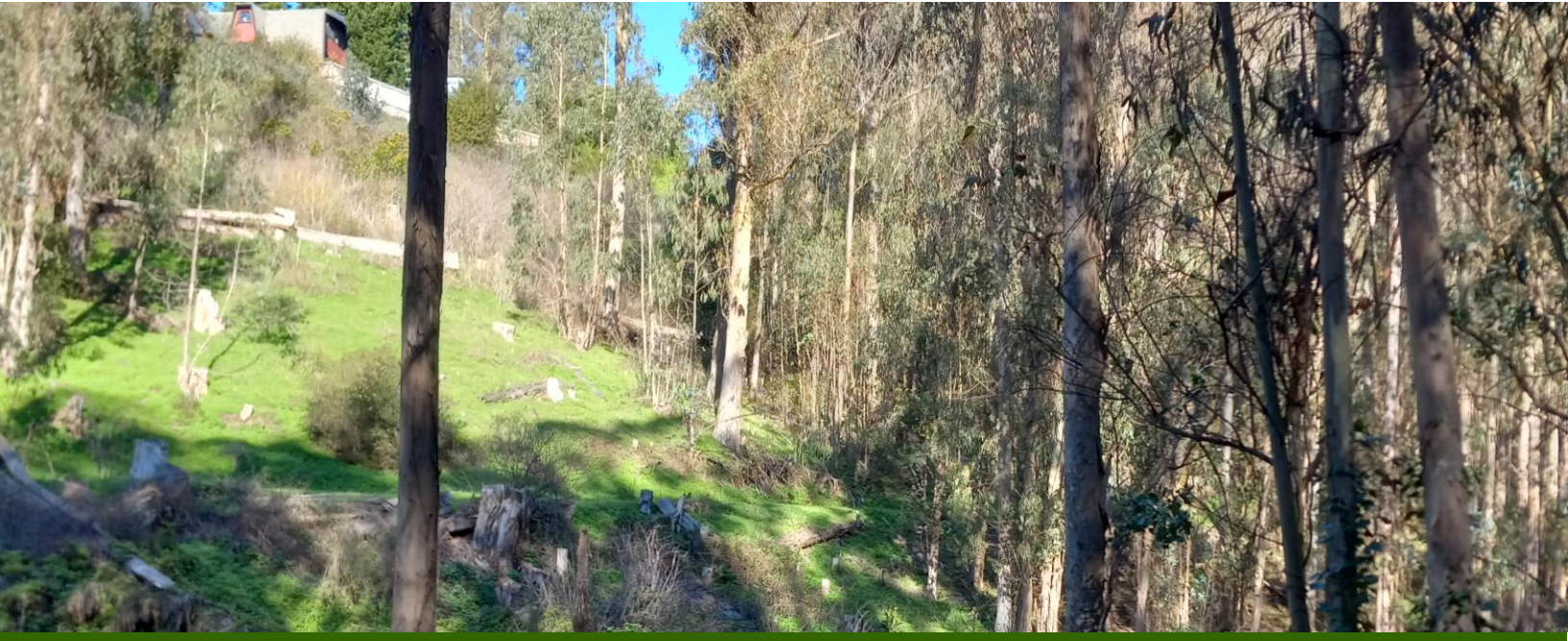

El Granada Wildfire Resiliency Scoping Project: Final Report

Prepared for San Mateo Resource Conservation District

June 2022

PANORAMA ENVIRONMENTAL, INC.

PROMETHEUS FIRE CONSULTING LLC

vibrant planet

SAN MATEO RESOURCE CONSERVATION DISTRICT

El Granada Wildfire Resiliency Scoping Project: Final Report

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Prepared for:

San Mateo Resource Conservation District

Prepared by:

Panorama Environmental, Inc.
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Acknowledgments

We would like to thank San Mateo County/County Parks, CAL FIRE, County Fire, Coastside Fire Protection District, the Midcoast Community Council, and community members for the insights, perspectives, and expertise they contributed to the development of this report. This acknowledgment does not imply their agreement with everything contained in this report.

This work would not have been possible without the financial support of San Mateo County through Measure K District Discretionary funds from Supervisor Horsley.

Recommended Citation: Panorama Environmental. June 2022. El Granada Wildfire Resiliency Scoping Project Final Report.

Available at http://www.sanmateorcd.org/project/el-granada-wildfire-resiliency-scoping-project/

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List of Acronyms

CAL FIRE	California Department of Fire and Forestry
CalVTP	California Vegetation Treatment Program
CEQA	California Environmental Quality Act
CWPP	Santa Cruz-San Mateo County Community Wildfire Protection Plan
dbh	Diameter at breast height
ECC	Emergency Command Center
ERC	Energy Release Component
FEMA	Federal Emergency Management Agency
GGNRA	National Park Service - Golden Gate Recreational Area
HVRA	High value resources and assets
IFTDSS	Interagency Fuel Treatment Decision Support System
LiDAR	Light detection and ranging
NEPA	National Environmental Policy Act
POST	Peninsula Open Space Trust
RAWS	Remote Automatic Weather Station
RCD	San Mateo Resource Conservation District
SFPUC	San Francisco Public Utilities Commission
WUI	wildland urban interface

1 Introduction

The purpose of the El Granada Wildfire Resiliency Scoping Project is to advance data-driven solutions to wildfire resiliency in and around the community of El Granada. Based on fire science, it provides a site-specific understanding of wildfire risks and hazards and scopes a suite of actions that would most effectively reduce those risks. It defines the wildfire risks (including fire ecology, local fire history, fuels characteristics, fuel models, weather, topography); assesses the risks (including most likely scenarios, ignition probability, wildfire behavior, potential wildfire spread, and general identification of values at risk); and then identifies projects to reduce those risks. By bringing an in-depth and analytically grounded focus on this geographic area, the project aims to develop a higher level of consensus for priority actions, position projects for grant funding or other resources, and help ensure effective investments.

This project builds on and is companion to several other efforts, including the Santa Cruz-San Mateo County Community Wildfire Protection Plan (CWPP) (2018), California Department of Fire and Forestry (CAL FIRE) wildfire hazard mapping, San Mateo County LiDAR data, vegetation mapping, and County Parks planning efforts. There is no obligation to implement any particular recommendation in this report. Rather, it provides an analytical foundation to identify effective strategies to help build community resilience to wildfire and to position those strategies for funding and other resources.

Information provided in this report is intended to be used as a planning tool to identify and inform future efforts related to funding opportunities, project development, and project implementation. The project is not intended to be an all-encompassing effort to address every aspect of wildfire resilience from concept to implementation. Each project recommended in this report requires further development including a site-specific understanding of existing conditions, and some projects may require environmental review and regulatory permits to complete the work. This analysis has been conducted specifically for the community and is not a subset of County or state assessments, nor can the results be extrapolated to inform risk at a greater landscape scale.

1.1 Background and History

The community of El Granada is located in unincorporated coastal San Mateo County within and adjacent to a CAL FIRE-designated Very High Fire Severity Zone. Some stakeholders have expressed particular concern about highly flammable eucalyptus trees in residential areas (approximately 122 acres of eucalyptus) and in San Mateo County Quarry Park (approximately 314 acres of eucalyptus). The Federal Emergency Management Agency (FEMA) defines the

wildland urban interface (WUI) as the zone of transition between unoccupied land and human development where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels (FEMA 2022b).

Following the 2008 Summit Fire, which burned over 4,000 acres in Santa Cruz County, CAL FIRE developed a CWPP for Santa Cruz and San Mateo counties with support from their respective resource conservation districts. The CWPP attempts to identify wildfire hazards, as seen across the landscape, and provide strategies to mitigate wildfire risk and restore healthier, more resilient ecosystems while protecting life and property. Furthermore, communities with CWPPs in place are given priority for some funding of hazardous fuels reduction projects. The CWPP was completed in 2010 and updated in 2018.

The 2018 CWPP for San Mateo-Santa Cruz Counties provides an overview of fire history within San Mateo and Santa Cruz counties and designated inland developed and undeveloped lands in and surrounding coastal communities as the WUI. The community of El Granada is located almost entirely within the WUI. The CWPP identifies wildlands around the perimeter of El Granada as high priority areas for vegetation management efforts (CAL FIRE and RCD 2018) including objectives to thin the eucalyptus at Quarry Park and to mitigate risks from eucalyptus through thinning and removal. The CWPP will be updated in 2022 and is anticipated to include high priority areas around El Granada.

Public agencies and public and private landowners have been taking actions to address the wildfire concerns in the area for many years, including a community chipper program, education regarding home hardening, removal of eucalyptus in some locations, incentivizing or reducing barriers to defensible space and eucalyptus removal on private property, vegetation management projects in Quarry Park, and better defining and improving ingress and egress through Zonehaven. Eucalyptus removal by private landowners significantly increased in July 2021 following a moratorium on tree removal permitting requirements put in place by San Mateo County Planning for certain tree types. Stakeholders, including public agency staff and landowners and residents, identified many additional actions that could contribute to long-term wildfire resiliency. A critical next step was to identify and begin to develop actions most likely to reduce wildfire risk and build wildfire resiliency, grounded in a thorough assessment of site-specific risks and opportunities. There was interest in applying science-based methodologies to develop a range of potential options to reduce wildfire hazard threats considering the area-specific challenges, which include a high concentration of eucalyptus trees, steep topography, and limited access.

In September 2021, with funds provided by San Mateo County, the RCD[1] distributed a Request for Proposals for a wildfire resiliency planning consultant for the El Granada Wildfire Resiliency Scoping Project, resulting in the selection of the consultant team that includes Panorama Environmental, Inc, Prometheus LLC, and Vibrant Planet. This project builds on the priorities identified in the 2018 CWPP by using the County's fine-scale county-wide vegetation data (Golden Gate National Parks Conservancy 2021) as well as other standard fire model inputs (e.g., weather, topography) to identify areas of wildfire risk and develop a set of potential actions to reduce wildfire risk and improve wildfire resilience in El Granada.

The RCD served as the project manager, facilitating input from partners including San Mateo County (Supervisor Horsley's Office), County Parks, CAL FIRE, County Fire, Coastside Fire Protection District, the Midcoast Community Council, and community members to help ensure that local expertise was incorporated and that the project met goals and expectations.

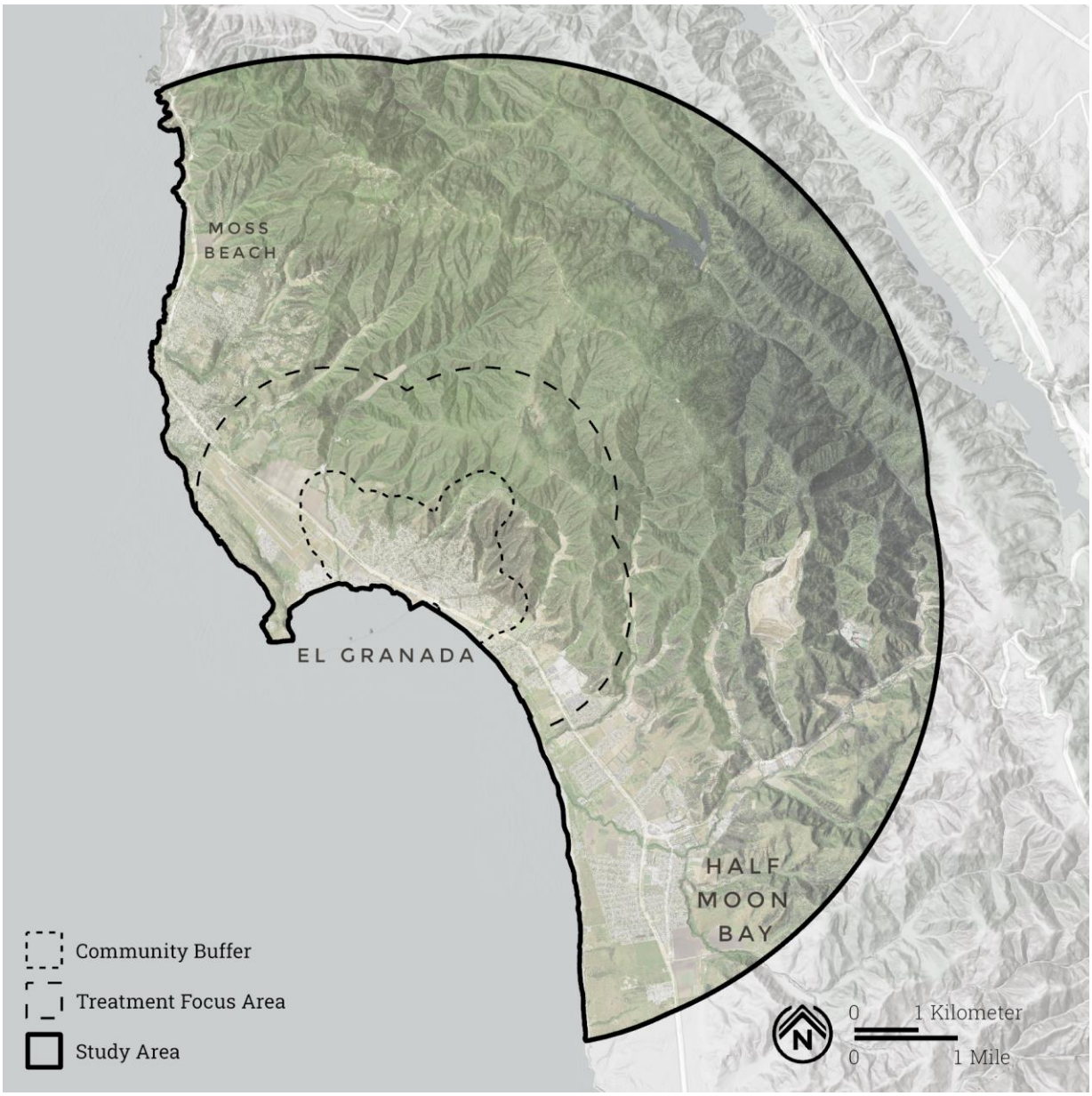
1.2 Purpose of the Project

The purpose of the wildfire resiliency scoping project was to conduct a data-driven analysis to identify areas of high risk on public and private lands and develop a potential suite of actions that can be undertaken to reduce the risk of wildfire reaching the community of El Granada.

This risk assessment used fine-scale vegetation data, weather data, topographic conditions, and community resources and assets to model wildfire hazard and community risk within the lands surrounding El Granada. An interim step of the wildfire risk assessment includes the identification of hazards across the burnable landscape. Hazard severity within the burnable landscape is anticipated to closely reflect the forthcoming CAL FIRE wildfire hazard severity maps because both hazard mapping exercises will be based on the same vegetation data set. However, some differences in hazard mapping may be evident due to modifications to the vegetation and weather data used to generate the hazard maps for this risk assessment. Data modifications are discussed in Section 3 of this report. The results of the wildfire risk assessment are representative of conditions specific to the Project Study Area (Figure 1) and identify actions that have the greatest treatment effectiveness based on relative risk to the community of El Granada. Vegetation management actions identified through the wildfire risk assessment have been developed to reduce wildfire risk to the community of El Granada. This analysis has been conducted specifically for the community and is not a subset of county or state assessments, nor can the results be extrapolated to inform risk at a greater landscape scale.

[1] The RCD is a non-regulatory special district created to help people protect, conserve, and restore natural resources. The work of the RCD is accomplished through voluntary partnerships with landowners and managers, technical advisors, area jurisdictions, government agencies, advocates, and others.

Figure 1 Project Study Area



Action implementation will require a site-specific understanding of existing conditions within each action area and may require environmental review and regulatory permits to complete the work. Each action identified in this report requires further development to become a "shovel ready" Project.

This report identifies areas across the landscape where implementation of vegetation treatments would be highly effective in reducing wildfire risk in El Granada. There are many ways that vegetation may be treated to effectively reduce the risk posed to the community. Section 5 of this report includes a potential suite of recommended actions to treat vegetation. Agencies, landowners, and partner groups are urged to use the information included in this report to develop projects consistent with the recommendations of this report; however, there is no requirement for any party to implement any of the identified actions.

1.3 Description of Project Area

El Granada is a census-designated place in the unincorporated midcoast region of San Mateo County within and adjacent to a CAL FIRE-designated Very High Fire Hazard Severity Zone. The coastal Mediterranean climate is characterized by fog and cool temperatures (below 70 degrees Fahrenheit) for much of the year. Most rainfall occurs in the winter and spring (U.S. Climate Data 2022). Periodically, dry offshore winds originating in the northeast, commonly called "Diablo Winds," occur across the Bay Area. Diablo Winds create extreme fire danger due to high wind speeds and decreased humidity, both of which dry out vegetation. Diablo Wind events are common in the late summer and fall, with the highest frequency of Diablo Wind events occurring in October, when live fuel moisture is also at a seasonal minimum, leading to severe fire danger conditions (Fire Weather Research Laboratory 2019).

The lands surrounding El Granada are predominantly undeveloped public and private lands that include lands managed by San Mateo County, the National Park Service - Golden Gate Recreational Area (GGNRA), the Peninsula Open Space Trust (POST), and the San Francisco Public Utilities Commission (SFPUC). Vegetation ranges from barren land to areas of chaparral dense with brush to eucalyptus forests. Large stands of eucalyptus trees occur in residential areas (approximately 122 acres of eucalyptus) and in San Mateo County Quarry Park (approximately 314 acres of eucalyptus). Eucalyptus was introduced to California in the 1850s and quickly flourished in California's Mediterranean climate. Eucalyptus trees yield allelopathic chemicals that suppress competitive understory vegetation allowing eucalyptus to grow in tall, dense forests that further shade out competing vegetation, often forming a monoculture. The heavy litter fall, flammable oil in the foliage, and open crowns bearing pendulous branches that ignite quickly promote fire spread (U.S. Forest Service 2022). Eucalyptus was observed as a wildfire fuel in coastal California in Santa Cruz County during the 2008 Trabing Fire and, prior to that, the Oakland Hills Fire in 1991 (CAL FIRE and RCD 2018).

Recent vegetation management projects have been conducted to remove or thin eucalyptus within El Granada and Quarry Park. The El Granada Median Project was conducted in 2021 by San Mateo County Department of Public Works to remove and thin eucalyptus from the medians of Avenue Cabrillo and The Alameda. Beginning fall 2021 the RCD, in partnership with San Mateo County Parks, treated a shaded fuel break and conducted hazardous tree removal along fire roads within Quarry Park. In 2019, approximately 100 acres of fuel reduction work was conducted in the park by CAL FIRE as one of Governor Newsom's 35 high-priority projects to protect vulnerable communities through fuel reduction. Current conditions in locations where fuel reduction work has been completed in Quarry Park, very few herbaceous plants, shrubs, and vines occur, and the surface fuels are comprised almost entirely of eucalyptus leaf litter, woody material of various diameters, and some residue from mechanically treated eucalyptus.

Eucalyptus thinning on Avenue Cabrillo

The El Granada area has not experienced major wildfire (i.e., fire larger than 10 acres) in over 50 years (CAL FIRE and RCD 2018). The hiatus in fire has resulted in a build-up of vegetation and a departure from natural fire ecology.

2 Data Collection

2.1 Overview

The Project team collected spatial, quantitative, qualitative, and contextual data to build an understanding of fire history, fire conditions, and recent vegetation management projects. Data collection efforts included meetings with project partners and the community, outreach to large landowners, review of literature and datasets provided to the consultant team, and independent research.

2.2 Outreach and Coordination

The RCD and consultant team met with partner groups and the community to collect quantitative, qualitative, and contextual data to develop an understanding of recently completed, ongoing, and future activities that are being undertaken in and around El Granada to improve wildfire resiliency. The data collection meetings and topics discussed are summarized in Table 1. In addition to the data collection meetings held with partners, the RCD and consultant team met with partners throughout the development of the wildfire risk assessment to provide updates on the assessment progress and receive feedback on early modeling results (refer to Section 3.2 Qualitative and Contextual Analysis).

Table 1 Data Collection Meetings

Meeting Data/ Partner Groups	Topics Discussed
January 3, 2022 Coastside Fire Protection District Board of Directors CAL FIRE – San Mateo Division San Mateo County Fire Department	• Fire history • Past and planned projects • CAL FIRE hazard severity mapping • Scope and area of review • Tree removal permits • Funding for action implementation
January 10, 2022 San Mateo County Parks San Mateo County Board of Supervisors	• Past and planned projects • Available county data sets • Ways to effectively treat eucalyptus
January 10, 2022 Midcoast Community Council	• Modeling weather conditions/Diablo Winds • Evacuation for El Granada Blvd • Weed abatement program • Recent projects in Quarry Park and El Granada Road medians

Meeting Data/ Partner Groups	Topics Discussed
January 10, 2022 El Granada Blvd Residents	• Proximity of residences to Quarry Park tree canopy • Modeling software (IFTDSS) • Weather patterns and high winds/weather data • Potential ignition sources (e.g., fireworks) • Recent resident project • Funding opportunities • Evacuation planning questions • Defensible space/enforcement
January 25, 2022 Community Members	• Weather patterns/windstorms/recent January windstorm • Additional potential HVRAs • Insurance coverage/claims • Scarper Peak Federal Aviation Administration facility • Environmental impacts & compliance • SFPUC and GGNRA projects near El Granada • Indigenous perspective and recent vegetation work • Treatment of unoccupied lots • Potential ignition sources (e.g., fireworks, powerlines) • Evacuation • Tourism/temporary population increase
January 25, 2022 (Field Visit Meeting) CAL FIRE	• CAL FIRE vegetation management pilot program

On January 25, 2022, the RCD held a community listening session that was open to the public. The listening session was well attended, and community members provided contextual data related to a January 21, 2022 windstorm that knocked out power to parts of El Granada when two trees fell on powerlines. Community members also provided feedback on topics of fire preparedness, ignition sources, and identified high value resources and assets (HVRA) [2]. The main topics discussed in the community listening session are identified in Table 1.

CAL FIRE personnel met with the consultant team during field verification of vegetation conditions and verified the local weather stations to use for weather observations and weather station data to develop modeled weather scenarios. GGNRA staff were contacted to provide details of past and ongoing fuels treatments. GGNRA provided spatial data for recently treated areas to help inform the wildfire risk assessment modeling efforts.

[2] High value resources and assets (HVRA) are valued elements of the man-made and natural environment. The types of HVRAs included in this analysis are included in the table titled "Model Input Data" in Appendix A.

SFPUC staff were contacted to discuss the project due to the proximity of SFPUC land in relation to El Granada. SFPUC land is included in the fire modeling to determine likely fire pathways to the El Granada community. POST staff were contacted to discuss recommended project areas that overlap on POST lands (refer to Section 5).

2.3 Data

2.3.1 Qualitative and Contextual Data

Partners and members of the public provided literature and contextual data for consultant review. A full list of literature provided to the consultants is included in Appendix A. Qualitative and contextual data included identification of HVRAs in and near the community, accounts of potential ignition sources, and constraining factors that hinder creation of defensible space, fire response, or evacuation. Contextual and qualitative data was used to inform modeling and develop a set of additional action categories to consider for future wildfire resiliency efforts. Categories of contextual data include the following:

- Identification of HVRAs
- Ignition sources: fireworks in Quarry Park, powerlines, vehicles
- Diablo Winds and change in wind speeds at higher elevations
- Evacuation routes

The consultants reviewed literature for information that would inform the level of fire hazard to the El Granada area and techniques or considerations for fire risk reduction that have proven successful in other areas experiencing high fire danger. Documents provided by partner groups and the public are identified in Appendix A.

2.3.2 Spatial and Quantitative Data

Spatial and quantitative data within the study area were used to develop model inputs. In some cases, contextual data was used to develop and/or refine spatial and quantitative datasets. Examples of spatial and quantitative data are listed below. Specific spatial and quantitative data used to model wildfire risk to the El Granada area are identified in Appendix A.

- Location of HVRAs
- Wind speeds and direction
- Canopy conditions
- Vegetation types and density
- Ladder fuels
- Topography and slopes
- Recent vegetation treatment projects
- Land ownership

2.4 Field Visits

The consultant team conducted field visits in January and February 2022 to observe and verify field conditions within the study area. Field visits were conducted by personnel from Prometheus Fire Consulting and Panorama Environmental, Inc. The purpose of the field visits was to assess fuel types and fuel density in El Granada medians, Quarry Park, and surrounding wildlands to verify the fuel classifications used in the wildfire risk assessment models.

During the field visits, the consultant team observed areas where recent fuel reduction projects had been implemented, including the Governor's Quarry Park fuel reduction project, the Department of Public Works El Granada median vegetation removal project, the RCD's shaded fuel break and hazardous tree removal project along fire roads in Quarry Park, and CAL FIRE's pilot fire hazard abatement program to reduce fire hazard across 15 properties within El Granada. The consultant team also observed vegetation removal techniques on private properties that may decrease fire hazard but increase erosion or tree-fall hazards. In some cases, landowners removed vegetation to bare ground, which leaves the land destabilized and susceptible to erosion. In other cases, the consultant team observed extreme limbing and topping of trees, which pose significant risks to the community because trees can become highly unstable during periods when soils are saturated or in high wind events. These trees can result in access limitations if trees fall across roads.

3 Analysis

3.1 Summary of Wildfire Risk Assessment Modeling

Fire models are used to develop and test fire scenarios across a study area to create a level of certainty about fire behavior. Inputs in the fire model include the following variables:

- HVRAs
- Fuel moisture
- Weather
- Topography
- Fuel model information

Fire behavior models assist decisionmakers with determining the best application of finite resources (e.g., time, funding) to achieve a desired outcome. Vibrant Planet's team of foresters, forest ecologists, and spatial ecologists conducted a quantitative fire risk assessment of the wildlands surrounding El Granada to understand the pathways of fire entering the community of El Granada in the event of a wildfire, and to identify opportunities to mitigate this risk with the greatest treatment effectiveness. The risk assessment included computer-based, spatial modeling based on industry standards for developing wildfire hazards and risk assessments.

This section provides a summary of the wildfire risk assessment modeling process. Key data that was developed or refined in coordination with project partners to support the modeling process is described in the sections below. A detailed description of the modeling process is provided in Appendix C.

The wildfire risk assessment modeling process includes four steps, as summarized in Table 2. The model study area is presented in Figure 1. The modeling process does not include consideration for conditions outside of the study area.

Fire hazard risks were assessed within the study area using high-resolution LiDAR-derived land cover data and Remote Automatic Weather Stations (RAWS) records to provide the weather inputs. Integrated hazard was mapped to show locations where high fire intensity overlaps with high fire probability. Next, the HVRAs requiring protection were mapped and their response to fire was characterized. Wildfire risk was determined by evaluating where hazards occur near HVRAs.

Table 2 Steps of the Wildfire Risk Assessment Modeling Process

Step	Description
Step 1: Hazard Characterization	Characterized fire behavior based on modeling ignitions across the burnable landscape. This step included refining vegetation data based on recent vegetation management projects and developing weather scenarios to use during modeling.
Step 2. HVRA Identification and Characterization	Identified community assets such as structures, services, utilities, and other infrastructure of high importance and determined how each asset would respond to fire.
Step 3: Risk Analysis	Determined where wildfire hazard occurs near HVRAs. Areas of high risk were determined to occur where high hazard occurs near areas of dense HVRA (e.g., neighborhoods) or near HVRAs that respond poorly to fire (e.g., structures).
Step 4: Treatment Effectiveness	Identified vegetation management methods that could be implemented across the burnable landscape to reduce risk to HVRAs. Target conditions for each vegetation management method were defined to determine a reduction in fire intensity. Reduced intensity translates to reduced hazard and a reduction in risk when hazard is reduced near HVRA. The quantified reduction in risk is referred to as a "treatment effectiveness" value, which indicates how implementation of vegetation management methods may reduce the expected loss of built infrastructure and assets when exposed to wildfire exposure.

Likely vegetation management methods were identified using existing vegetation datasets, information about property ownership, structural vegetation characteristics, modeled fire risk, and estimated vegetation health conditions. These vegetation management methods were applied to the modeled landscape within the study area to determine areas of higher and lower treatment effectiveness. Treatment effectiveness is based upon how treatments may reduce fire intensity and the expected loss of built infrastructure and assets due to wildfire exposure inside the community.

Some variables, such as structure construction material, volume of stored combustible material, and the existing degree of home hardening within a community, are difficult to define across a large study area, resulting in reduced certainty of modeling results. To reduce the number of variables within the study area and increase confidence in modeling results, this analysis focuses on risk *to* the community from wildfire on surrounding wildlands and does not include ignition potential, structure-to-structure fire transmission, or fire pathways within the El Granada community.

3.2 Wildfire Risk Assessment Modeling Inputs

3.2.1 High Value Resources and Assets

Identification of HVRAs is an important component of the risk-assessment process and represent locations on the landscape that may warrant increased protection in the event of a wildfire. Identification was based upon spatial extent (complete and available datasets within the study area) and community/stakeholder input. HVRA are listed in Table 2 and shown on Figure 2. Scores were assigned to each HVRA based upon their relative importance to one another (Table 3) and response functions based on their likely response to wildfires of various intensity as expressed by flame length.

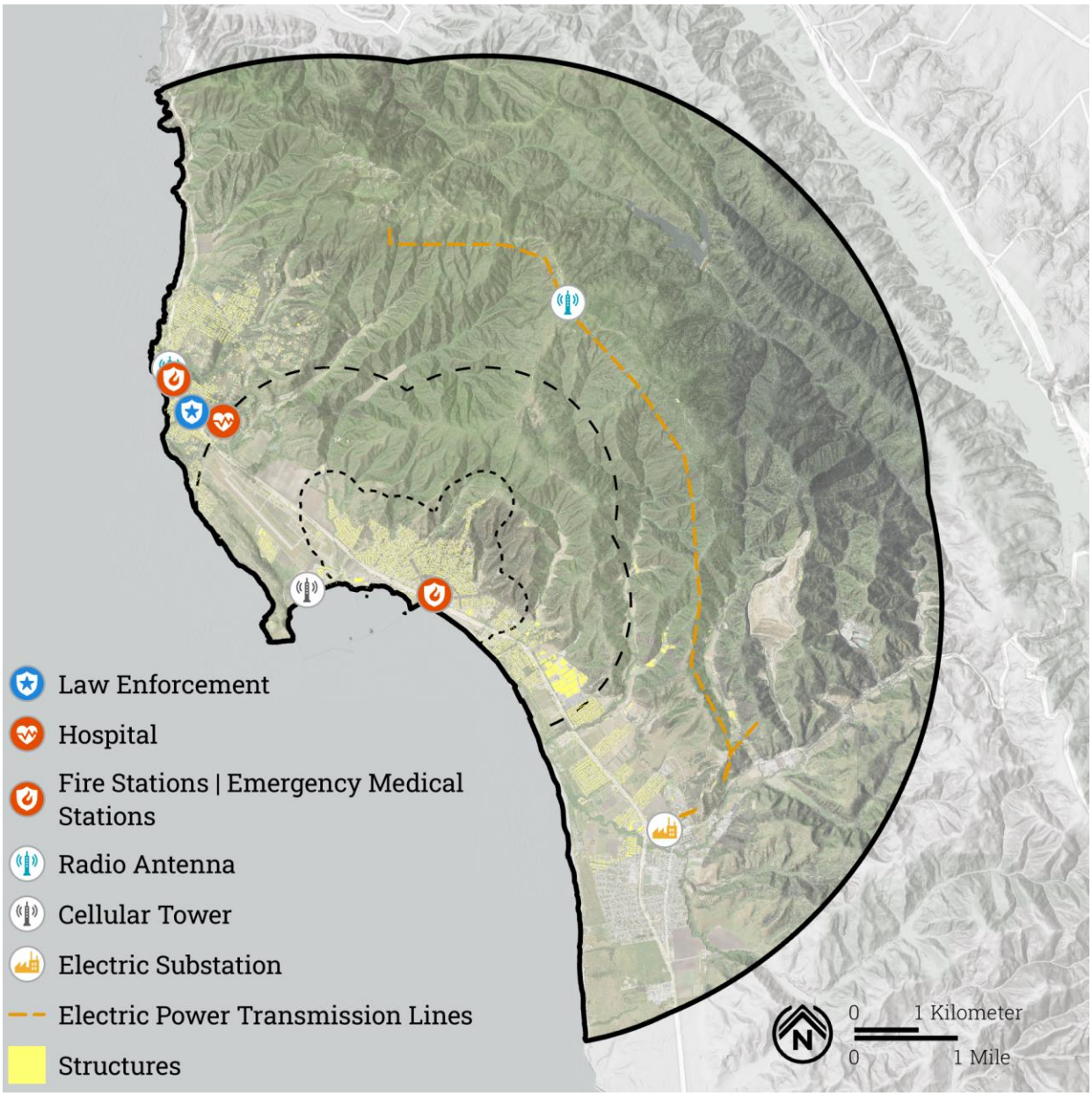
Table 3 HVRA and Relative Importance Score

High Value Resources and Assets	Score
Cellular Tower	3.5
Radio Antenna	3.5
Fire Stations | Emergency Medical Stations	4.5
Hospital	4.5
Law Enforcement	4.5
Structures greater than 500 sq ft	3
Structures less than 500 sq ft	2
Electric Substations	4
Electric Power Transmission Lines	4
Community Transmission Zone	3.8
Community Buffer	3.8

Source: (Vibrant Planet 2022b)

In addition to built infrastructure and assets that are categorized as HVRAs, two strategic areas were included. First, a community transmission zone-based upon community wildfire exposure. This data identifies sources of exposure, where high values indicate larger numbers of buildings exposed to wildfires igniting in that pixel and spreading to adjacent developed areas. Second, a community buffer around the main community within El Granada. These strategic areas were assigned scores based on the average of all other HVRAs assessed.

Figure 2 High Value Resources and Assets



3.2.2 Weather & Fuel Moisture

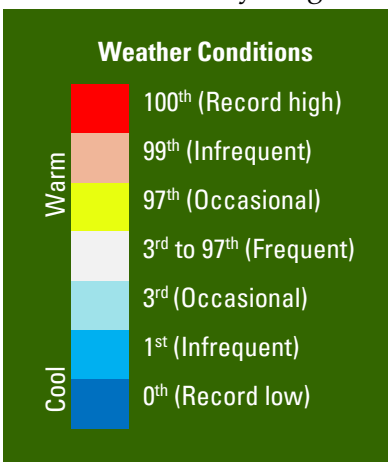
Weather information pertinent to the spread of wildfire was identified and gathered from historical observations and input from the community. LiDAR-derived datasets provided information on fuel characteristics and topography, while weather data from the Spring Valley RAWS station and the Half Moon Bay Airport Station, both within the study area, were used to inform fuel moisture values, wind speeds, and wind direction. RAWS allow the calculation of fuel moistures for 1-, 10-, and 100-hour fuels as well as herbaceous and live woody fuel moistures. Weather stations and conditions used for the analysis were carefully selected and reviewed by local CAL FIRE personnel.

Wind and fuel moisture information for Peak Fire and Diablo Wind conditions were determined using the Energy Release Component (ERC) composite fuel moisture index which considers live and dead fuel contribution to potential fire intensity. The ERC was computed using the Spring Valley RAWS and based on the 97th percentile statistics during the relevant period of interest for two fire weather scenarios:

1. Peak Fire Conditions - between July and October
2. Diablo Winds Extreme Fire Conditions - based on periods of northeasterly winds between August and November

The Peak Fire condition is based on the fire-modeling industry standard and is often referred to as the "97th percentile" weather condition which includes fuel moisture conditions, wind speed and direction, temperatures between the 97th and 100th percentile for data collected during fire season (July through October) between 1998 and 2022 (Vibrant Planet 2022b). Ignitions that occur during 97th percentile conditions would be expected to result in complex fires where an initial attack or fire control may often fail (IFTDSS 2022).

Modeling conditions at the 97th percentile fire weather is not intended to serve as an understanding of the very worst-case fire effects, but rather to determine how the current vegetation and fuels environment react to what is considered a threshold for problem fires. Choosing percentile weather removes subjectivity and thus bias as the calculation is run directly from the data. This process is objective and has become the industry standard for everything from determining national fire danger ratings to, as in this case, estimating risk from wildfire.



The 97th percentile captures everything from the 97th percentile and above (top 3 percent). If the wildfire risk assessment were modeled at the 98th or 99th percentile, it would be missing valuable information from the 97th percentile. The 98th and 99th percentile for weather conditions are less common, so limiting the data to only the uppermost extremes would be less reliable. By using the 97th percentile and above, this captures enough data of extreme weather conditions to provide more reliable input than just using the rare and uppermost most extreme weather conditions. The 97th percentile represents a realistic scenario of extreme weather conditions. Weather and fuel moisture conditions represented by the 97th percentile occur with enough frequency to have a reasonable likelihood of a wildfire ignition occurring during 97th percentile conditions. During El Granada's Peak Fire conditions, the wind direction trends from northwest, bringing maritime winds with speeds ranging from 2 to over 64 miles per hour with mean 10-minute speeds of 25 miles per hour (Vibrant Planet 2022a) (Figure 3).

Partners and the public expressed concern about Diablo Wind events and how these winds increase fire hazard within El Granada. The Diablo Wind condition was developed by extracting weather data from the Spring Valley Weather Station to create a dataset

representative of the dry, northeasterly Diablo Winds. During Diablo Wind conditions, winds bring hotter, drier inland air over the study area blowing from the northeast and range in speed from 2 to over 43 miles per hour, with mean 10-minute speeds of 18 miles per hour (Vibrant Planet 2022a) (Figure 3).

Peak Fire and Diablo Wind conditions were each modeled to simulate potential fire behavior and generate composite fire behavior conditions assessment.

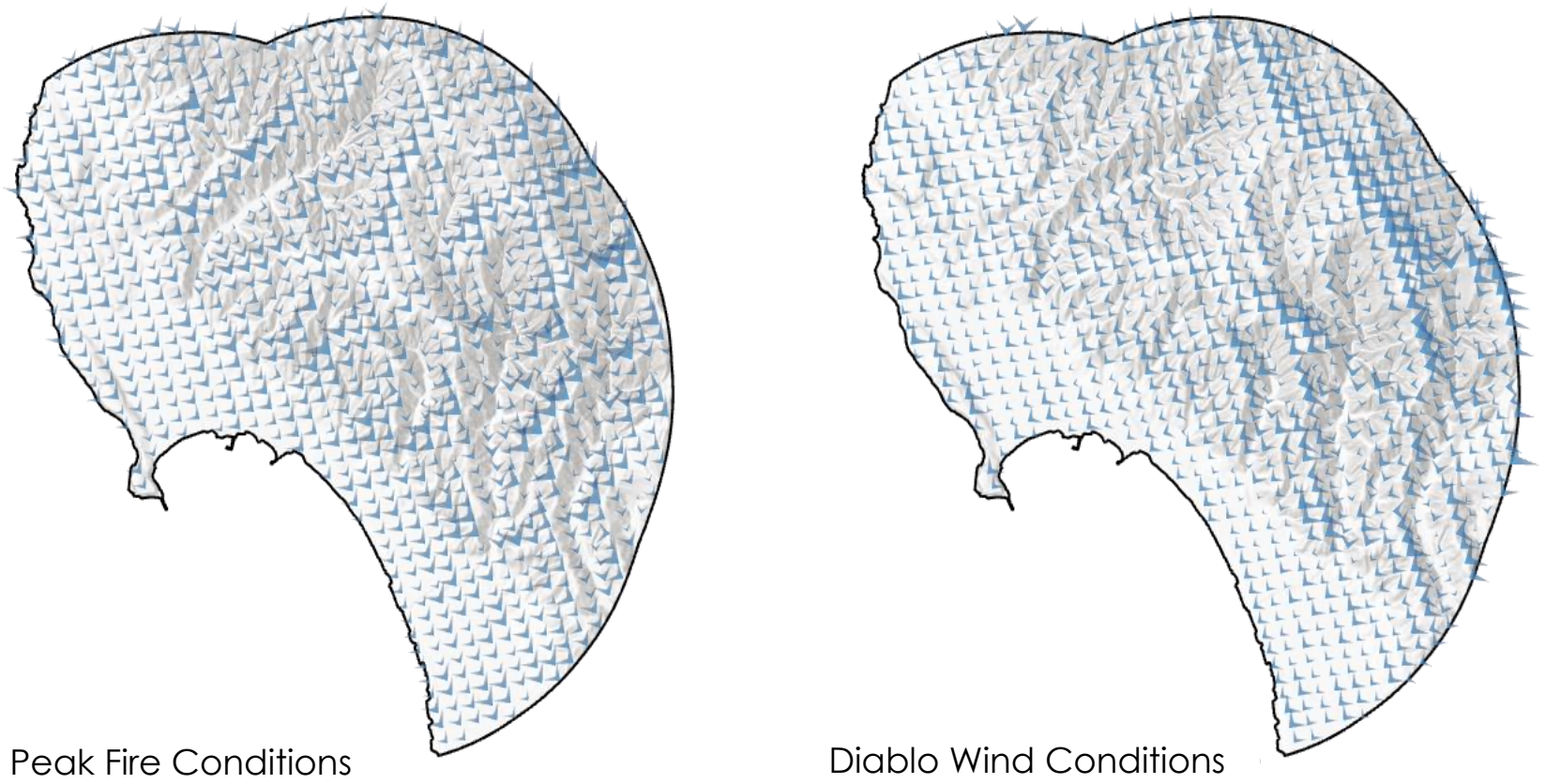
3.2.3 Geophysical/Vegetative Characteristics

Canopy and surface fuel conditions were derived from the 2021 San Mateo Countywide Fine Scale Vegetation Map and Landscape Database Project (Golden Gate National Parks Conservancy 2021). The fuel and landscape conditions in the Fine Scale Vegetation Map and Landscape Project represent conditions present when the data was collected in 2017 and 2018.

Canopy and surface fuel conditions were updated in areas where recent (i.e., since 2017) vegetation treatments occurred to reflect the change in fuel conditions. Additionally, areas dominated by eucalyptus were updated so that surface fuel models more accurately represented fuel conditions and likely fire behavior. In accordance with the San Mateo County Vegetation to Fuel Model Crosswalk Report recommendations, ground-truthing of the LiDAR-derived fine-scale vegetation assignments occurred during field visits in January and February 2022. Based on the field verification efforts, areas of dense, untreated eucalyptus were re-classified from TL6 (moderate load, broadleaf litter) to TU5 (very high load, dry climate timber shrub). Areas where eucalyptus had been treated recently were classified as TL6.

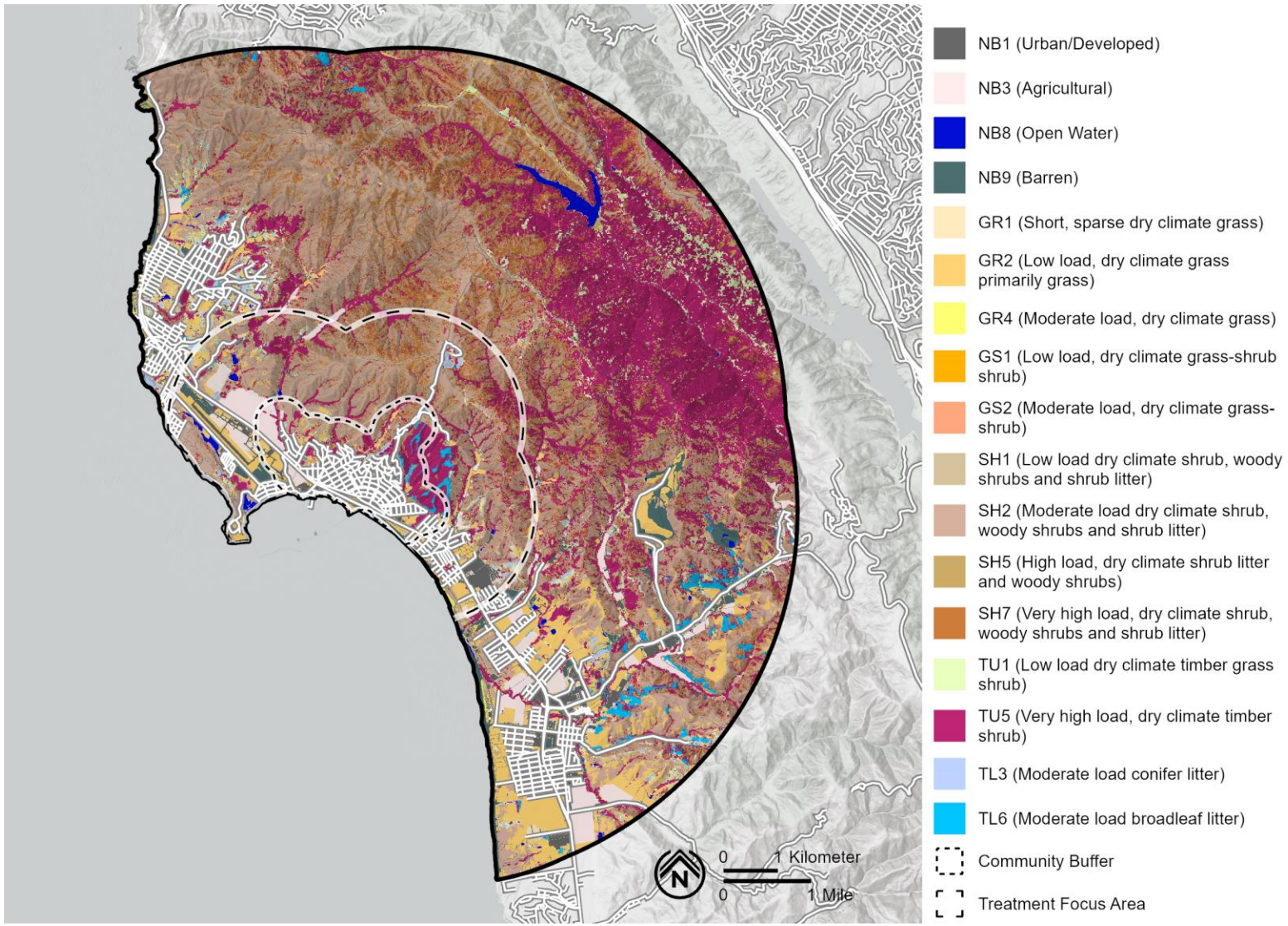
Fuel categories used during modeling are shown in Figure 4.

Figure 3 Peak Fire and Diablo Wind Conditions



Note: Wind vectors for Peak Fire conditions (left) and Diablo Winds extreme wind conditions (right). Vector arrows are scaled by size (relative wind speeds) and direction. Arrows point in the direction winds are blowing.

Figure 4 Fuel Classifications within the Study Area



Source: (Vibrant Planet 2022a)

3.3 Development of Recommended Project Areas

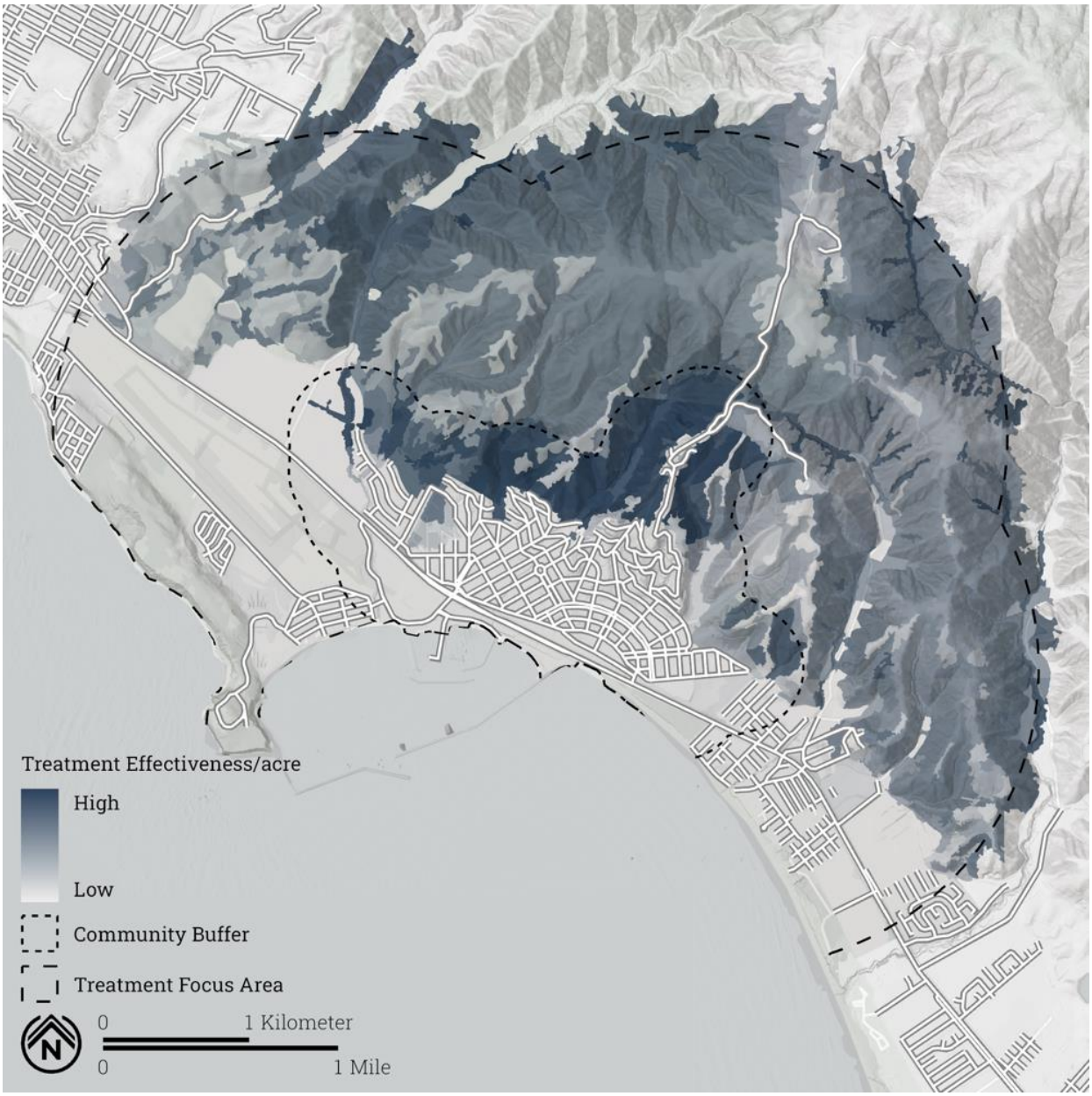
The wildfire risk assessment was conducted as a way of identifying risk and developing a suite of recommended projects to address the risk to El Granada. Vibrant Planet's wildfire risk assessment identified areas of high risk within a 2-mile radius around El Granada. Five vegetation management methods were applied across the burnable landscape based on site conditions, such as vegetation types, fuel loads, and topography. Vegetation management methods include grazing, hand thinning, mastication, ladder fuel removal, and canopy removal.

Each vegetation management method results in a modification of vegetation classes (e.g., ladder fuels, woody vegetation, stand height, canopy cover) on the landscape. A reduction in vegetation classes results in reduced fire intensity and, therefore, reduced risk if vegetation management occurs near HVRAs. The reduction in risk quantified between pre- and post-implementation of vegetation management methods is referred to in this analysis as the "treatment effectiveness" metric. Treatment effectiveness for the modeled vegetation management methods is shown in Figure 5. A higher treatment effectiveness value indicates greater reduction in risk to the community. Treatment effectiveness values were instrumental in developing the suite of recommended projects to effectively reduce wildfire risk to El Granada.

Project areas were identified by grouping adjacent segments based on the treatment effectiveness, subject to an overall size limit of approximately 200 acres. Grouping was achieved using a spatial optimization algorithm developed by Ager et al.[3] After initial grouping, segments of high treatment effectiveness that were not assigned to a project area were grouped to an adjacent project using a secondary algorithm. Not all landscape segments were included within projects. Segments of the landscape that exhibited low treatment effectiveness relative to other segments within the study area were not incorporated into a project area.

[3] https://www.firelab.org/project/national-scenario-planning-platform

Figure 5 Treatment Effectiveness for the Community Buffer and Treatment Focus Area



4 Key Findings

The wildfire risk assessment described in Section 3 of this report included simulation of 7,500 ignitions randomly distributed across the burnable landscape within the study area for two weather scenarios: Peak Fire and Diablo Wind. As a result of the simulated fire scenarios, over 99 percent of the burnable pixels experienced at least one simulated fire. Key findings identified through this community wildfire risk assessment are discussed below.

Finding 1: The most significant wildfire risk originates outside of El Granada.
Ignitions in the wildlands to the north of El Granada are more likely to generate fire intensity that leads to catastrophic wildfire reaching El Granada. Dense chaparral fuels and steep drainages, such as the Deer Creek Drainage northeast of El Granada Boulevard, pose the greatest risk to the community of El Granada. The wildfire risk assessment indicates that treatment of vegetation within the Deer Creek Drainage and around homes adjacent to the drainage and El Granada Boulevard will provide the most risk reduction to the community. Section 5 of this report identifies a recommended suite of actions to reduce risk to the community of El Granada. Recommended Project 1 has the highest treatment effectiveness, indicating that treatment of this area would provide the greatest reduction in risk to El Granada. Recommended Project 1 includes the Deer Creek Drainage and land adjacent to residences on the east and west sides of upper El Granada Boulevard. Implementation of recommended Project 1 would reduce the risk of wildfire spreading from Deer Creek Drainage into Quarry Park.

Finding 2: Burn probability and conditional flame length within the center of Quarry Park is low.
Modeling results indicated that the center of Quarry Park had a relative low burn probability and conditional flame length, even when exposed to ignitions within the park. The area was assigned a treatment of Large Tree Removal – Ladder Fuel Removal, consistent with neighboring segments within Quarry Park. The wildfire risk assessment predicted a low treatment effectiveness value, indicating that treatment within this area would be less effective in reducing fire risk to El Granada than treating other areas of the landscape. It is important to note that the modeling results indicate *relative* treatment effectiveness, meaning that treatments within the center of Quarry Park would have some effect on reducing wildfire risk, but the risk reduction would not be as great as treatments showing higher treatment effectiveness results.

Treatment effectiveness within the center of Quarry Park is anticipated to be lower than other areas as a result of topography, wind directions, recent treatments within the park, and proximity to HVRAs. Topography in the center of Quarry Park creates a west-facing bowl that protects vegetation from winds modeled in Peak Fire and Diablo Wind conditions. Recent

treatments within the park have reduced fuel connectivity from the center of the park and the areas adjacent to residences that surround the park.

Vegetation closer to homes poses more of a risk than vegetation further away. The proximity of vegetation to HVRA is factored into the risk assessment; therefore, treatments closer to homes and other HVRA have a higher treatment effectiveness. Because the center of Quarry Park is not adjacent to homes, the risk is lower for this area of the park and the treatment effectiveness is lower when compared to other areas within the study area.

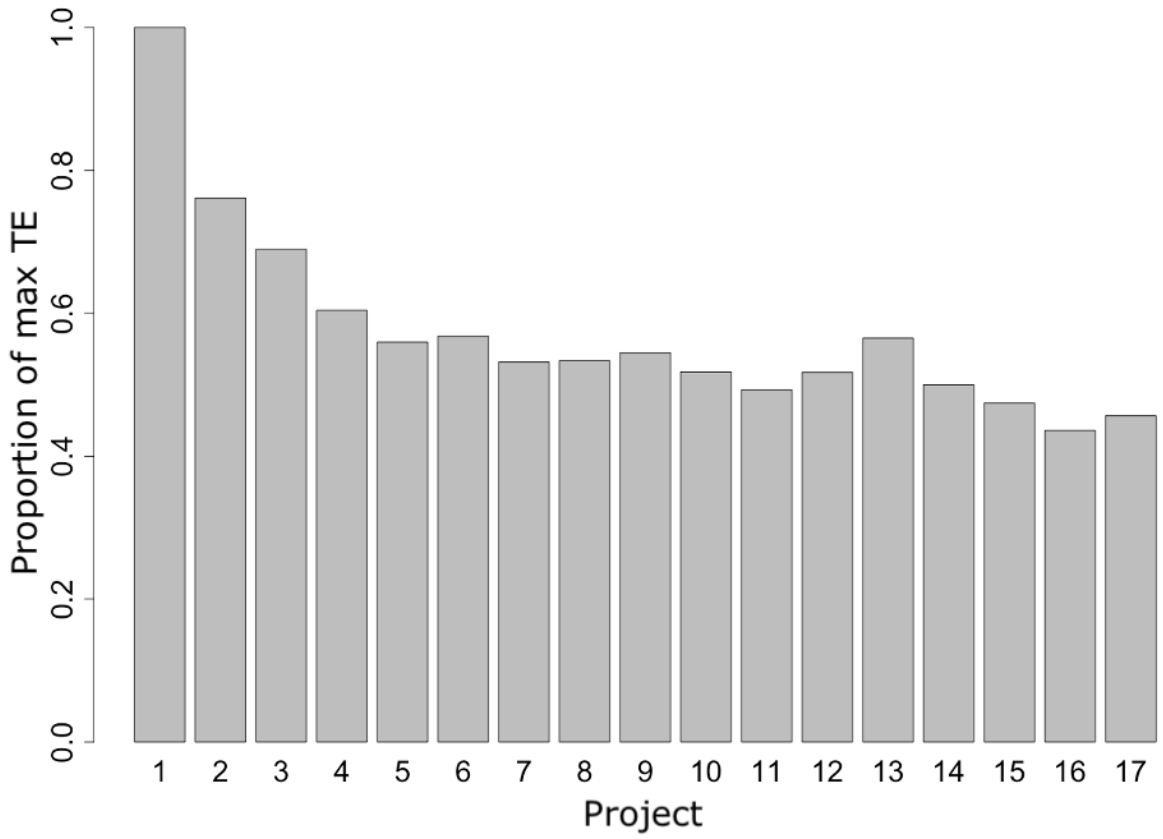
Finding 3: The Treatment Effectiveness for Projects 1-3 is substantially higher than for all other projects

Recommended projects were created without prioritization. Rather each project was developed by a computer algorithm that combined nearby segments of the landscape to create highly effective projects of approximately 200 acres in size. Areas with the highest treatment effectiveness scores occur along the community boundary where high intensity wildfire may approach the community. Recommended Project 1 has the highest treatment effectiveness score, indicating that implementing vegetation management methods in accordance with Project 1 would provide the highest reduction of wildfire risk to the community (Error! Reference source not found.). Projects 2 and 3 are both more effective in reducing wildfire risk than Projects 4 through 17.

This analysis shows that implementation of Projects 1, 2, and 3 would have the greatest effect on wildfire risk reduction for the community of El Granada. Implementation of Projects 4 through 17 have relatively consistent treatment effectiveness values. This means that several of the projects 4 through 17 could be interchanged with relatively low impact on the treatment effectiveness gain.

For example, Project 8, located to the northeast of the El Granada community in the Quarry Park area, does not show substantial reduction in treatment effectiveness compared with Project 5, located at the edge of the Study Area. While this modeling and spatial optimization process performs well for breaking up large landscapes into tractable project areas, it is recommended that land managers use evidence-based analysis alongside local knowledge, participant input, ground-truthing, and other site-specific criteria to define final project areas, treatment methods, and sequencing.

Figure 6 Comparison of Treatment Effectiveness across Projects



5 Recommended Actions

5.1 Overview

A total of five recommended potential vegetation management methods have been identified to reduce the risk of wildfire breaching the boundaries of the El Granada community (Table 4). Actions include a combination of vegetation management methods. Seventeen specific actions (individual projects) are identified as having the highest treatment effectiveness to reduce the risk of wildfire coming to the community of El Granada. These 17 actions are described in the sections that follow.

Table 4 identifies an estimated per-acre cost of implementing the treatment method. It is important to note that costs identified for each treatment method are based on current bids received from contractors on the San Francisco Peninsula and only include implementation activities. Site specific considerations such as challenging access or sensitive natural resources can increase costs. The cost estimates provided below do not include environmental compliance, project management, permitting, or post-project maintenance costs, which will increase the overall project cost.

Table 4 Vegetation Management Methods

Vegetation Management Method	Definition
Large tree removal – overstory removal/ create openings Estimated Cost per Acre: $8,000 - $10,400	Treatment is generally variable and is applied to mimic vegetation structure patterns that would exist in the areas intact disturbance regime and includes large opening creation of 1 to 4 acres, with no more than 25 percent of the stand in large openings. Treatment is typically focused on trees greater than 10 inches dbh. Dominant woody vegetation is affected by as much as 35 percent over the treatment area but can be affected as much as 100 percent in specific areas. Co-dominant woody vegetation is affected by as much as 50 percent; however, effects are also variably distributed. Overall canopy cover may be reduced by as much as 40 percent. This type of treatment could include, but is not limited to, fuel breaks.
Large tree removal – ladder fuel removal Estimated Cost per Acre: $5,000 - $6,500	Treatment is generally consistently and equally applied across an area and is focused on significantly reducing the effects of high intensity fire. Treatment is typically focused on trees greater than 10 inches dbh. Dominant woody vegetation is generally unaffected. Co-dominant woody vegetation is affected by as much as 25 percent; however, overall canopy cover remains intact. As much as 90 percent of subdominant woody vegetation is cut and removed. This type of treatment could include, but is not limited to, shaded fuel breaks, as overall canopy cover remains intact.

Vegetation Management Method	Definition
Hand thinning – chip or pile Estimated Cost per Acre: $16,000 - $20,800	Treatment is generally consistently and equally applied across an area and is focused on significantly reducing the effects of high intensity fire. Treatment is typically focused on trees less than 12 inches dbh. Dominant woody vegetation is generally unaffected. Co-dominant woody vegetation is affected by as much as 25 percent; however, overall canopy cover remains intact. As much as 90 percent of subdominant woody vegetation is cut and removed. Treatment will include chipping or piling of cut material. Follow-up burning of piled material may be required.
Rearrangement – mastication or mowing Estimated Cost per Acre: $5,500 - $7,150	Achieved primarily by wheeled or tracked masticators or mowers. Treatment is typically focused on trees less than 12 inches dbh and shrubs or other vegetation in the understory. Treatment is generally applied consistently and equally across an area and is focused on significantly reducing fine fuels and ladder fuels and on reducing canopy bulk density, which decrease a fire's rate of spread, the potential for crown initiation, and the ability for sustained crown fire. Dominant woody vegetation is generally unaffected. As much as 90 percent of subdominant woody vegetation is affected through rearrangement. Rearranged material is left on site.
Grazing Estimated Cost per Acre: $750 - $975	Predominantly achieved by goats that are used for fuel reduction and are confined to a specific area (< 5 acres) for a considerable amount of time. Goat grazing helps reduce fine fuels and a fire's rate of spread as well as some ladder fuel reduction and subsequent flame lengths. Shorter woody vegetation can be affected by as much as 50 percent. Palatable herbaceous vegetation is significantly affected, by 90 percent to 100 percent.

5.2 Vegetation Management Projects

The fire risk assessment modeling identified a total of 17 recommended individual projects within the treatment area, as illustrated in Figure 7 and described in the action cards in Appendix D. Vegetation treatment projects are approximately 200 acres in size and include a variety of vegetation management methods. Each action card includes the action metrics presented in Table 5 and a description of the action, environmental review requirements, and maintenance/reoccurrence considerations.

Figure 7 Recommended Vegetation Management Projects

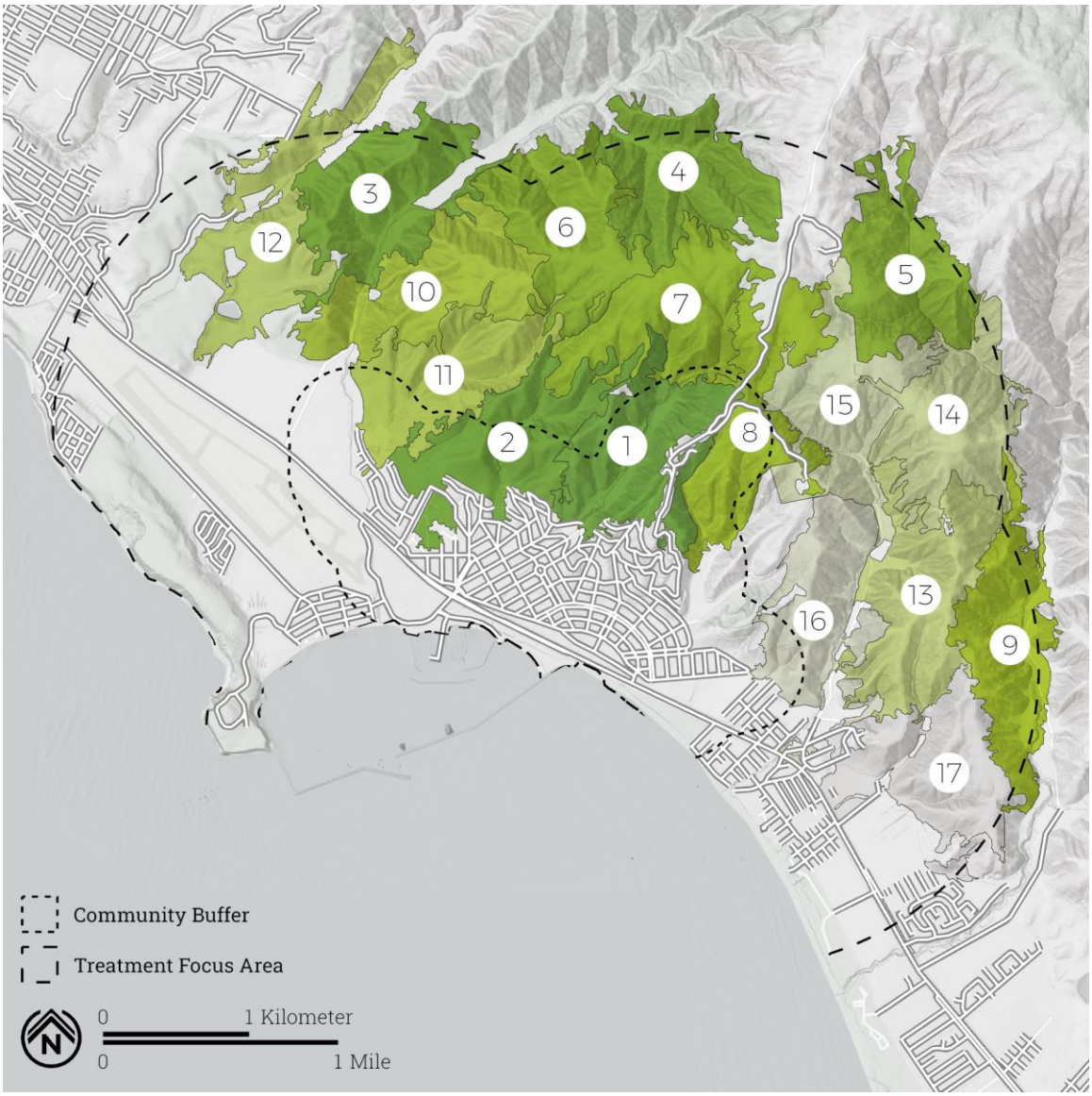


Table 5 Vegetation Management Action Metrics

Metric	Definition
Treatment effectiveness	The treatment effectiveness value describes the risk reduction that is provided by the treatment. The treatment effectiveness is calculated for each treated segment of the landscape. The treatment effectiveness for each segment within a project is added together to calculate an overall project treatment effectiveness value. Higher treatment effectiveness values indicate a higher degree of risk reduction resulting from project implementation.
Cost	Estimated cost to implement the vegetation treatment. The estimated cost does not include all project planning and maintenance costs. Costs associated with project definition, environmental review, permitting, and maintenance should be considered
Acres	Number of acres that are included within the footprint of each project area
Land ownership	Landowners within the project area
Responsible party	Identified if a responsible party can be determined based on land ownership.

Treatment methods selected within this report are considered likely and are not indented to be mutually exclusive. Is likely that multiple or different treatments may occur within any project area. The treatments highlighted within this report were used to determine the treatment effectiveness value by analyzing how management may affect fire behavior post treatment based on the treatment method that was selected. Due to the complexity of selecting multiple combinations of treatments the treatment effectiveness was evaluated using only the selected treatment for each segment.

All treatment areas should be ground verified prior to any implementation and the treatments identified should be considered as recommended treatments for planning purposes only. Other factors such as site access, micro topographic limitations, archaeological or sensitive species should be evaluated and may affect treatment opportunities.

Action cards in Appendix D identify the likely environmental review requirements for each project. Environmental review considerations include compliance with the National Environmental Policy Act (NEPA) for actions on federal lands and California Environmental Quality Act (CEQA) for actions on state or private lands. Anticipated NEPA and CEQA compliance requirements identified in the action cards are based predominantly on landownership; however, project funding sources, regulatory permits, or other discretionary approvals from State or federal agencies, could trigger additional environmental review requirements. Project development and planning efforts should include consideration of site surveys for environmental resources and preparation of environmental review documentation.

In some cases, project boundary modification may be considered to avoid potential impacts to resources and/or to expedite the environmental review process.

The California Vegetation Treatment Program (CalVTP), developed by the Board of Forestry and Fire Protection, identifies areas of treatable landscape across California (Board of Forestry and Fire Protection 2022). The CalVTP Programmatic Environmental Impact Report (Programmatic EIR) was prepared to analyze environmental effects of vegetation management projects and expedite the implementation of vegetation treatments to reduce wildfire risk while conserving natural resources. Action cards included in Appendix D identify applicability of the CalVTP to streamline environmental review for projects that occur within the Programmatic EIR coverage area. A Project Specific Analysis should be prepared using the CalVTP Project Specific Analysis template to ensure proposed actions qualify for CalVTP coverage.

5.3 Implementation of Recommendations

Identification of the actions listed in Table 4 is intended to provide the planning framework for project implementation. Additional project planning efforts related to project funding, definition, environmental review, and permitting will be required prior to mobilizing crew and equipment for vegetation management.

A key component to project implementation will be ground verification of vegetation conditions within project areas at the time that project planning occurs. Fuel conditions within project areas may change over time and recommended vegetation treatments must be ground-verified against the intended treatment area to ensure feasibility and effectiveness of the recommended treatment at the time of treatment. Consideration for riparian corridors, habitat features, very steep terrain, and access limitations, may all modify the final treatable acreage.

Vegetation management projects (Figure 7) were developed based on modeled treatment effectiveness. On this account, project boundaries do not take land ownership into consideration. The project planning and implementation phase will require coordination with landowners, and achieving project implementation may involve combining projects or modifying project boundaries based on land ownership, agency jurisdiction, and funding.

Long term vegetation maintenance should be a consideration when planning vegetation treatments. Treatment intensity, proximity to structures, access and vegetation types are considerations that may affect any long-term vegetation maintenance program. Maintenance considerations for each project have been identified on the action cards included in Appendix D. It is recommended that, if feasible, annual inspections by a trained professional occur post treatment specifically focused on reoccurring maintenance.

5.4 Related Actions

In addition to the vegetation management methods that are recommended as part of this project, property owners and community members can improve their resiliency to wildfire by

following the guidance and recommendations of CAL FIRE, Office of the State Fire Marshall, the California Office of Emergency Services, the California FireSafe Council, and the Coastside Fire Protection District. These groups identify the need for and provide specific recommendations regarding home hardening and defensible space as summarized below.

There are three ways homes and structures can be exposed to wildfire: direct flames from a wildfire or burning neighboring home; radiant heat from nearby burning plants or structures; and flying embers.

Flying embers from a wildfire can destroy homes up to a mile away and are responsible for the destruction of most homes during a wildfire. For this reason, home hardening is recommended for all homes in El Granada.

Home hardening addresses the most vulnerable components of homes and structures with building materials and installation techniques that increase resistance to heat, flames, and embers that accompany most wildfires. Embers can accumulate on decks and porches or be forced into roof gaps or vents and ignite plants, leaves, fencing, or furniture. The top three home hardening priorities for all homes include roofs, fences, and near-home vegetation (California FireSafe Council 2019). All homeowners in El Granada are recommended to consider the following home hardening guidelines:

1. Avoid combustible materials on the property, especially within the first 5 feet of the home.
2. Incorporate fire- and ember-resistant construction materials, installation details, and maintenance.
3. Be thoughtful about landscaping choices and maintenance.

Defensible space is defined as the careful selection, location and maintenance of vegetation and other combustible materials on and around your property. The purpose of defensible space is to:

- Minimize the pathways of wildfire that can burn directly to homes and structures;
- Reduce radiant heat exposures to the home and structures;
- Reduce the potential for embers to ignite vegetation adjacent to homes and structures; and
- Provide a safe place for fire personnel to defend homes and structures and allow for safe routes for evacuation.

The Wildfire Home Retrofit Guide provides recommendations for hardening structures and creating defensible space. The Wildfire Home Retrofit Guide is available online: http://www.readyforwildfire.org/wp-content/uploads/Wildfire_Home_Retrfit_Guide-1.26.21.pdf

There are two Alert Wildfire cameras currently in place to verify and monitor fires in the El Granada region. One is at Pillar Point Harbor and one is on Montara Mountain. These cameras

are controlled by CAL FIRE's local Emergency Command Center (ECC), allowing first responders and the public to view current fire activity.

Future considerations to improve modeling of fire behavior could include installation of a local RAWS[4]. A local RAWS within or in closer proximity to the El Granada community would collect weather data that can be used for future location-specific fire modeling activities and help inform early fire response. Due to the topography of the study area, weather conditions vary greatly from the Half Moon Bay Airport weather station, near sea level, and the Spring Valley weather station, located 690 feet above sea level. A RAWS located in El Granada, near the top of El Granada Boulevard, would provide more accurate wind speeds and direction, humidity, and fuel moisture levels to be used in future wildfire modeling efforts.

[4] Remote Automatic Weather Station

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Appendix A – Data Sources

APPENDIX A

Model Input Data

Data category	Data name/source	How data Is used in the model
Fuel and landscape conditions	Projects of recent completion or future planning 1. Quarry Park Completed vegetation treatments 2. El Granada Medians 3. CAL FIRE Pilot Project	Update fuel models to reflect conditions since June 2018 LiDar, which fuel models will be based on
	Fine-scale vegetation map	Calculate majority cover type (i.e., woody vs. not woody), calculate percent cover of woody, shrubs, standing dead, and tree cover and identify different National Vegetation Classification (NVCS) map classes. Vegetation classes within the study area were refined based on field verification site visits. Fuel conditions within Quarry Park were modified to reflect dense fuel loads in areas that had not been treated as part of recent vegetation management efforts.
	San Mateo County Vegetation Map Data	Segmentation and attribution to identify similar ecological units
	San Mateo Canopy Height Model	Attribution to determine treatments as well as the potential to assign value, risk
	San Mateo Canopy Closure	Attribution to determine treatments as well as the potential to assign value, risk
	San Mateo Raw Ladder Fuels	Attribution to determine treatments as well as the potential to assign value, risk
	SanMateoCounty_Imagery2018	Viewing, QA/QC, maps, communication
	San Mateo County 5-meter Fuel Model	Segmentation of landscape using fuel conditions; used in Fire Hazard modeling, attribution
	National Weather Service Hazard and Weather District Viewer 4. Spring Valley Station 5. Half Moon Bay Airport Station	Develop site-specific weather conditions for the 97th percentile conditions and Diablo Wind conditions
	Windy.com	
Treatment opportunities	Fine-scale vegetation map, invasive plant layer	Identify opportunities to treat invasive species

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Data category	Data name/source	How data Is used in the model
Land ownership	Publicly Available Dataset (USGS Protected Lands)	Allows for potential segmentation of treatments on private versus public land
Topography	Countywide 1-foot LiDar-derived contours	Average percent slope of segmented units will be used for assigning treatment opportunities.
High Value Resources/Assets (HVRA)	**Built Environment** • Structures ≥ 500 sq. ft. • Roads (including evacuation routes) • Cell towers • Radio antennae • Emergency services (police, fire, medical) • Evacuation centers • Substations • Power plants • Transmission and distribution lines • Water and wastewater treatment facilities • Water tanks • Stream gauges • Weather stations • Reservoirs/Dams • Expected buildings affected Sources include Microsoft Building Layer; and HIFLD* database; California Data Exchange Center; Western Regional Climate Center; National Inventory of Dams; EPA Air Quality; Caltrans Roads Data (identifies treatment based on asset presence)	Identify risk to community resources/assets and develop treatment based on asset presence

APPENDIX A

Table 2 Documents and Other Information Sources Provided by Partners and Public

Document Title	Author	Citation
Santa Cruz County San Mateo County Community Wildfire Protection Plan (CWPP)	CALFIRE, San Mateo – Santa Cruz Unit (CAL FIRE) The Resource Conservation District for San Mateo County and Santa Cruz County (RCD)	(CAL FIRE and RCD 2018)
Vegetation Management Committee Action Plan	CAL FIRE and the Coastside Fire Protection District	(CAL FIRE and the Coastside Fire Protection District 2021)
Vegetation Management Committee	Coastside Fire Protection District	(Coastside Fire Protection District 2021)
Report on Unimproved Parcels with Unmitigated Flammable Vegetation in the High Fire Hazard Severity Areas of the District	Gary Silva	(Silva 2021)
Why Ferguson Fire Didn't Destroy Yosemite West	John Mock, Ph.D. and Kimberley O'Neil	(Mock and O'Neil 2019)
A Wildfire Assessment Report for Beverly Hills	David Shew and J. Lopez	(Shew and Lopez 2021)
County of San Mateo Routine Maintenance Program. Final Environmental Impact Report	County of San Mateo	(County of San Mateo 2020)
Wildfire Fuel Management Program	County of San Mateo Board of Supervisors	(County of San Mateo Board of Supervisors 2021)
Midcoast Community Council Wildfire Issues and Status	Midcoast Community Council	(Midcoast Community Council 2022)
Wildfire in the Midcoast	Midcoast Community Council	(Midcoast Community Council n.d.)
El Granada Residents Input to the RCD El Granada Wildfire Resiliency Consultant	El Granada Residents	(El Granada Residents 2021a)
Regional Prioritization Plan Outline	San Mateo Resource Conservation District	(RCD 2021)
San Mateo County Parks Department. Wildfire Fuel Management Program 2021–2026 Projects	San Mateo County Parks Department	(San Mateo County Parks Department 2021)
San Mateo County Board of Supervisors Quarry Park Threat Petition	El Granada Residents	(El Granada Residents 2021b)

Quarry Park Eucalyptus Canopy Fire. An El Granada Tragedy?	Keith Mangold	(Mangold 2021)
Half Moon Bay Review: Grassroots Effort Focuses on Potential for Canopy Fire	Clay Lambert	(Lambert 2021)
Tree Permit Exemption Request Due to Current Fire Hazard Conditions	Ian Larkin	(Larkin 2021)
Press Release: As Wildfire Threat Grows, Property Owners Get Green Light to Remove Certain Trees	County of San Mateo	(County of San Mateo 2021)
Important Notice Regarding Permit Exemption for Tree Removal	County of San Mateo Planning and Building	(County of San Mateo Planning and Building 2021b)
Consider for Approval a Resolution Declaring Seasonal Weeds a Public Nuisance	Coastside Fire Protection District	(Coastside Fire Protection District 2021b)
California Fire Protection District Law of 1987	Fire Department Administrative Services	(Fire Department Administrative Services 1987)
Report on Unimproved Parcels with Unmitigated Flammable Vegetation in the High Fire Hazard Severity Areas of the District	Gary Silva, Fire Marshal	(Silva 2021)
Email Exchange Re: "Permit Exemption for Hazardous Trees - Effective July 1, 2021, to July 1, 2022"	Gregg Dieguez	(Dieguez 2021a)
Dieguez Summary of Wildfire Issues MidCoast	Gregg Dieguez	(Dieguez 2021b)
Email Exchange Re: "NWS weather station data elevation to El Granada and Quarry Park"	Karen Allanson	(Allanson 2022)
Golden Gate National Recreation Area Fire Management Plan	GGNRA	(GGNRA 2008)
2021 San Francisco Public Utilities Commission Wildfire Mitigation Plan	SFPUC	(SFPUC 2020)
San Francisco Public Utilities Commission Wildfire Mitigation Plan 2021 Informational Release; Responses to Wildfire Safety Advisory Board's 2021 Guidance Advisory Opinion	SFPUC	(SFPUC 2021)

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FEMA Mobile App and Text Messages (web page)	FEMA	(FEMA 2022a)
Ordinance No. 2019-03	Coastside Fire Protection District	(Coastside Fire Protection District 2019)
Weed and Rubbish Abatement Program	Coastside Fire Protection District	(Coastside Fire Protection District 2021c)
El Granada Eucalyptus Tree Removal Project (for MCC, KV, 2021-06-07)	County of San Mateo	(County of San Mateo 2021a)
Petition to Focus on the High Fire Risk Zones and Preserve Tree Medians of El Granada	El Granada Advocates	(El Granada Advocates 2022)

Appendix B – Additional Action Categories for Future Investigation

Additional Action Categories for Future Investigation

Some emerging action categories were identified as a result of Partner meetings and literature review but not developed into actions under this scope of work. Action categories were developed based on contextual data obtained through Partner meetings, the Community Listening Session, and reviewing literature that identified actions similar to those identified below, which may also benefit the El Granada community. Some of the emerging action ideas may already be implemented at some level within the community; however, based on contextual data and community discussions, the fire threat still exists.

Emerging Action Categories

Category	Emphasis	Examples
Vegetation management	Prescribed fire as maintenance tool	Prescribed burning could be considered in some areas of the landscape for future implementation to maintain natural fire ecology and reduce vegetation build-up. Additional modeling and investigation into appropriate areas is recommended.
Structure protection/ defensible space creation	Community support services	Chipping program expansion, permanent hazardous tree permit exemption, tree removal rebate program
Critical access and public infrastructure improvements	Pre-attack planning	Safe refuge areas, fire staging areas
	Emergency access	Maintain access on El Granada Blvd. (e.g., vegetation setbacks, parking restrictions)
	Infrastructure improvements	Underground utilities
Fire safety education	Reduce ignition potential in Quarry Park	Informational signage and kiosks in Quarry Park; neighborhood watch
	Diablo Wind events	Flyers, signage, social media
Services and procurement	Living/interactive risk model	Fire modeling after action implementation
	People and equipment	Staff positions, aging equipment replacement

Appendix C –Wildfire Risk Assessment Modeling

Wildfire Risk Assessment Modeling Process

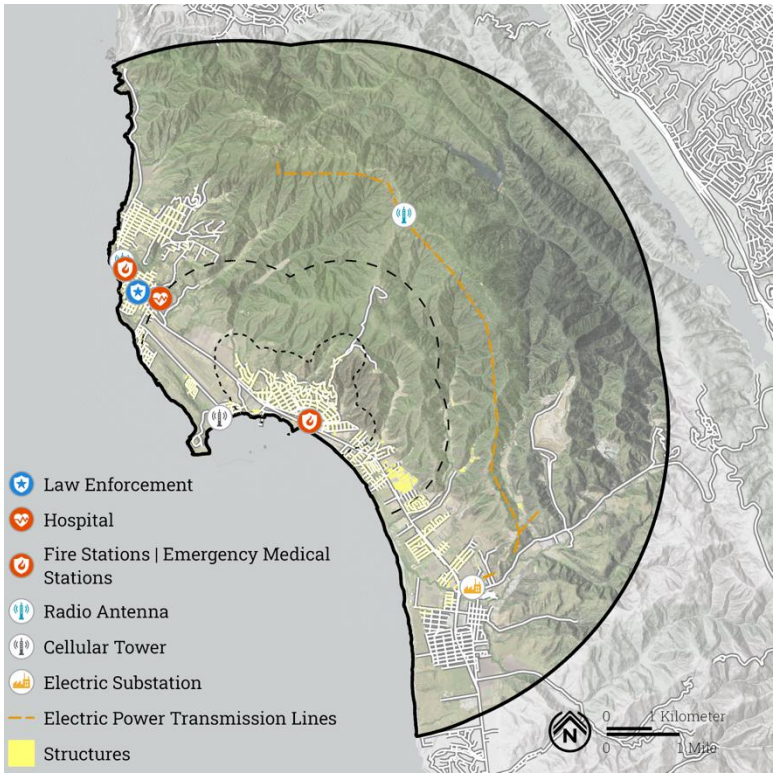


Figure 1. High value resources and assets (HVRAs) included in the analysis.

High Value Resources & Assets

High value resources and assets (HVRAs) were identified based upon spatial extent (complete and available datasets within the study area) and community/stakeholder input. Scores were assigned to each HVRA based upon their relative importance to one another (**Table 1**) and response functions based on their likely response to wildfires of various intensity as expressed by flame length (**Table 2**).

Table 1. HVRA and relative importance score.

High Value Resources and Assets	Score
Tower	3.5
Radio Antenna Cellular	3.5
Fire Stations | Emergency Medical Stations	4.5
Hospital	4.5
Law Enforcement	4.5
Structures greater than 500 sq ft	3
Structures less than 500 sq ft	2
Electric Substations	4
Electric Power Transmission Lines	4
Community Transmission Zone	3.8
Community Buffer	3.8

In addition to built infrastructure and assets that are categorized as HVRAs, two strategic areas were included. First, a community transmission zone-based upon community wildfire exposure.[1] This data identifies sources of exposure, where high values indicate larger numbers of buildings exposed to wildfires igniting in that pixel and spreading to adjacent developed areas. Second, a community buffer around the main community within El Granada. These strategic areas were assigned scores based on the average of all other HVRAs assessed.

Table 2. Impact of fire intensity (flame length) on HRVAs. Response functions dictate the potential loss due to fire intensity, varying between 0, 33%, 66%, and 99% loss (0, -1, -2, -3, respectively).

Flame Length (ft)	Other Structures (< 500 sq ft)	Structures (≥ 500 sq ft)	Energy Facilities	Electric lines	Communications Infrastructure	Emergency Service Facilities
0	0	0	0	0	0	0
<2 (non-zero)	-1	-1	-1	-1	-1	-1
2-4	-1	-1	-1	-1	-1	-1
4-6	-2	-2	-2	-2	-2	-2
6-8	-2	-2	-2	-2	-2	-2
8-12	-3	-3	-3	-3	-3	-3
> 12	-3	-3	-3	-3	-3	-3

Fire Modeling

Fire simulations using FlamMap v6.1[2] require four key inputs:

1. fuel moisture
2. weather
3. topography
4. fuel model information

[2] https://www.firelab.org/project/flammap

Weather & Fuel Moisture

Weather information pertinent to the spread of wildfire was identified and gathered from historical observations and input from the community.

LiDAR-derived datasets provided information on fuel characteristics and topography. Weather data from the Spring Valley RAWS station and the Half Moon Bay Airport Station (**Figure 2**) were used to calculate fuel moistures for 1-, 10-, and 100-hour fuels as well as herbaceous and live woody fuel moistures. Weather stations and conditions used for the analysis were reviewed by local CalFire personal. The fire weather data was summarized using FireFamily+ v5.0[3] after being assessed for data quality.[4] Data were generally available from 1998 to 2022, however there were several gaps present from maintenance, damage or other factors that would cause weather observation recording to go offline for periods of time (**Figure 3**).

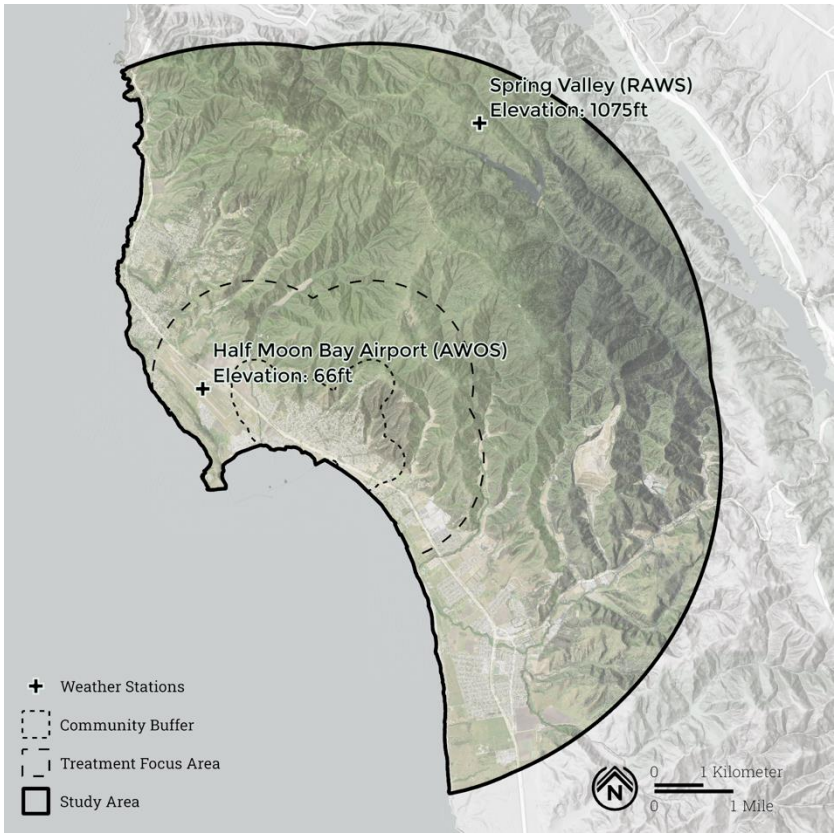


Figure 2. Location of weather stations used for determining fire modeling conditions.

[3] https://www.firelab.org/project/firefamilyplus, https://www.fs.fed.us/rm/pubs/rmrs_gtr067.pdf

[4] https://cefa.dri.edu/Publications/qcreport.pdf

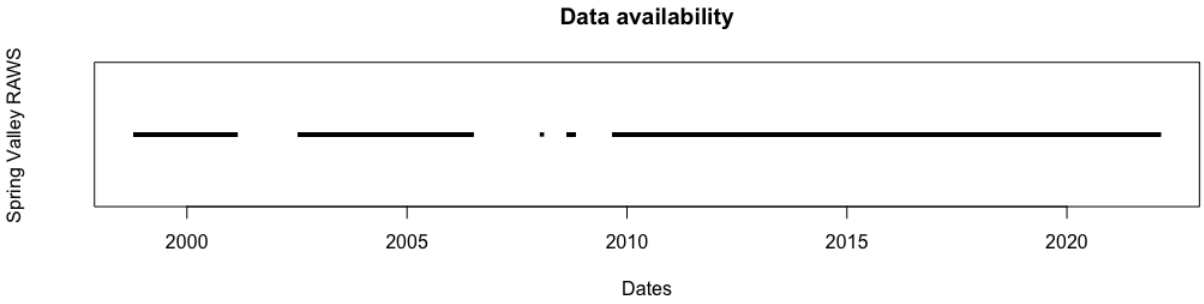


Figure 3. Spring Valley RAWS data availability summary.

Wind and fuel moisture information for Peak and Diablo conditions (**Table 3**) were determined using the Energy Release Component (ERC) composite fuel moisture index which considers live and dead fuel contribution to potential fire intensity. The ERC was computed using the Spring Valley RAWS and based on the 97th percentile[5] statistics during the relevant period of interest for two fire weather scenarios:

1. Peak Fire Conditions - between July and October
2. Diablo Extreme Fire Conditions - based on periods of northeasterly winds between August and November

Along with the wind data, these weather variables serve as weather inputs to FlamMap, the program used to simulate potential fire behavior.

Table 3. Weather and fuel parameters used for Peak Fire Conditions and Extreme Diablo Wind Conditions scenarios in FlamMap.

Parameter	Peak Fire Conditions Scenario	Extreme Diablo Wind Conditions Scenario
1-hour fuel moisture	3 %	3 %
10-hour fuel moisture	4 %	4 %
100-hour fuel moisture	9 %	9 %
Herbaceous fuel moisture	3 %	3 %
Live wood fuel moisture	60 %	60 %
Wind speed	26 mph	36 mph

[5] https://iftdss.firenet.gov/firenetHelp/help/pageHelp/content/30-tasks/summaries/auto97summary.htm

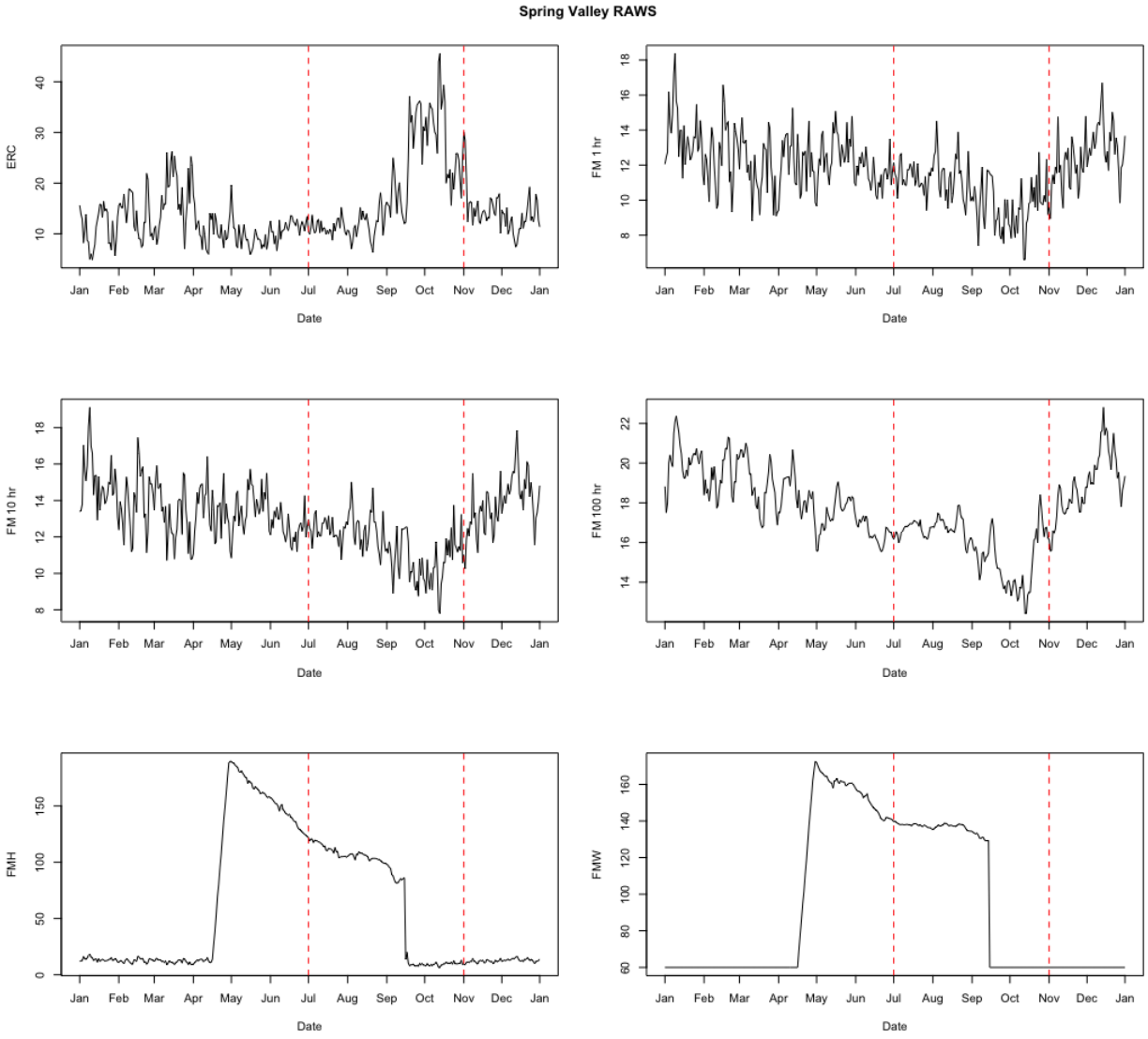
Wind direction	320°	47°

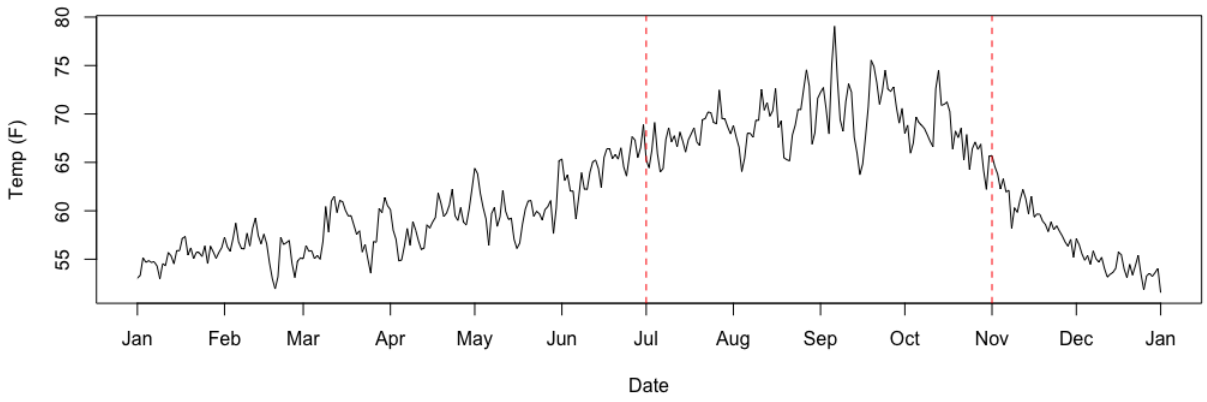
The reported 10-minute wind speeds were converted to 1-minute averages[6] and 97th percentile,[7] or "worst-case scenario" speeds and directions were identified (**Table 3**).

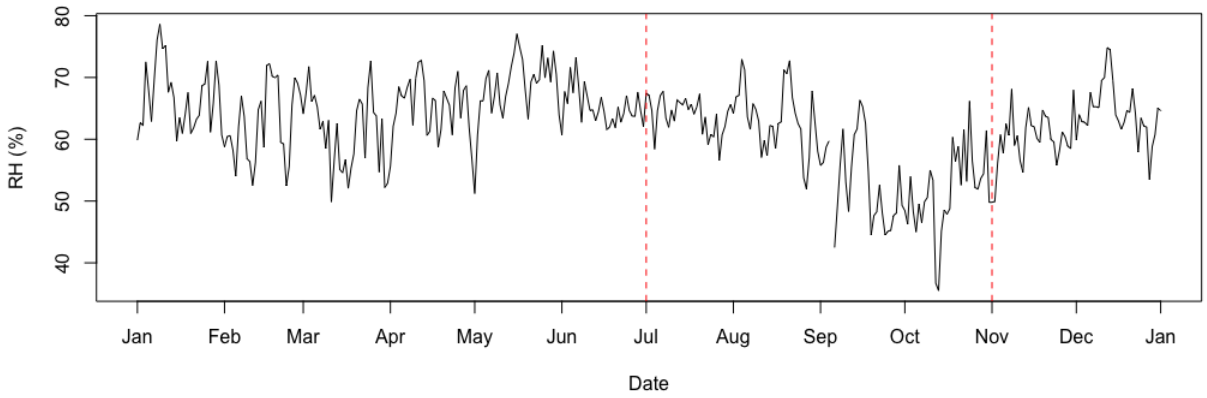
[6] https://www.fs.usda.gov/sites/default/files/legacy_files/fire-management-today/64-1.pdf
[7] https://iftdss.firenet.gov/firenetHelp/help/pageHelp/content/30-tasks/summaries/auto97summary.htm

Weather Stations

Spring Valley RAWS




Temp (F)
55
60
65
70
75
80
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Date


RH (%)
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50
60
70
80
Jan
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Apr
May
Jun
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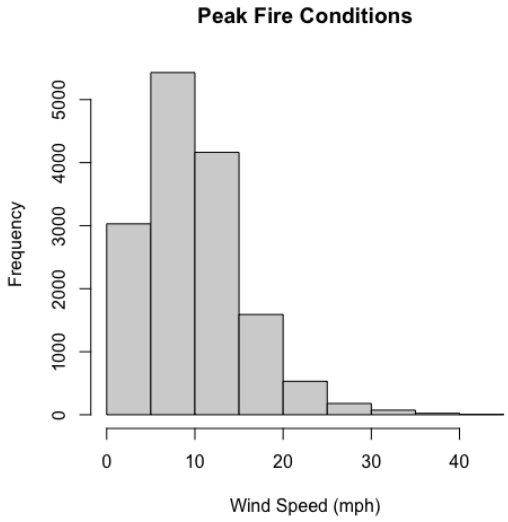
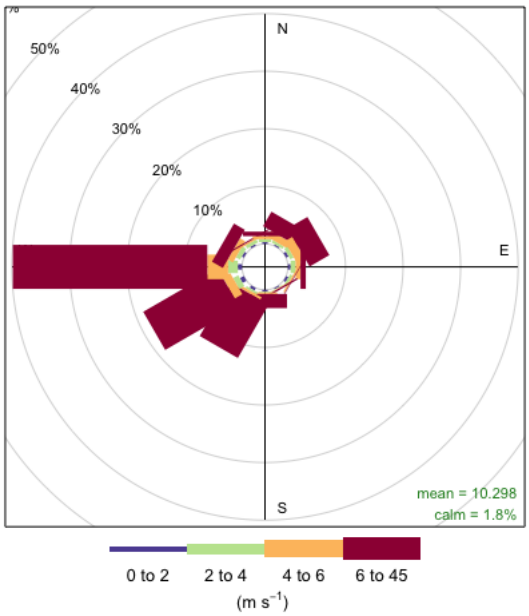
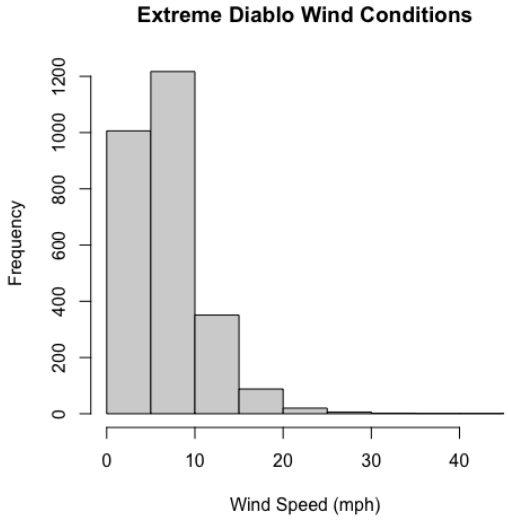
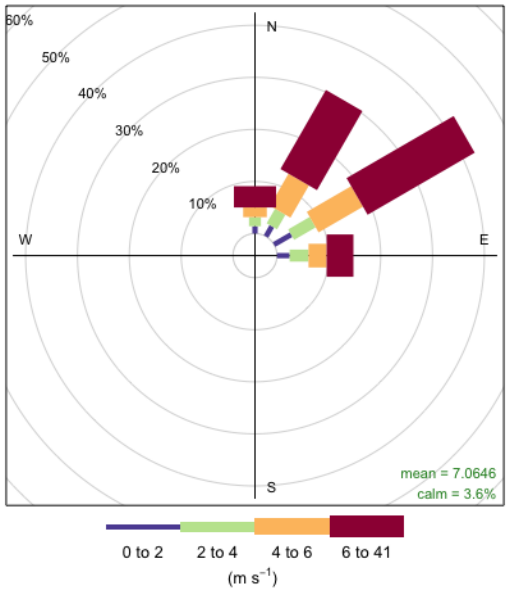
Oct
Nov
Dec
Jan
Date





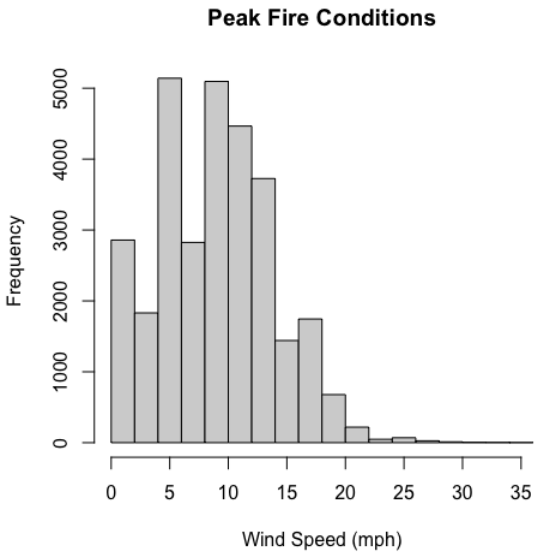
Frequency of counts by wind direction (%)

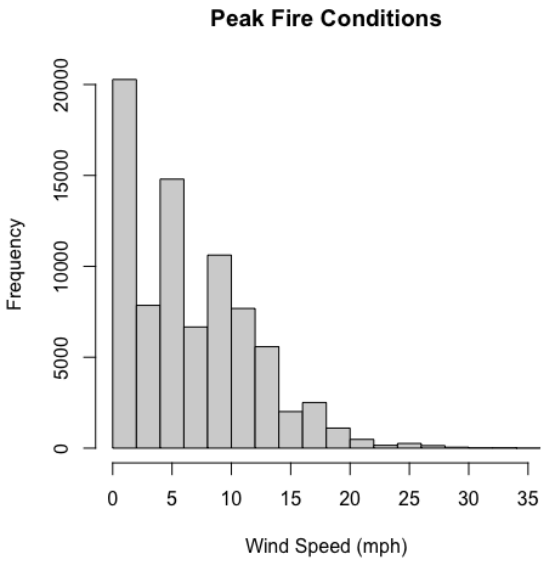




Frequency of counts by wind direction (%)

Half Moon Bay FAA Station wind speeds for Peak Fire Conditions (top) and Diablo Extreme Winds (bottom): 1200-200 (left), Anytime (right)


Peak Fire Conditions
Frequency
0
1000
2000
3000
4000
5000
0
5
10
15
20
25
30
35
Wind Speed (mph)


Peak Fire Conditions
Frequency
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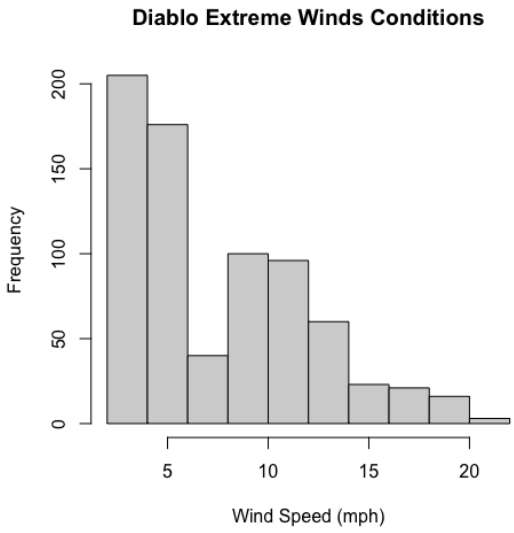
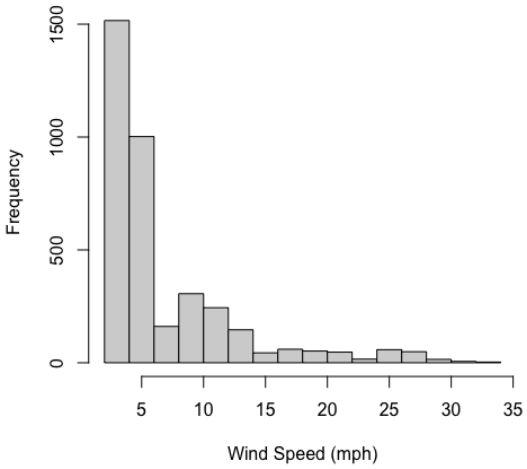
5000
10000
15000
20000
0
5
10
15
20
25
30
35
Wind Speed (mph)


Diablo Extreme Winds Conditions
Frequency
0
50
100
150
200
5
10
15
20
Wind Speed (mph)


Diablo Extreme Winds Conditions
Frequency
0
500
1000
1500
5
10
15
20
25
30
35
Wind Speed (mph)

Geophysical/Vegetative Characteristics

In addition to the ERC fuel moisture data and weather data, typical fire modeling requires geophysical and vegetation information, known as a landscape file (LCP). The LCP includes elevation, slope and aspect and vegetation summary which includes canopy height, canopy base height, percent cover, canopy bulk density and a fuel model (**Figures 4, 5**). The FlamMap outputs lend themselves well to landscape comparisons (for example, pre- and post-treatment effectiveness) and to identifying hazardous fuel and topographic combinations, thus aiding in prioritization and assessment.[8]

[8] http://fire.org/downloads/farsite/publications/JOF_Oct_Nov_2004_stratton.pdf

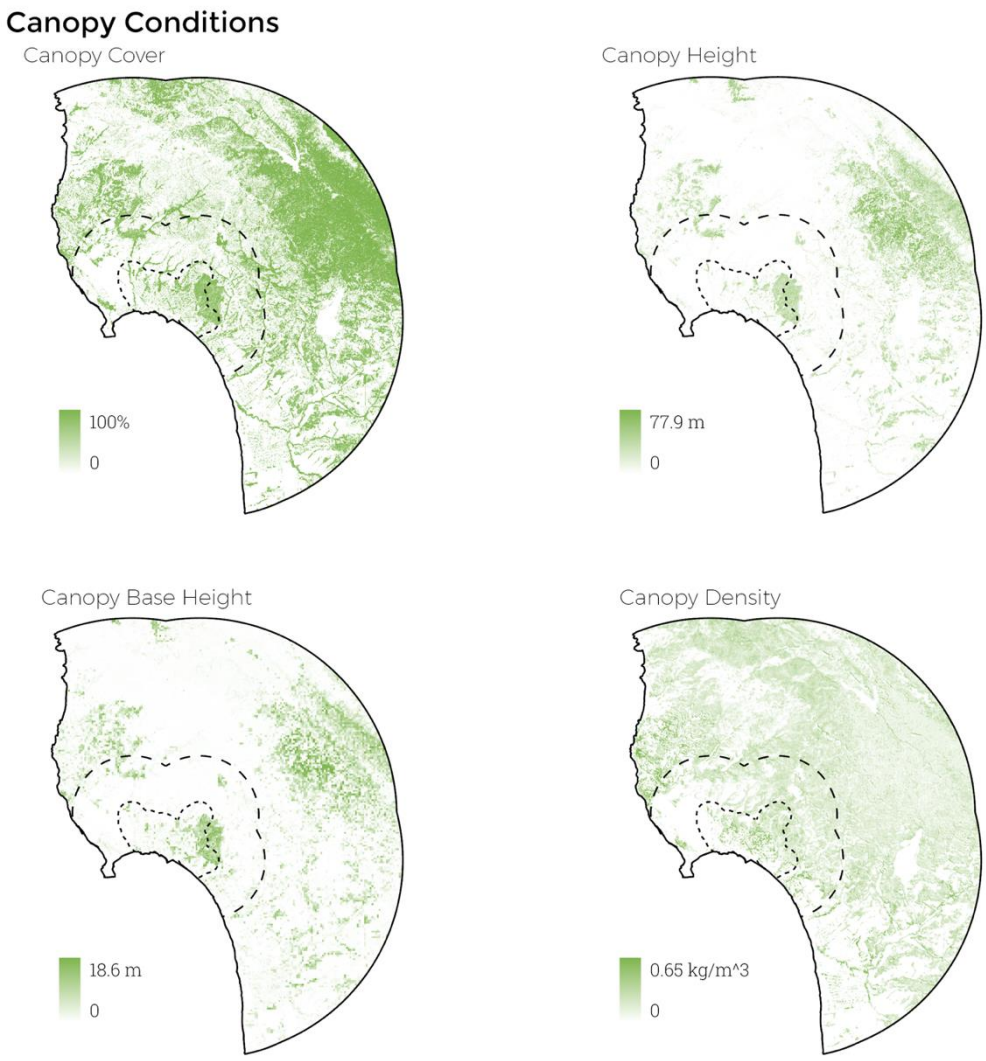


Figure 4. Vegetative conditions within the Study Area from the LCP.

Adjustments to LCP files

Canopy and surface fuel conditions were derived from the county-wide LiDAR acquisition and updated in areas where treatments occurred after data acquisition and as well as areas dominated by eucalyptus vegetation type. In treated areas (**Figure 5**), conditions were updated based on rulesets from the LANDFIRE program.[9] Eucalyptus dominated vegetation areas were additionally updated so that surface fuel models more accurately represented likely fire behavior based on field surveys of the Quarry Park area.[10] Namely, untreated areas of eucalyptus that had been mapped as TL6 (moderate load, broadleaf litter) were adjusted to TU5 (very high load, dry climate timber shrub).

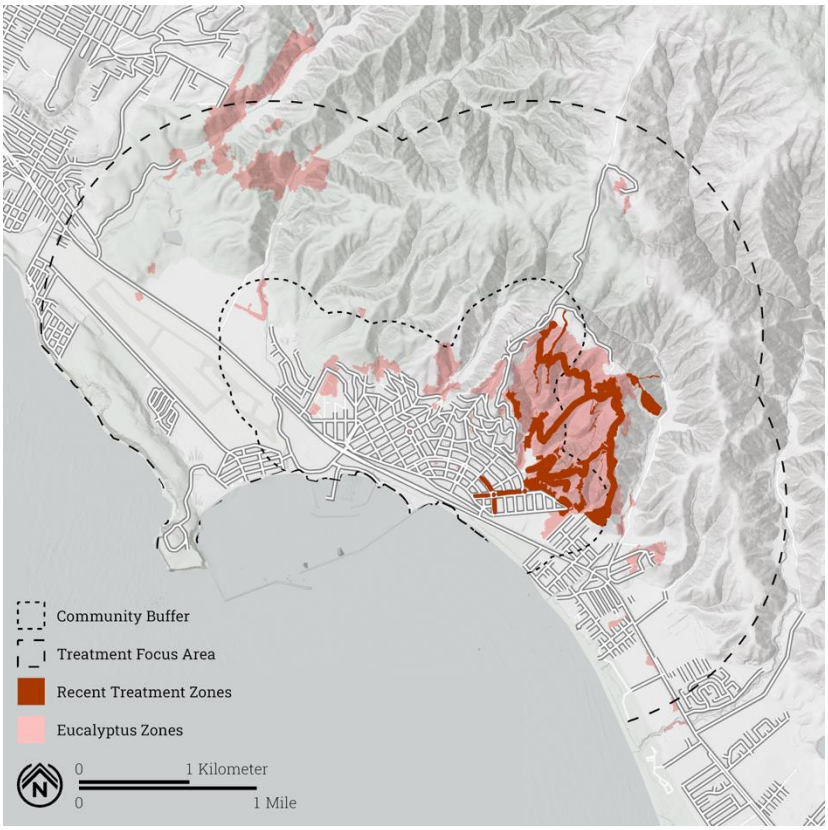


Figure 5. Recent treatment and eucalyptus zones where landscape files were updated prior to fire simulations.

[9] https://landfire.gov

[10] Prometheus_ElGranada_Report_Jan_11_2022

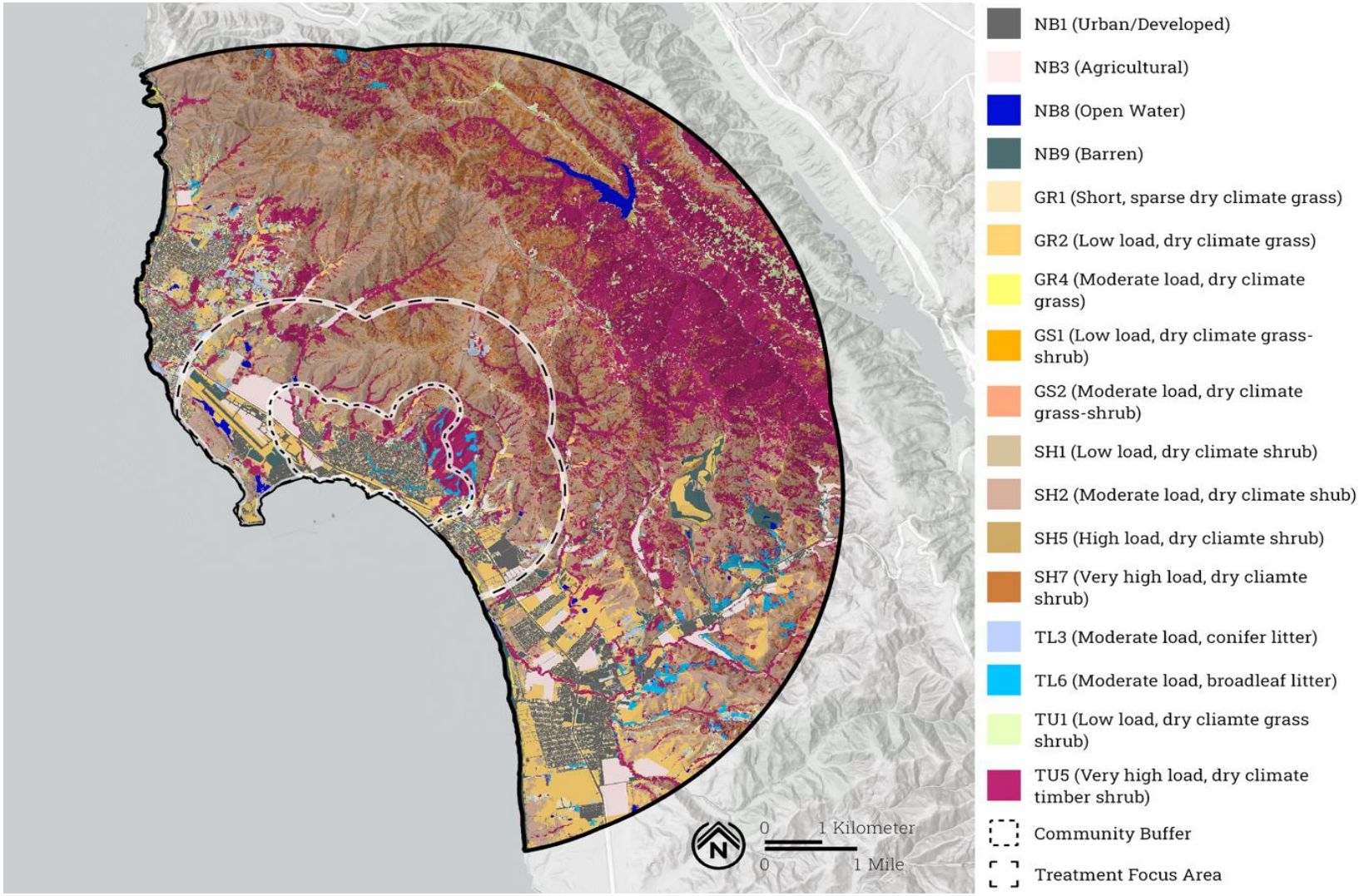


Figure 6. Fuel models used in fire modeling.

Utilizing the weather/fuel moisture data and the LCP the FlamMap model was run with the following parameters for both Peak fire and Diablo extreme wind conditions:

- Gridded winds
- Scott/Reinhardt (2001) crown fire calculation method[11]
- 10 m resolution of calculations
- 480 min max simulation time
- 0.2 spot fire probability
- 7,500 ignitions randomly distributed across all burnable pixels within the study area
- Over 99% of burnable pixels experienced at least one simulated fire

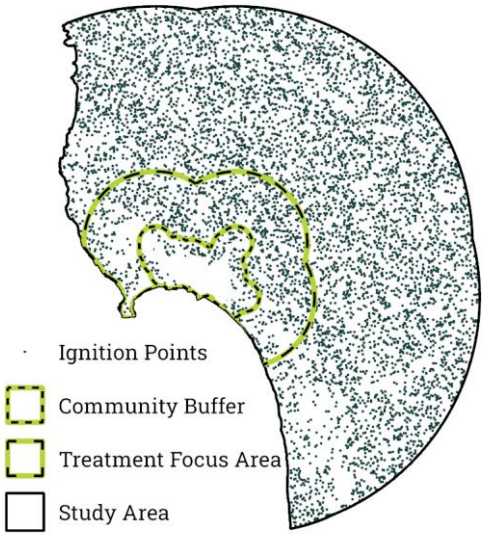


Figure 7. Ignition points within the Study Area.

Modeling parameters use for Minimum Travel Time (MTT) runs in FlamMap.

Parameter	Value
Generate Gridded Wind	Yes
Crown Fire Calculation Method	Scott/Reinhardt (2001)
Resolution of Calculations	10
Maximum Simulation Time (min)	720
Interval for Minimum Travel Paths (distance)	500
Spot Probability	0.2
Spotting Delay (mins)	0
Lateral Search Depth	6
Vertical Search Depth	4

[11] Fuel models do not take into account specific vegetation characteristics by species, such as eucalyptus. The focus is on volume of combustible material opposed to how that material may combust.

Model Output

Model outputs included predicted burn probability and conditional flame length predictions for each fire weather scenario. Conditional flame length represents the mean flame length for all simulated fires on a model run for a given point on the landscape.[12] Burn probability represents the likelihood of a fire under a set of static weather and fuel moisture conditions, characterized here by peak and Diablo conditions (**Table 3**).[13]

Additionally, composite conditions, representing the combined simulations for both scenarios, were evaluated. This was generated based on a weighted average of the peak and Diablo scenarios, where the weights were determined by overlaying the fire perimeter outputs from each scenario across the structures within El Granada and calculating the cumulative number of structures impacted by each scenario. This resulted in a peak fire weather scenario weight of 52,467 structures affected and extreme Diablo fire scenario weight of 169,549 structures affected, representing an approximate ratio of 1:3 favoring the more extreme fire behavior experienced under Diablo conditions.

Lastly, model outputs indicating integrated hazard (**Figure 8**) were created by combining burn probability and conditional flame length.[14]

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[12] https://iftdss.firenet.gov/firenetHelp/help/pageHelp/content/20-models/lbp/out/conditionalfl.htm?tocpath=Modeling%7CLandscape%20Burn%20Probability%20(LBP)%7COutputs%7C_____5

[13] https://iftdss.firenet.gov/firenetHelp/help/pageHelp/content/20-models/lbp/out/burnprob.htm

[14] https://iftdss.firenet.gov/firenetHelp/help/pageHelp/content/20-models/lbp/out/inthazard.htm

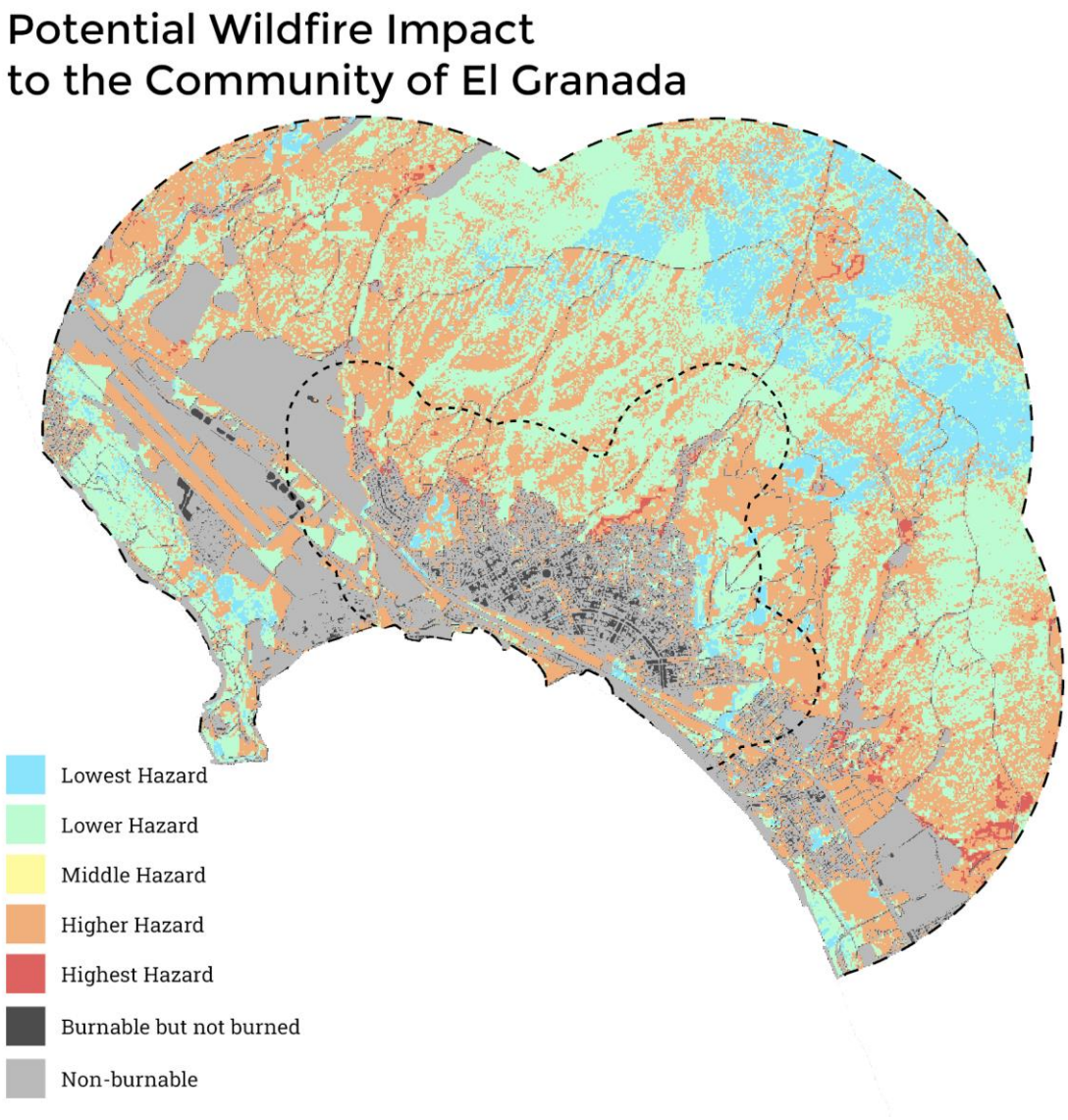


Figure 8. Integrated Hazard Map depicting the landscape based upon potential wildfire impact.

Segmentation & Ownership

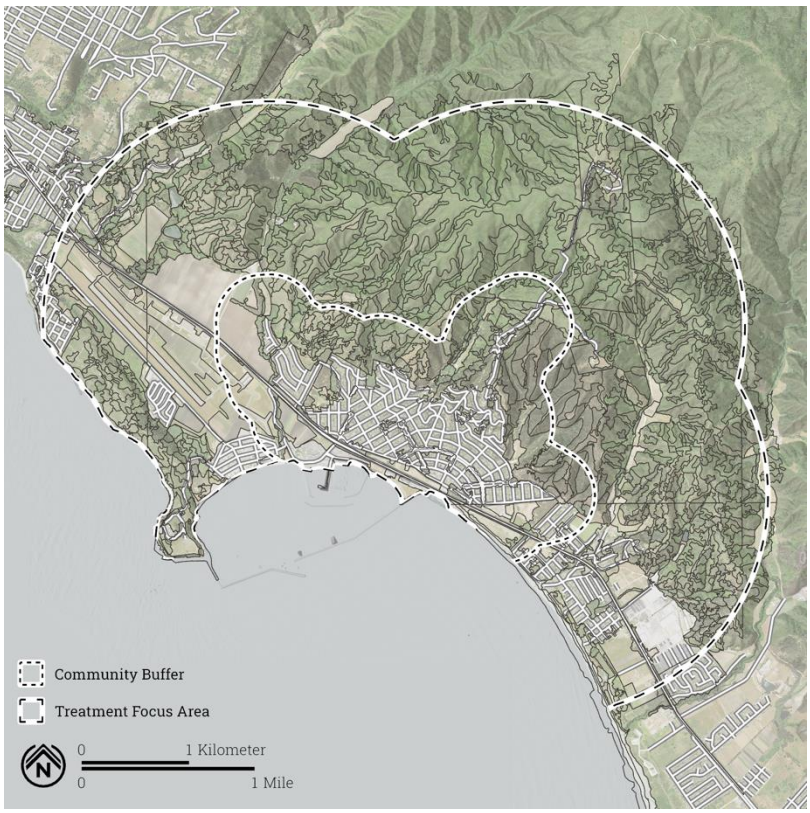
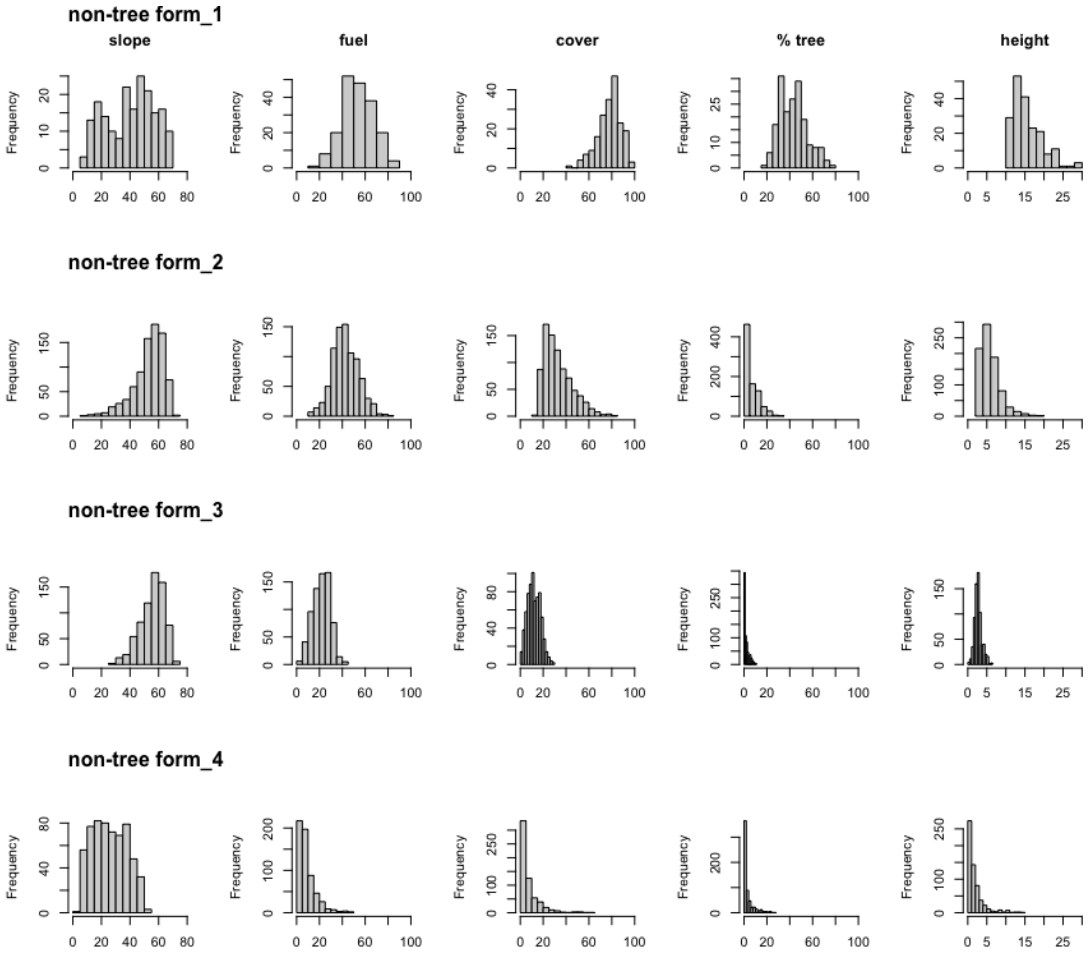


Figure 9. Segmentation of the Treatment Focus Area using the San Mateo County fine scale vegetation map and local public ownerships.

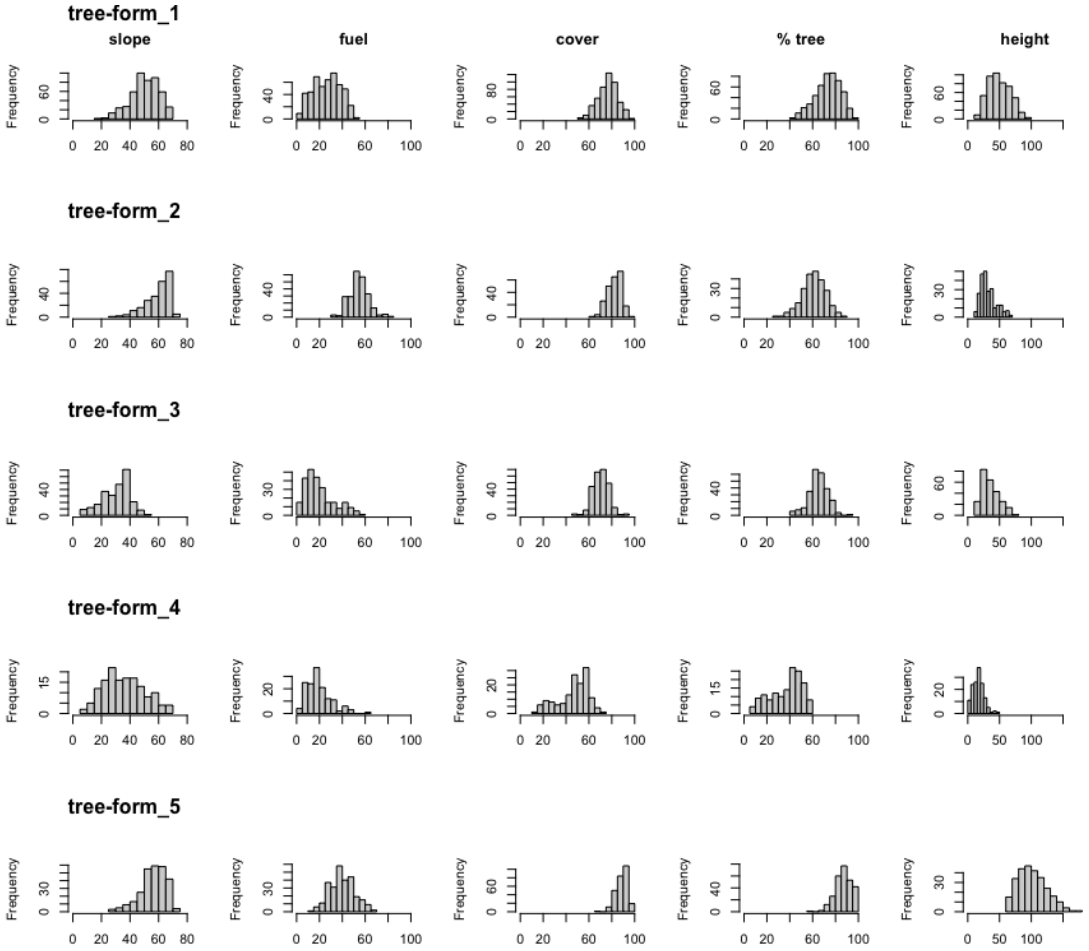
To determine treatment units the landscape was segmented both by ownership and vegetation classes (**Figure 9**). Vegetation class data and likely treatments are presented on the following pages.

The basis for vegetation segmentation was the San Mateo County fine scale vegetation map. This was segmented further in the Quarry Park area based on variation in terrain and roads. The addition of ownership included public lands only, where non-public lands were considered "private/other" (**Figure 10**). This process resulted in 1,363 segments with an average size of 4.9 acres (minimum 1 acre, maximum 303 acres) and a total area of 6,672 acres. Approximately 46% of the landscape is comprised of public land with the National Park Service managing 30% of the land (Golden Gate National Recreation Area) within the treatment focus area, followed by the County of San Mateo County Parks and Recreation Department (11%), Peninsula Open Space Trust (3%)[15], and California Department of Parks and Recreation (1%).

[15] Peninsula Open Space Trust is included as public land for this analysis



Group	Slopes	Ladder fuels	Cover	Woody vegetation	Stand height	Treatment identified
Non-tree form 1	Moderate	High	High	Moderate	High	Hand thinning - Chip or Pile
Non-tree form 2	High (over 40%)	Moderate	Moderate	Low	Low/moderate	Grazing
Non-tree form 3	High (over 40%)	Low	Low	Low	Low	Grazing
Non-tree form 4	Low/moderate	Low	Low	Low	Low	Rearrangement - Mastication or Mowing



Group	Slopes	Ladder fuels	Cover	Woody vegetation	Stand height	Treatment identified
Tree-form 1	Moderate/high (over 40%)	Moderate	High	High	Moderate	Large Tree Removal - Ladder Fuel Removal
Tree-form 2	High (over 40%)	High	High	Moderate	Low/moderate	Large Tree Removal - Overstory Removal/Create Openings
Tree-form 3	Low/moderate	Low/moderate	High	Moderate	Low/moderate	Large Tree Removal - Ladder Fuel Removal
Tree-form 4	Low/moderate	Low/moderate	Moderate	Low	Low/moderate	Hand thinning - Chip or Pile
Tree-form 5	Moderate/high (over 40%)	Moderate	High	High	High	Large Tree Removal -

	Ladder Fuel Removal

Ownership	Acres
Private/Other	3598
National Park Service	2042
San Mateo County Parks and Recreation Dept.	758
Peninsula Open Space Trust	206
California Department of Parks and Recreation	68

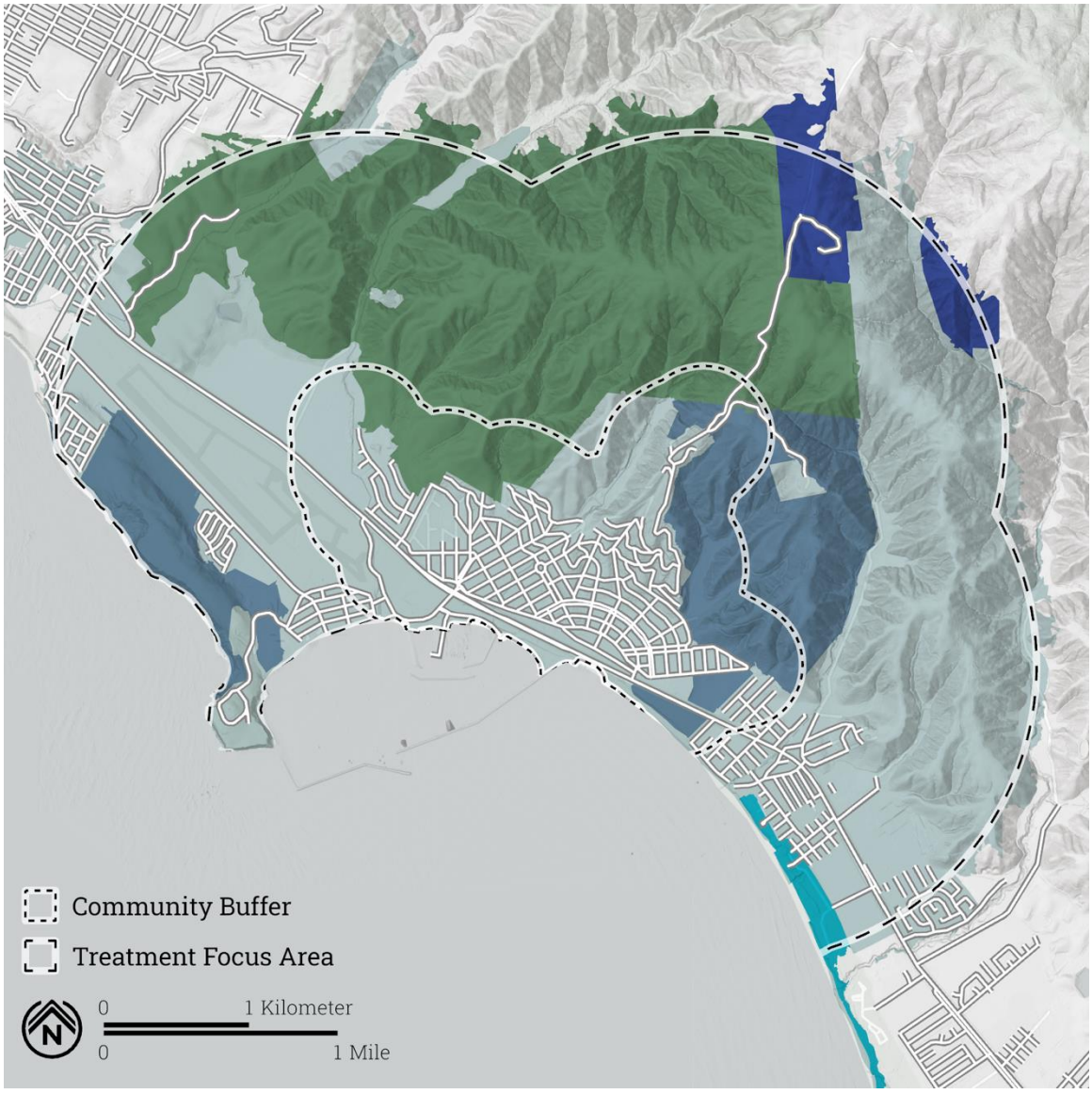


Figure 10. Ownership within the Treatment Focus Area.

Treatment	Acres
Grazing	2485
Hand thinning - Chip or Pile	293
Large Tree Removal - Ladder Fuel Removal	827
Large Tree Removal - Overstory Removal/Create Openings	105
Rearrangement - Mastication or Mowing	1268
Home hardening/defensible space	957
None specified - assess on site	736

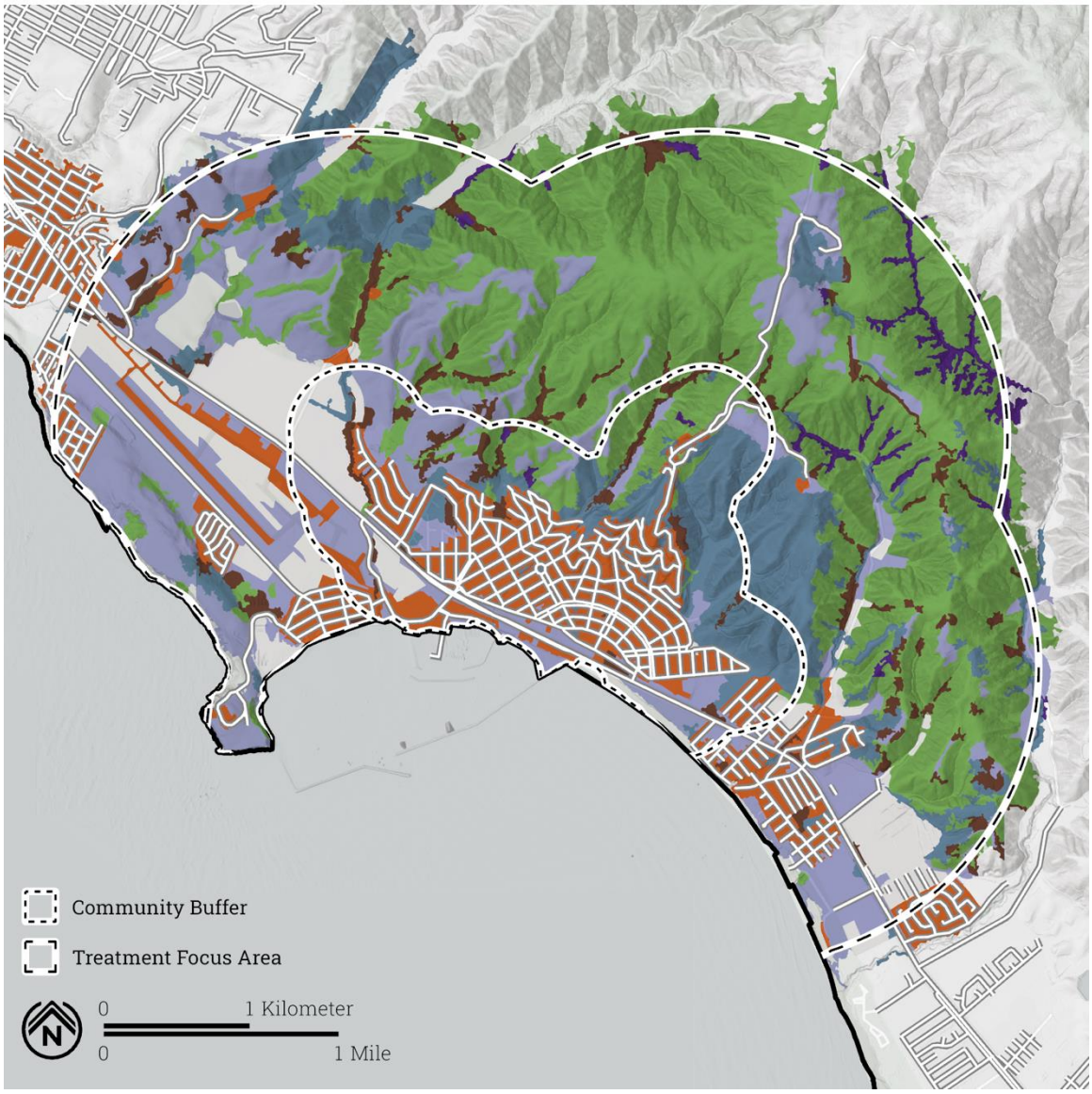


Figure 11. Treatments identified across the Treatment Focus Area.

Treatments were assigned to each segment to characterize the potential reduction of fire intensity from active management (**Figure 11**). The assigned treatments were based on a combination of slope, ladder fuel, canopy cover, percent woody vegetation, and stand height within each landscape segment. Some areas were excluded from treatment assignment due to their dominant vegetation/map class not being amenable to traditional landscape interventions (e.g., annual cropland, barren, cliff and canyon). Additionally, areas dominated by development were identified as potential places to assess for home hardening and defensible space. Vegetation treatments that were assigned to the landscape were predicted to result in a change in vegetation conditions that would affect fire intensity within each landscape segment. The reduction of fire intensity within each polygon is a predictor of how effective a treatment will be in reducing wildfire risk. In this analysis, Treatment Effectiveness (TE) is based upon how treatments may reduce the expected loss of built infrastructure and assets due to wildfire (**Figure 13**). Segments with high TE values are predicted to benefit most from treatments by reducing fire intensity and thereby lessening the risk to assets in the immediate vicinity, reducing the likelihood that fire will reach an asset of interest, or a combination of both.

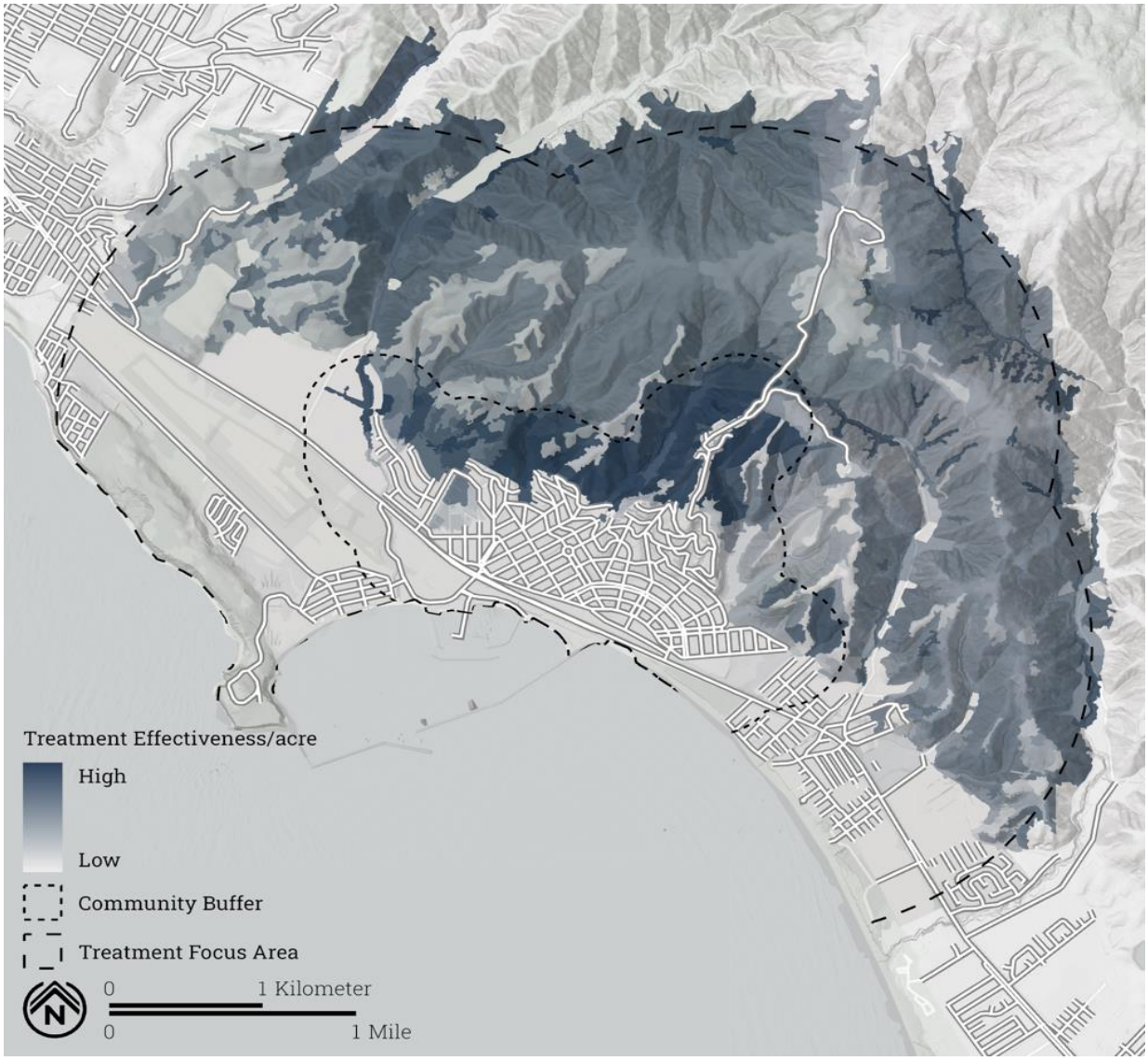


Figure 13. Treatment Effectiveness for the Community Buffer and Treatment Focus Area.

Project Areas

Project areas were identified by grouping adjacent segments based on the TE, subject to an overall size limit of approximately 200 acres (**Figure 14**). Grouping was achieved using a spatial optimization algorithm developed by Ager et al.[16] After initial grouping, segments of high TE that were not assigned

[16] https://www.firelab.org/project/national-scenario-planning-platform

to a project area were grouped to an adjacent project via a secondary algorithm.

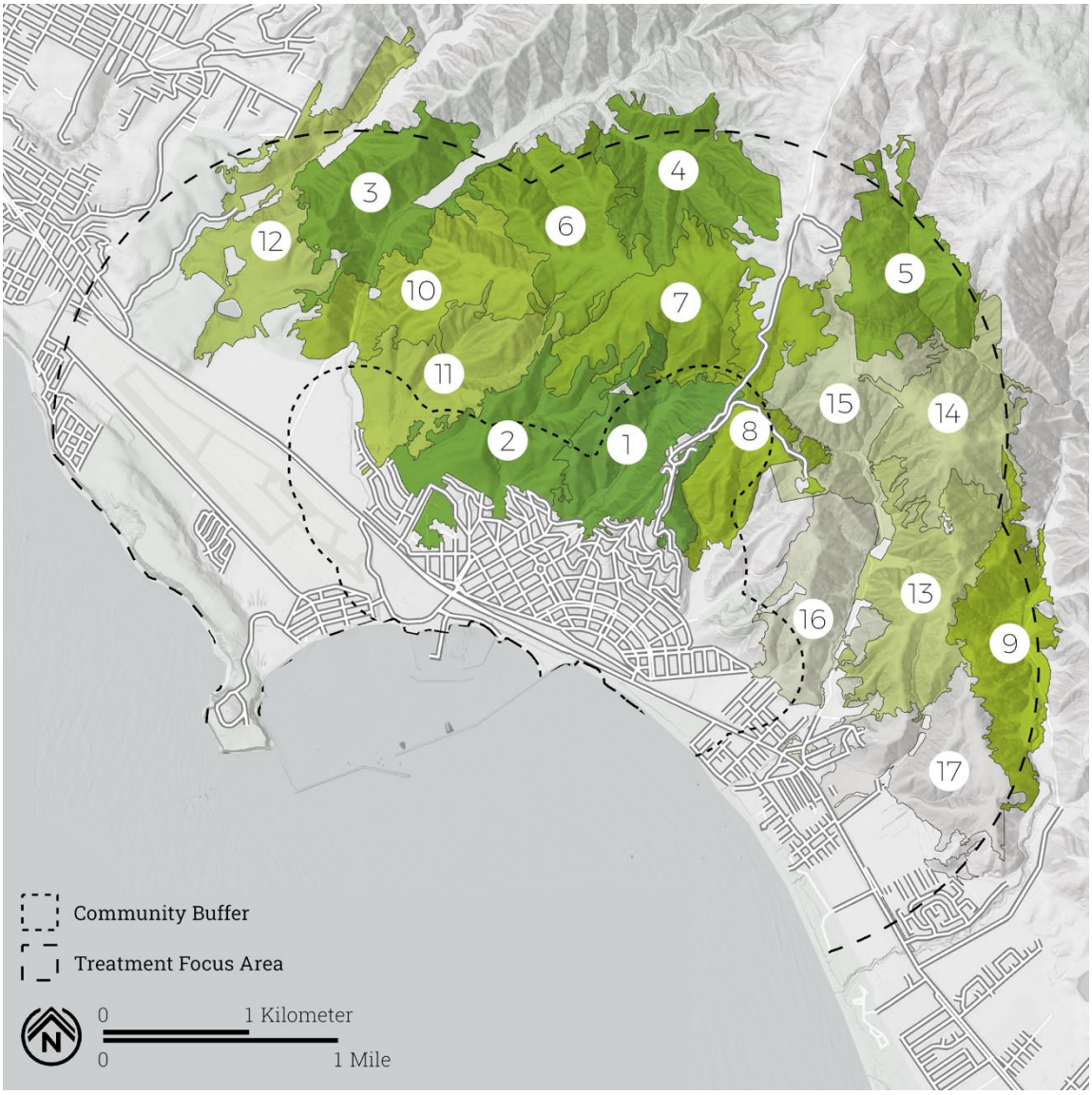


Figure 14. Identified projects within the Treatment Focus Area.

Total TE by project shows each project's total TE relative to the project with the maximum total TE, which is project 1 (**Figure 15**). Total TE is not monotonically decreasing for each subsequent project as unassigned adjacent polygons are added after running the spatial optimization algorithm. Results indicate that several projects could be interchanged with relatively low impact on TE gain. For example, Project 8, located to the northeast of the El Granada community in the Quarry Park area, does not show substantial reduction in TE compared with Project 5, located at the edge of the Study Area. While this modeling and spatial optimization process performs well for breaking up large landscapes into tractable project areas, it is recommended that land managers use evidence-based analysis alongside local knowledge, participant input, and other site-specific criteria to define final project areas and sequencing.

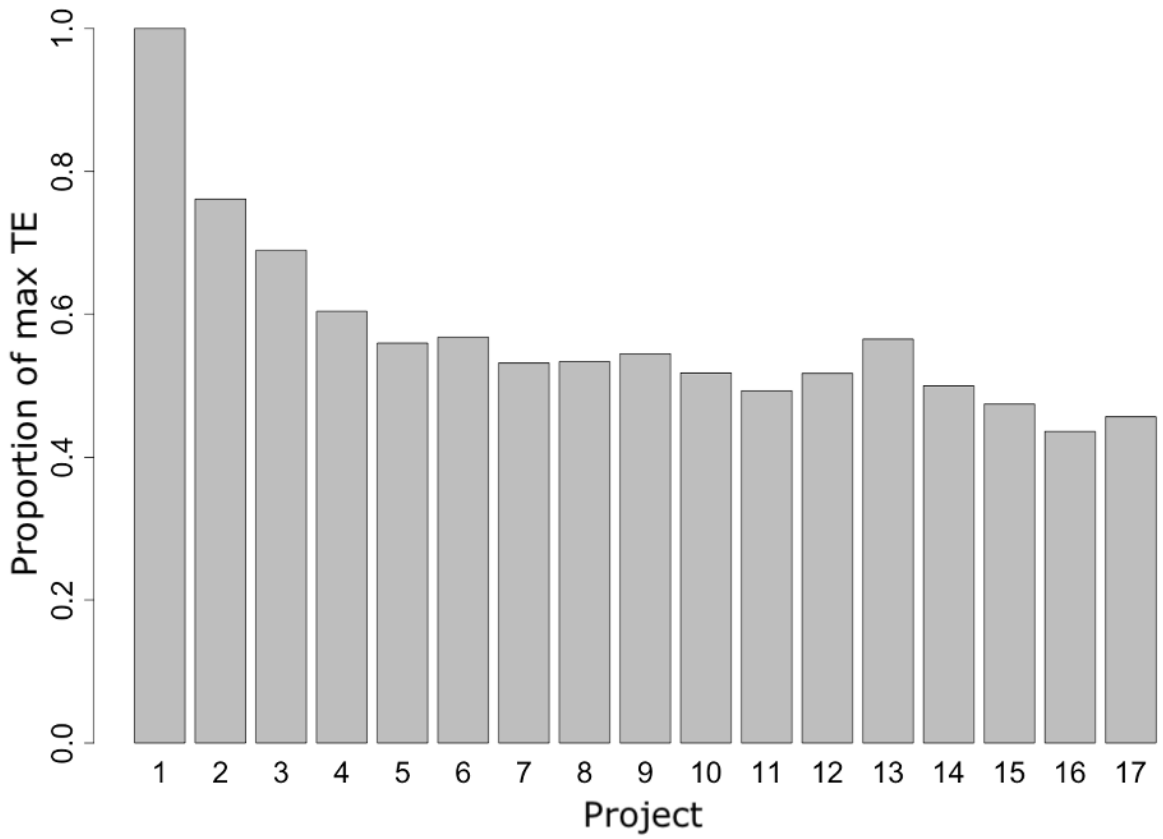
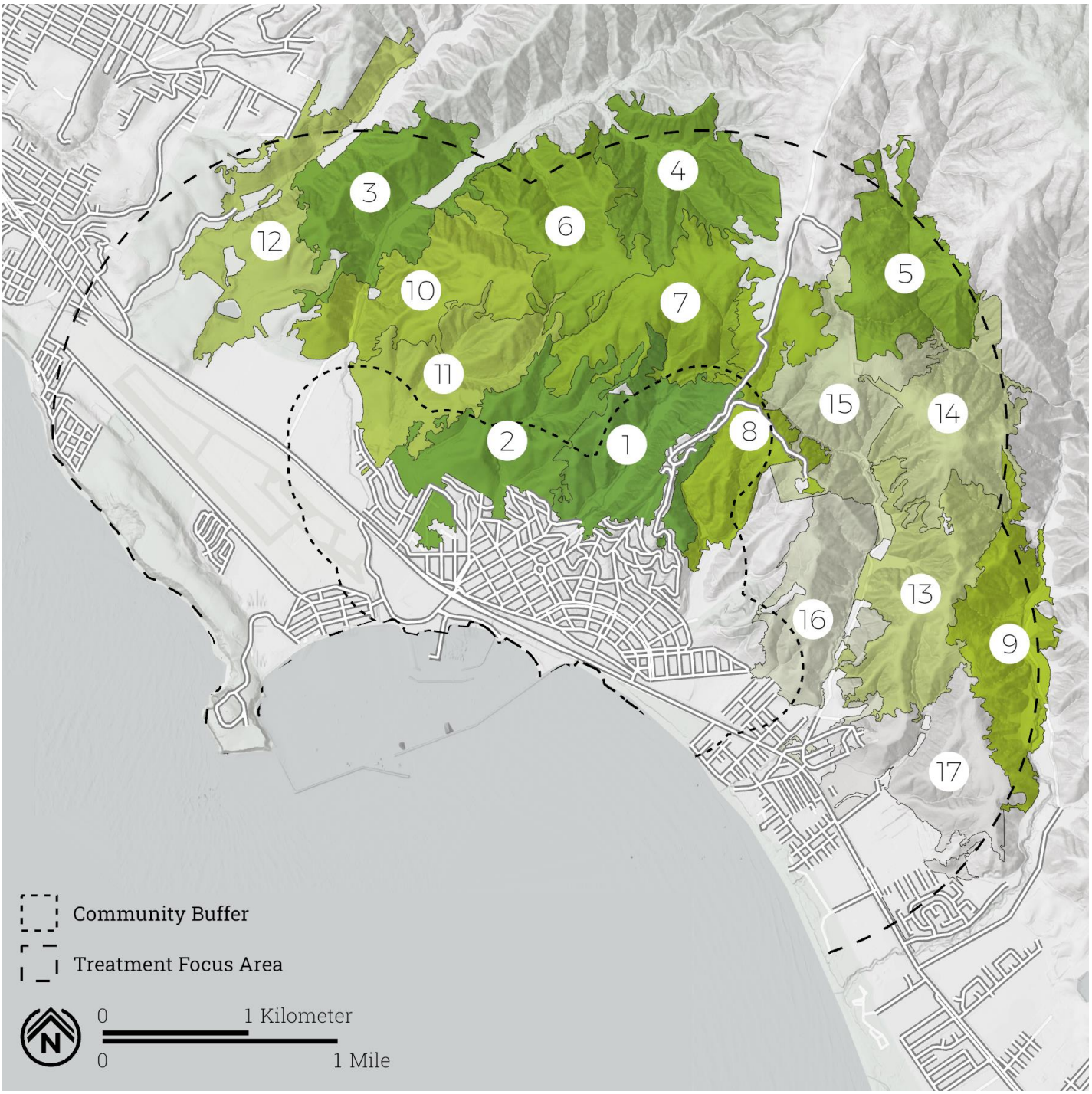


Figure 15. Total TE by project as a proportion of the project with the maximum TE (Project 1).

Appendix D – Vegetation Treatment Action Cards

Recommended Projects



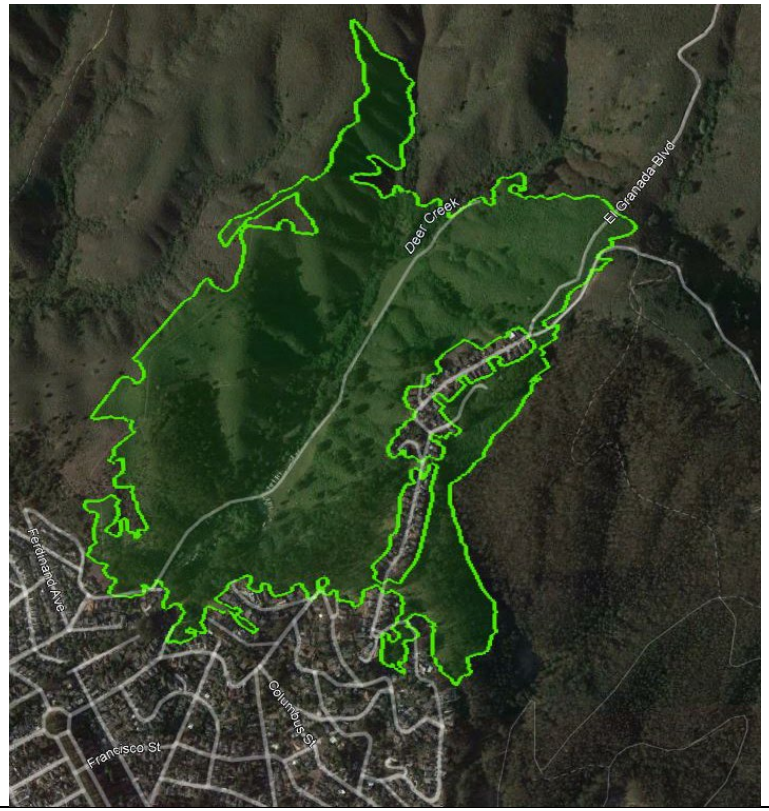
PROJECT NO. 1

Action ID	Action Name	Action Type
1	South Deer Creek Drainage	Grazing, Large Tree/Ladder Fuel Removal, Rearrangement - Mastication/Mowing, Hand Thinning-Chip/Pile, and Large Tree/Overstory Removal

Action Metrics

Treatment Effectiveness Score:	68,569
Cost Estimate:	$803,594 - $1,044,672
Acres:	222
Land Ownership:	National Park Service (36 acres) San Mateo County Parks and Recreation Department (35 acres) Private/Other (151 acres)
Responsible Party:	Multiple

Project 1 General Location



Description of Action:

Project 1 is located predominantly on the west side of El Granada Boulevard, north of the community of El Granada. A smaller portion of the project lies on the east side of El Granada Boulevard and within Quarry Park.

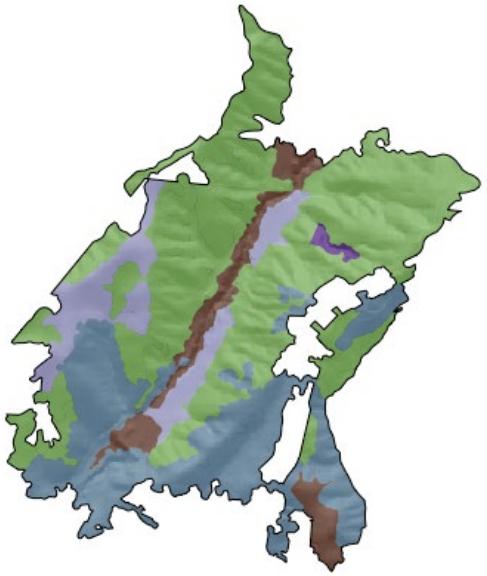
Project 1 involves a combination of treatment methods, with grazing being the predominant treatment method (120 acres) in coastal scrub areas, followed by Large Tree/Ladder Fuel Removal (61 acres) closer to the community north of San Juan Avenue and Del Monte Road and along the east side of El Granada Boulevard, Rearrangement-Mastication/Mowing (22 acres), Hand Thinning-Chip/Pile (17 acres) along the Deer Creek Drainage, and one-acre of Large Tree/Overstory Removal-Create Openings. Large Tree/ Overstory Removal/Create Openings could be substituted in some locations for Large Tree/Ladder Fuel Removal. Field verification of site-specific conditions would be necessary to determine feasibility of Large Tree/ Overstory Removal/Create Openings.

PROJECT NO. 1

Environmental Review Requirements:

Environmental field surveys would be required prior to implementation to determine if sensitive resources occur within project area and can be avoided. If impact avoidance is not possible, several permits could be required including CEQA (private and County land) and NEPA (federal land) review, species and waters permitting, and cultural resources and tribal consultations.

Project area is within treatable landscape area as defined within the CalVTP. If all project impacts are within the scope of the Programmatic EIR prepared for the CalVTP program, the CEQA environmental review process can be streamlined.

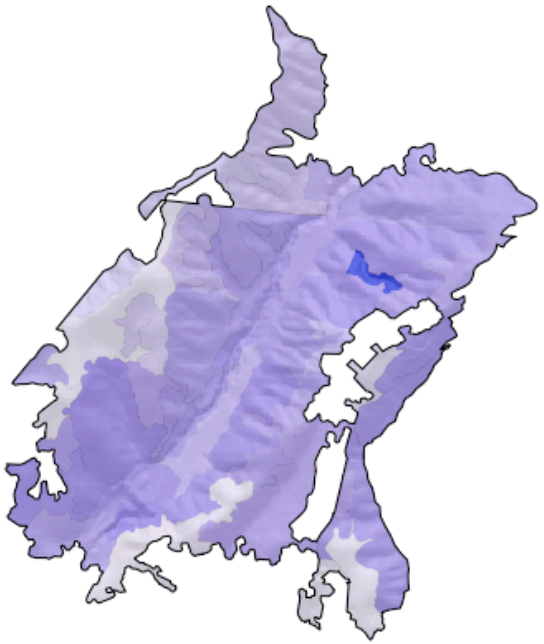


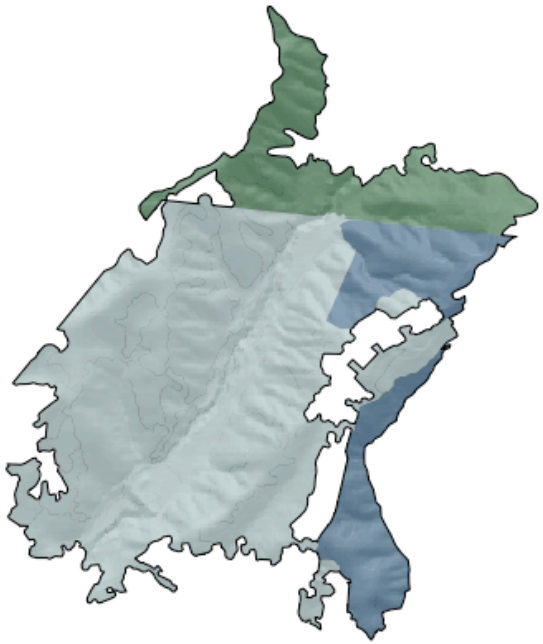
Maintenance/Reoccurrence Considerations:

It is recommended that a maintenance plan be developed for each project and annual inspections by a trained professional occur post treatment specifically focused on reoccurring maintenance. Some maintenance considerations may include, but are not limited to, the following:

- Conduct goat grazing and hand thinning approximately every 1-2 years to prevent re-growth of vegetation. Goat grazing is effective on re-sprouts or young plants that grow back following initial treatment; however, require intensive management, temporary fencing, predator control, and observation to ensure they do not consume desirable vegetation or sensitive plant species/communities.
- Reoccurring maintenance for more intensive treatments such as large tree removal-ladder fuel and overstory removal should occur on an approximately 3 to 5-year schedule.
- Time hand thinning, grazing, and mastication/mowing treatments prior to weeds going to seed to minimize the spread of invasive weed species and remove material from site.
- Herbicide treatments may be required for cut eucalyptus stumps and for control of other invasives such as scotch broom, cape ivy, and jubata grass.
- Minimize ground disturbance when using mechanized equipment for large tree overstory and ladder fuel removal and mastication to the extent possible to minimize soil erosion and spread of invasive weeds.
- In areas where ground disturbance occurs, revegetate immediately with native vegetation.

PROJECT NO. 1





Treatment

- Grazing
- Hand thinning - Chip or Pile
- Large Tree Removal - Ladder Fuel Removal
- Large Tree Removal - Overstory Removal/Create Openings
- Rearrangement - Mastication or Mowing

TE / acre

- 200
- 400
- 600

Ownership

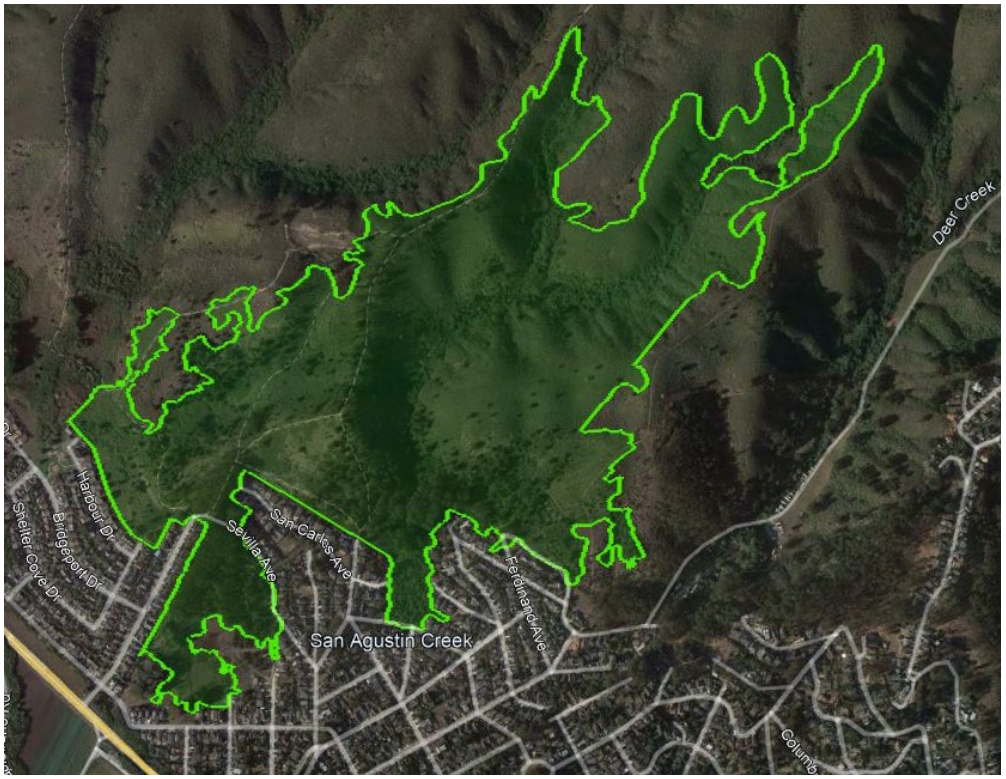
- National Park Service
- Private/Other
- San Mateo County Parks and Recreation Dept., County of

PROJECT NO. 2

Action ID	Action Name	Action Type
2	San Agustin Creek Drainage	Grazing, Rearrangement-Mastication/Mowing, Hand Thinning-Chip/Pile, Large Tree/Ladder Fuel Removal, and Large Tree/Overstory Removal

Action Metrics	
Treatment Effectiveness Score:	52,217
Cost Estimate:	$1,138,098 - $1,479,527
Acres:	222
Land Ownership:	National Park Service (186 acres) Private/Other (36 acres)
Responsible Party:	Multiple

Project 2 General Location



Description of Action:

Project 2 is located north of the community of El Granada and north and east of the Clipper Ridge neighborhood. Agustin Creek is a primary drainage in this project area.

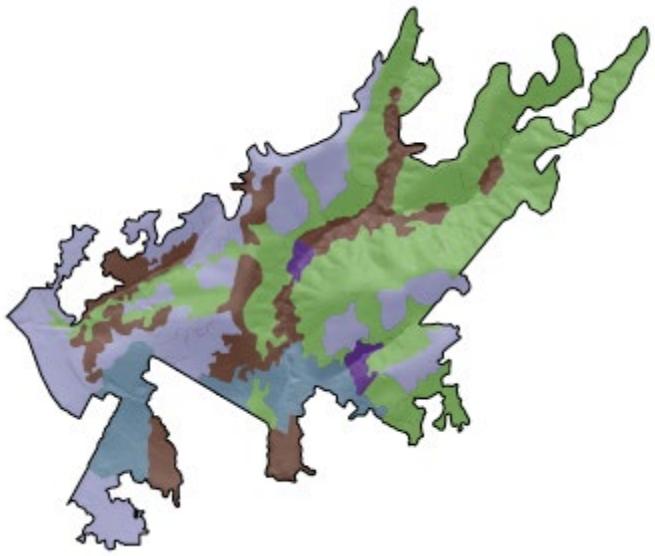
Project 2 involves a combination of treatment methods, with grazing being the predominant treatment method (100 acres) in coastal scrub areas, followed by Rearrangement-Mastication/Mowing (60 acres), Hand Thinning-Chip/Pile (38 acres), Large Tree/Ladder Fuel Removal (21 acres) in the eucalyptus grove on the east side and north end of Coral Reef Avenue, and Large Tree/Overstory Removal-Create Openings (3 acres) in the open space north of the end of Ferdinand Avenue.

PROJECT NO. 2

Environmental Review Requirements:

Environmental field surveys would be required prior to implementation to determine if sensitive resources occur within project area and can be avoided. If impact avoidance is not possible, several permits could be required including CEQA (private land) and NEPA (federal land) review, species and waters permitting, and cultural resources and tribal consultations.

Project area is within treatable landscape area as defined within the CalVTP. If all project impacts are within the scope of the Programmatic EIR prepared for the CalVTP program, the CEQA environmental review process can be streamlined.

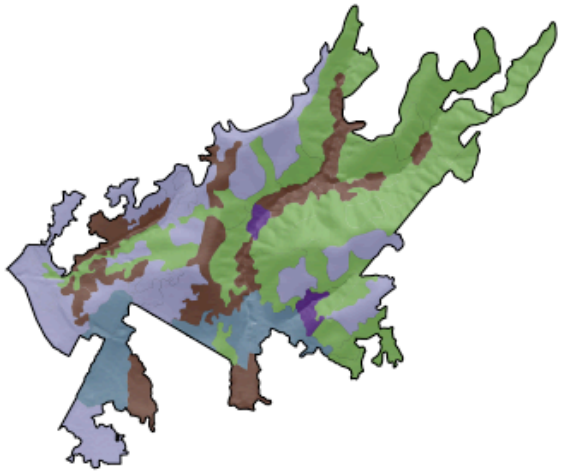


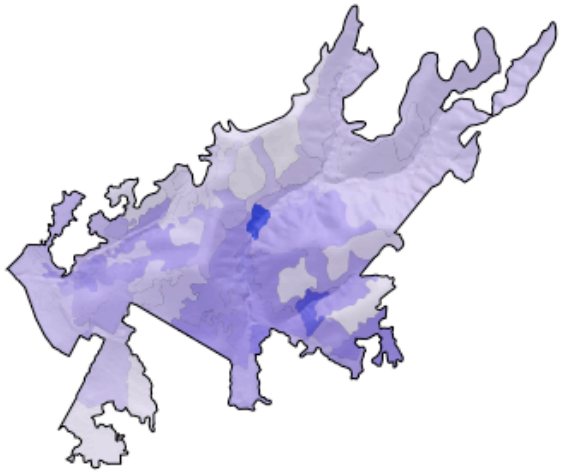
Maintenance/Reoccurrence Considerations:

It is recommended that a maintenance plan be developed for each project and annual inspections by a trained professional occur post treatment specifically focused on reoccurring maintenance. Some maintenance considerations may include, but are not limited to, the following:

- Conduct goat grazing and hand thinning approximately every 1-2 years to prevent re-growth of vegetation. Goat grazing is effective on re-sprouts or young plants that grow back following initial treatment; however, require intensive management, temporary fencing, predator control, and observation to ensure they do not consume desirable vegetation or sensitive plant species/communities.
- Reoccurring maintenance for more intensive treatments such as large tree removal-ladder fuel and overstory removal should occur on an approximately 3 to 5-year schedule.
- Time hand thinning, grazing, and mowing/mastication treatments prior to weeds going to seed to minimize the spread of invasive weed species and remove material from site.
- Herbicide treatments may be required for cut eucalyptus stumps and for control of other invasives such as scotch broom, cape ivy, and jubata grass.
- Minimize ground disturbance when using mechanized equipment for large tree overstory and ladder fuel removal and mastication to the extent possible to minimize soil erosion and spread of invasive weeds.
- In areas where ground disturbance occurs, revegetate immediately with native vegetation.

PROJECT NO. 2





Treatment

- Grazing
- Hand thinning - Chip or Pile
- Large Tree Removal - Ladder Fuel Removal
- Large Tree Removal - Overstory Removal/Create Openings
- Rearrangement - Mastication or Mowing

TE / acre

- 200
- 400
- 600

Ownership

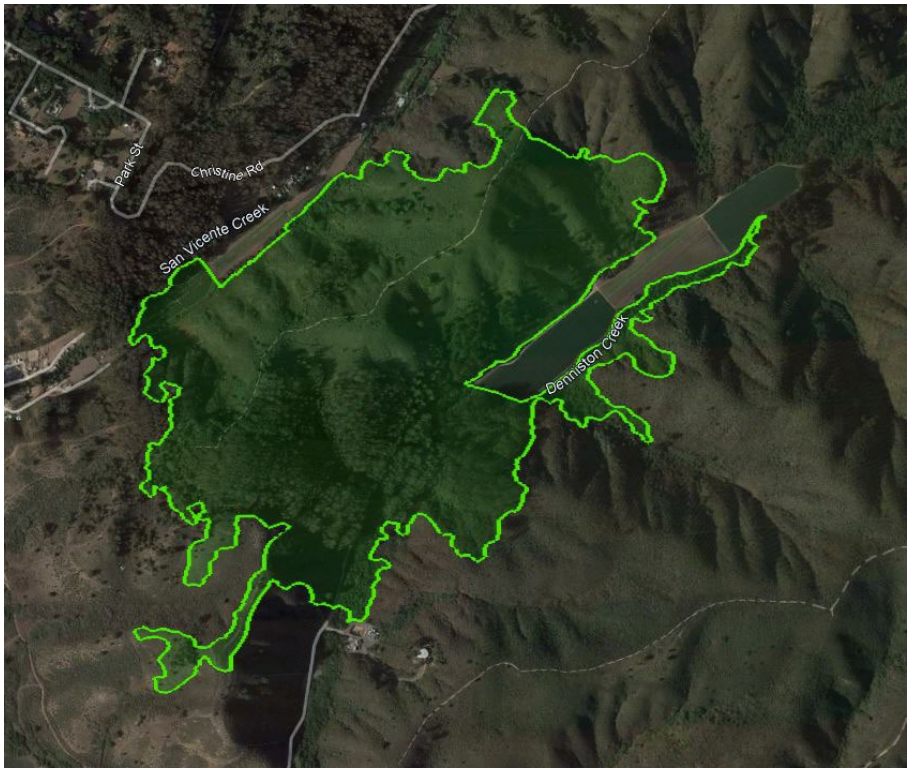
- National Park Service
- Private/Other

PROJECT NO. 3

Action ID	Action Name	Action Type
3	West Denniston Creek Drainage	Grazing, Large Tree/Ladder Fuel Removal, Hand Thinning-Chip/Pile, Rearrangement-Mastication/Mowing, and Large Tree/Overstory Removal

Action Metrics	
Treatment Effectiveness Score:	47,269
Cost:	$799,309
Acres:	226
Land Ownership:	National Park Service (209 acres) Private/Other (16 acres)
Responsible Party:	Multiple

Project 3 General Location



Description of Action:

Project 3 is located north of the agricultural fields between the communities of El Granada and Montara, between San Vicente Creek to the west side and Denniston Creek to the east. Project No. 5 is located to the east of this project area.

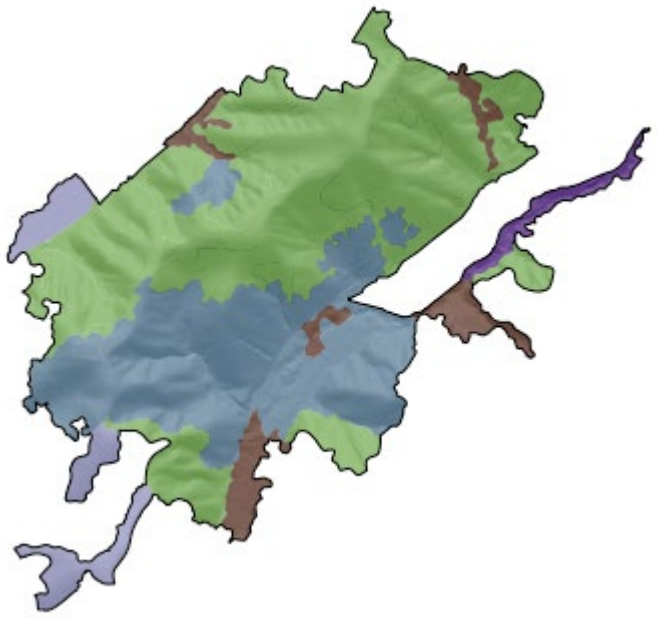
Project 3 involves a combination of treatment methods, with grazing being the predominant treatment method (120 acres) in coastal scrub areas, followed by Large Tree/Ladder Fuel Removal (73 acres) in a eucalyptus grove in the southern project area, Hand Thinning-Chip/Pile (15 acres), Rearrangement-Mastication/Mowing (13 acres), and Large Tree/Overstory Removal-Create Openings (4 acres) along Denniston Creek.

PROJECT NO. 3

Environmental Review Requirements:

Environmental field surveys would be required prior to implementation to determine if sensitive resources occur within project area and can be avoided. If impact avoidance is not possible, several permits could be required including CEQA (private land) and NEPA (federal land) review, species and waters permitting, and cultural resources and tribal consultations.

Project area is within treatable landscape area as defined within the CalVTP. If all project impacts are within the scope of the Programmatic EIR prepared for the CalVTP program, the CEQA environmental review process can be streamlined.

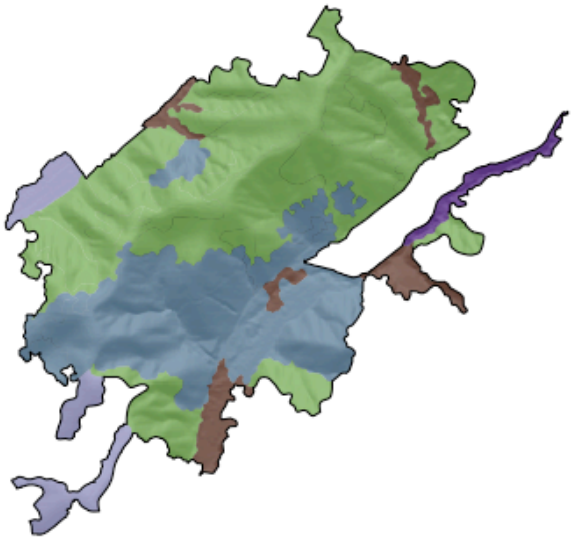


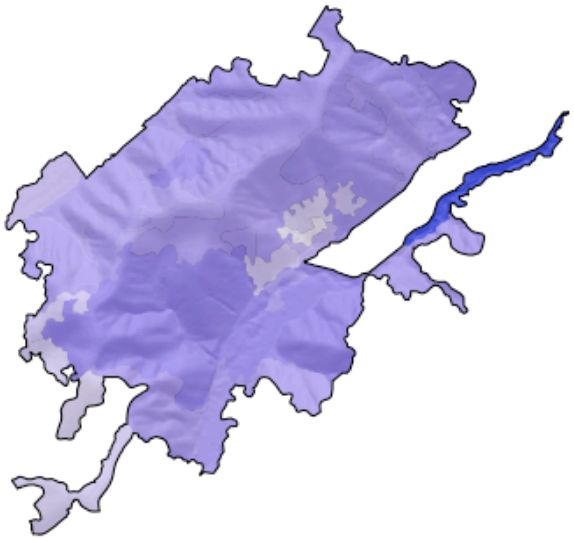
Maintenance/Reoccurrence Considerations:

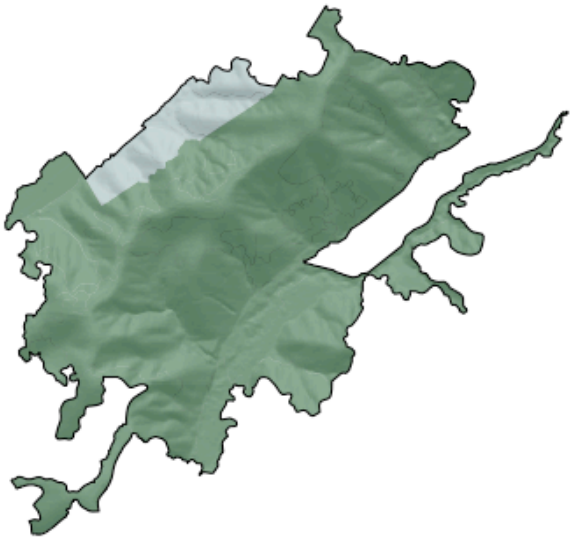
It is recommended that a maintenance plan be developed for each project and annual inspections by a trained professional occur post treatment specifically focused on reoccurring maintenance. Some maintenance considerations may include, but are not limited to, the following:

- Conduct goat grazing and hand thinning approximately every 1-2 years to prevent re-growth of vegetation. Goat grazing is effective on re-sprouts or young plants that grow back following initial treatment; however, require intensive management, temporary fencing, predator control, and observation to ensure they do not consume desirable vegetation or sensitive plant species/communities.
- Reoccurring maintenance for more intensive treatments such as large tree removal-ladder fuel and overstory removal should occur on an approximately 3 to 5-year schedule.
- Time hand thinning, grazing, and mastication/mowing treatments prior to weeds going to seed to minimize the spread of invasive weed species and remove material from site.
- Herbicide treatments may be required for cut eucalyptus stumps and for control of other invasives such as scotch broom, cape ivy, and jubata grass.
- Minimize ground disturbance when using mechanized equipment for large tree overstory and ladder fuel removal and mastication to the extent possible to minimize soil erosion and spread of invasive weeds.
- In areas where ground disturbance occurs, revegetate immediately with native vegetation.

PROJECT NO. 3







Treatment

- Grazing
- Hand thinning - Chip or Pile
- Large Tree Removal - Ladder Fuel Removal
- Large Tree Removal - Overstory Removal/Create Openings
- Rearrangement - Mastication or Mowing

TE / acre

- 100
- 200
- 300

Ownership

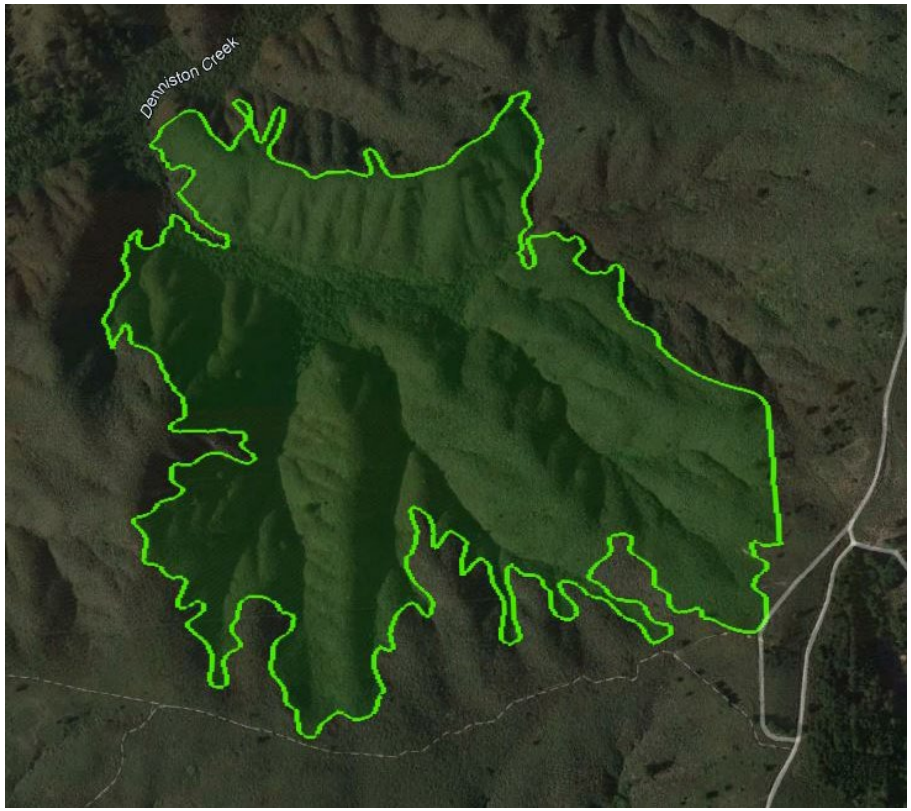
- National Park Service
- Private/Other

PROJECT NO. 4

Action ID	Action Name	Action Type
4	Between Denniston and Locks Creeks	Grazing, Hand Thinning-Chip/Pile, and Large Tree/Overstory Removal

Action Metrics	
Treatment Effectiveness Score:	41,421
Cost Estimate:	$356,513 – $463,467
Acres:	221
Land Ownership:	National Park Service (221 acres)
Responsible Party:	National Park Service

Project 4 General Location



Description of Action:

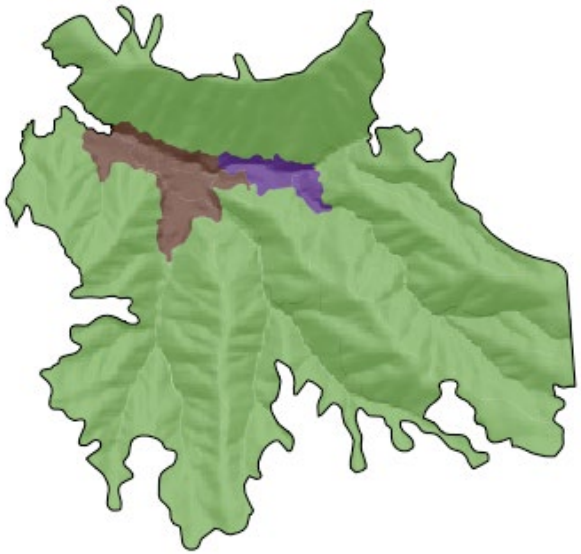
Project 4 is located entirely on National Park Service land in a remote coastal scrub area approximately 0.75 mi northwest of the end of El Granada Boulevard.

Project 4 involves a combination of treatment methods, with grazing being the predominant treatment method (206 acres) within coastal scrub areas, followed by Hand Thinning-Chip/Pile (11 acres), and Large Tree/Overstory Removal-Create Openings (4 acres) in an unnamed tributary to Deer Creek and San Agustin Creek.

PROJECT NO. 4

Environmental Review Requirements:

Environmental field surveys would be required prior to implementation to determine if sensitive resources occur within project area and can be avoided. If impact avoidance is not possible, several permits could be required including NEPA review as this project occurs only on federal land, species and waters permitting, and cultural resources and tribal consultations.

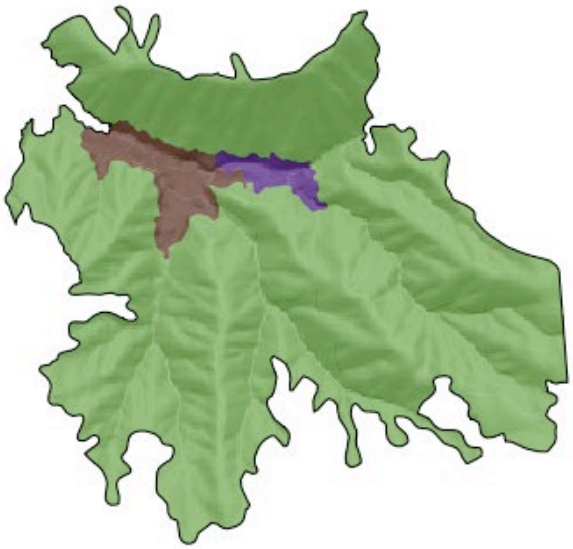


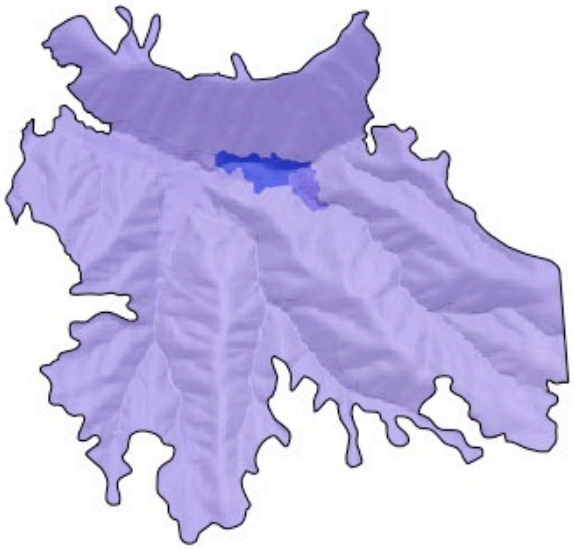
Maintenance/Reoccurrence Considerations:

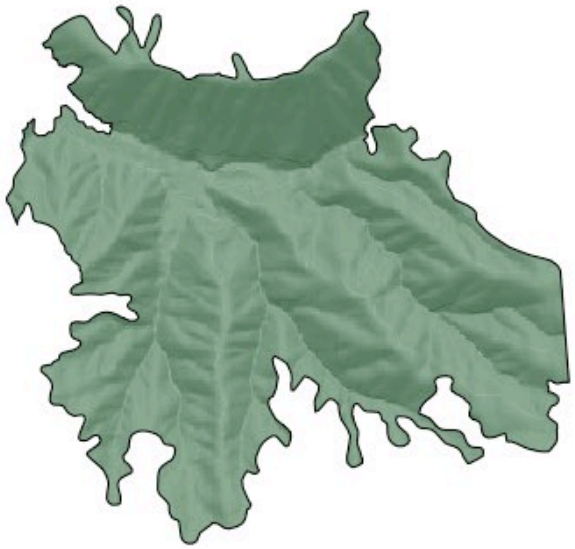
It is recommended that a maintenance plan be developed for each project and annual inspections by a trained professional occur post treatment specifically focused on reoccurring maintenance. Some maintenance considerations may include, but are not limited to, the following:

- Conduct goat grazing and hand thinning approximately every 1-2 years to prevent re-growth of vegetation. Goat grazing is effective on re-sprouts or young plants that grow back following initial treatment; however, require intensive management, temporary fencing, predator control, and observation to ensure they do not consume desirable vegetation or sensitive plant species/communities.
- Reoccurring maintenance for more intensive treatments such as large tree removal-overstory removal should occur on an approximately 3 to 5-year schedule.
- Time hand thinning and grazing treatments prior to weeds going to seed to minimize the spread of invasive weed species and remove material from site.
- Herbicide treatments may be required for cut eucalyptus stumps and for control of other invasives such as scotch broom, cape ivy, and jubata grass.
- Minimize ground disturbance when using mechanized equipment for large tree overstory removal to the extent possible to minimize soil erosion and spread of invasive weeds.
- In areas where ground disturbance occurs, revegetate immediately with native vegetation.

PROJECT NO. 4







Treatment

- Grazing
- Hand thinning - Chip or Pile
- Large Tree Removal - Overstory Removal/Create Openings

TE / acre

- 200
- 250
- 300
- 350

Ownership

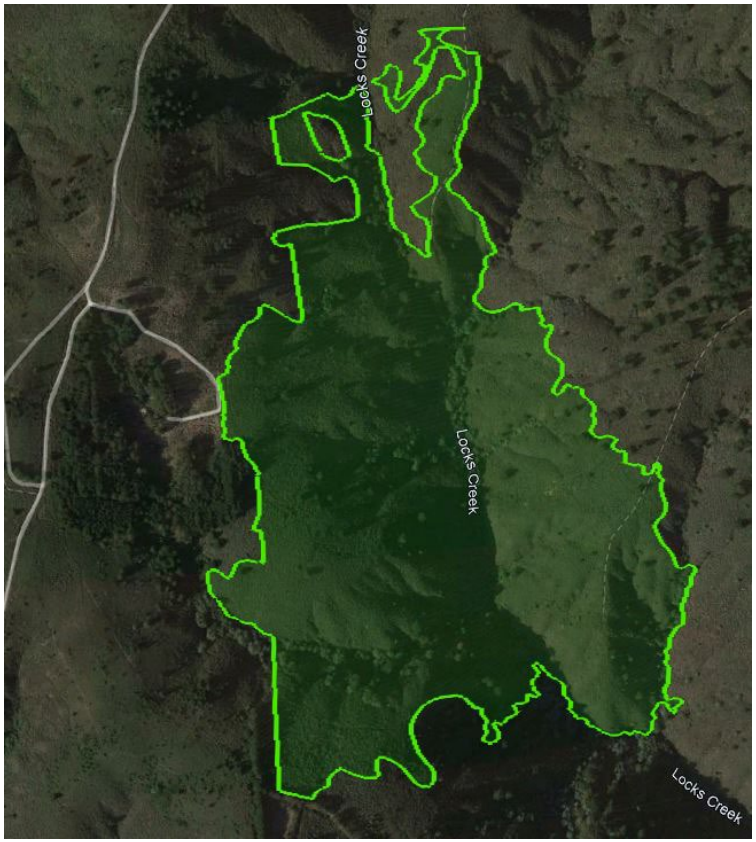
- National Park Service

PROJECT NO. 5

Action ID	Action Name	Action Type
5	Locks Creek Drainage	Grazing, Large Tree/Overstory Removal, and Large Tree/Ladder Fuel Removal

Action Metrics	
Treatment Effectiveness Score:	38,384
Cost Estimate:	$318,113 - $413,547
Acres:	204
Land Ownership:	National Park Service (3 acres) Peninsula Open Space Trust (52 acres) Private/Other (149 acres)
Responsible Party:	Multiple

Project 5 General Location



Description of Action:

Project 5 is located approximately 0.5-mile north of Quarry Park and surrounds the Locks Creek drainage north of the El Granada and Miramar communities.

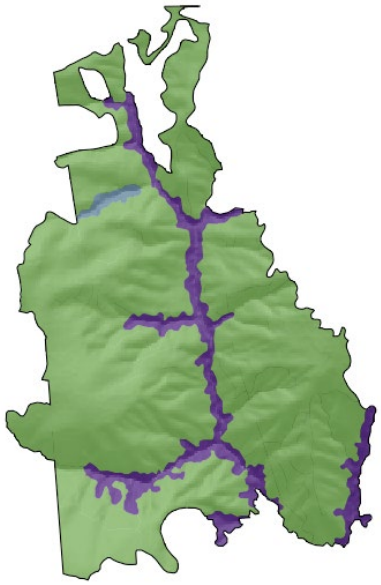
Project 5 involves a combination of treatment methods, with grazing being the predominant treatment method (181 acres), followed by Large Tree/Overstory Removal-Create Openings (22 acres) along the Locks Creek Drainage, and Large Tree/Ladder Fuel Removal (1 acre) along an unnamed tributary to Locks Creek.

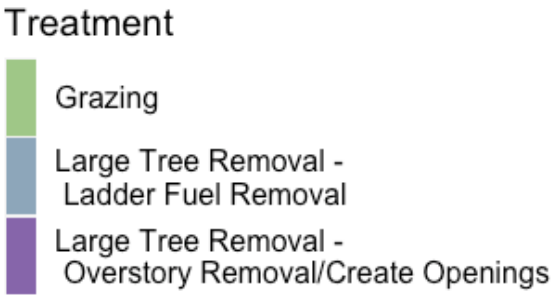
PROJECT NO. 5

Environmental Review Requirements:

Environmental field surveys would be required prior to implementation to determine if sensitive resources occur within project area and can be avoided. If impact avoidance is not possible, several permits could be required including CEQA (private land) and NEPA (federal land) review, species and waters permitting, and cultural resources and tribal consultations.

Project area is within treatable landscape area as defined within the CalVTP. If all project impacts are within the scope of the Programmatic EIR prepared for the CalVTP program, the CEQA environmental review process can be streamlined.



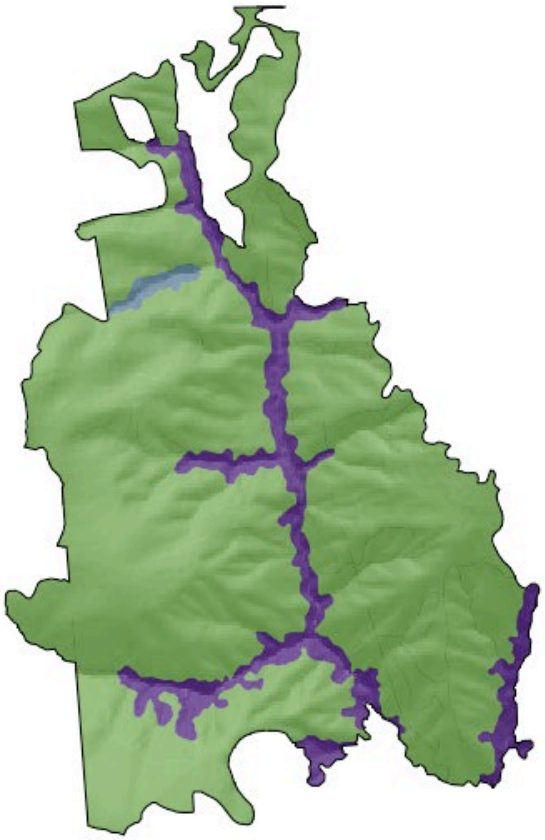


Maintenance/Reoccurrence Considerations:

It is recommended that a maintenance plan be developed for each project and annual inspections by a trained professional occur post treatment specifically focused on reoccurring maintenance. Some maintenance considerations may include, but are not limited to, the following:

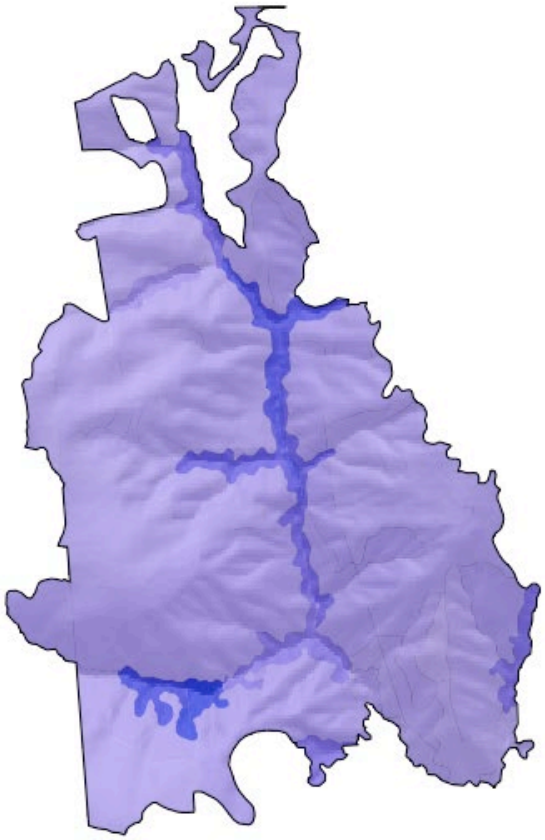
- Conduct goat grazing and hand thinning approximately every 1-2 years to prevent re-growth of vegetation. Goat grazing is effective on re-sprouts or young plants that grow back following initial treatment; however, require intensive management, temporary fencing, predator control, and observation to ensure they do not consume desirable vegetation or sensitive plant species/communities.
- Reoccurring maintenance for more intensive treatments such as large tree removal-ladder fuel and overstory removal should occur on an approximately 3 to 5-year schedule.
- Time grazing treatments prior to weeds going to seed to minimize the spread of invasive weed species.
- Herbicide treatments may be required for cut eucalyptus stumps and for control of other invasives such as scotch broom, cape ivy, and jubata grass.
- Minimize ground disturbance when using mechanized equipment for large tree overstory and ladder fuel removal to the extent possible to minimize soil erosion and spread of invasive weeds.
- In areas where ground disturbance occurs, revegetate immediately with native vegetation.

PROJECT NO. 5



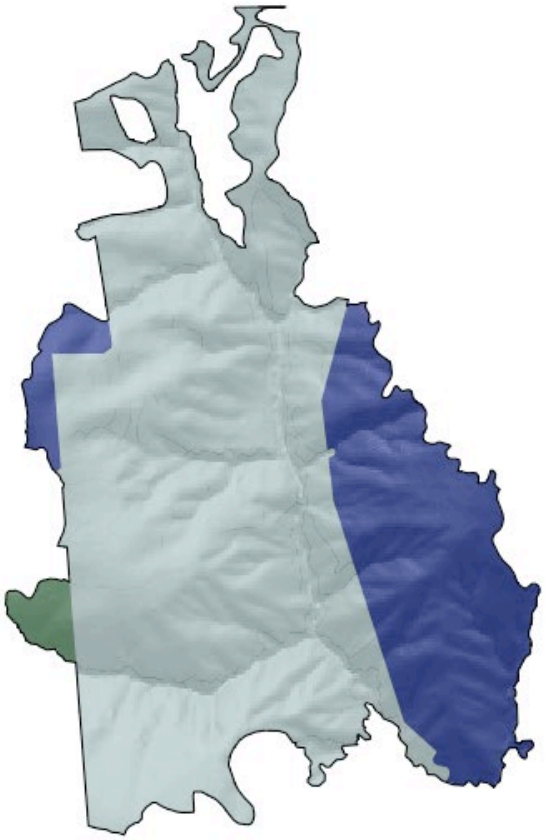
Treatment

- Grazing
- Large Tree Removal - Ladder Fuel Removal
- Large Tree Removal - Overstory Removal/Create Openings



TE / acre

- 200
- 250
- 300
- 350



Ownership

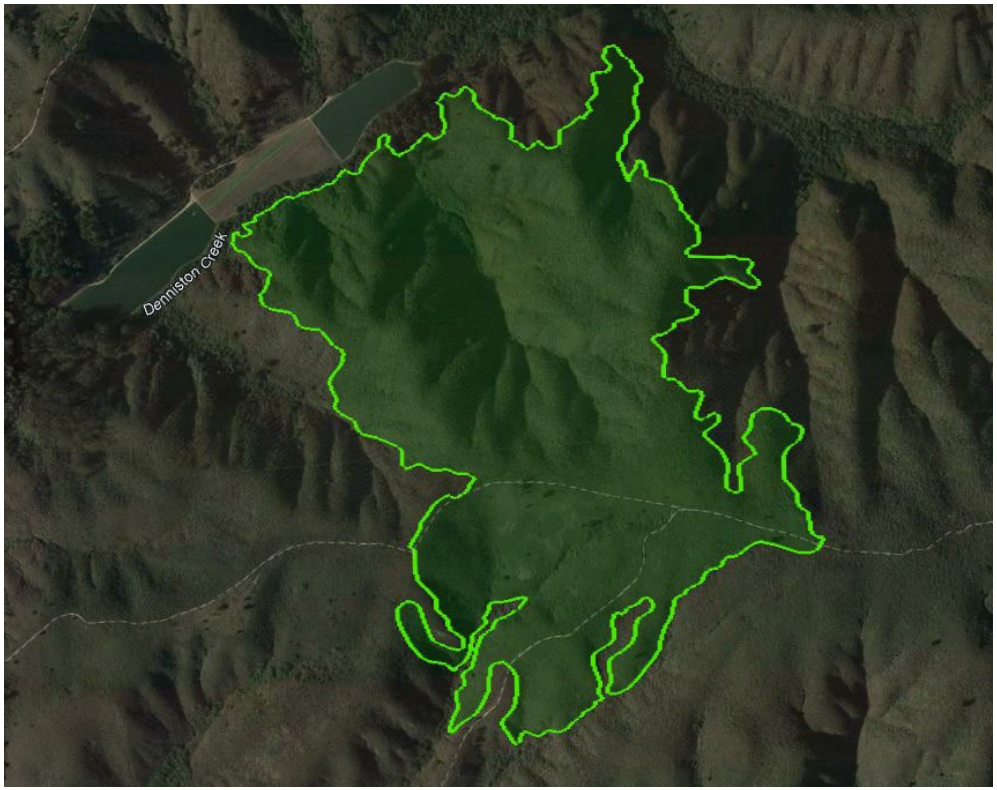
- National Park Service
- Peninsula Open Space Trust
- Private/Other

PROJECT NO. 6

Action ID	Action Name	Action Type
6	East Denniston Creek Drainage	Grazing, Large Tree/Overstory Removal, and Rearrangement - Mastication/Mowing

Action Metrics	
Treatment Effectiveness Score:	38,955
Cost Estimate:	$224,242 - $291,515
Acres:	217
Land Ownership	National Park Service (217 acres)
Responsible Party:	National Park Service

Project 6 General Location



Description of Action:

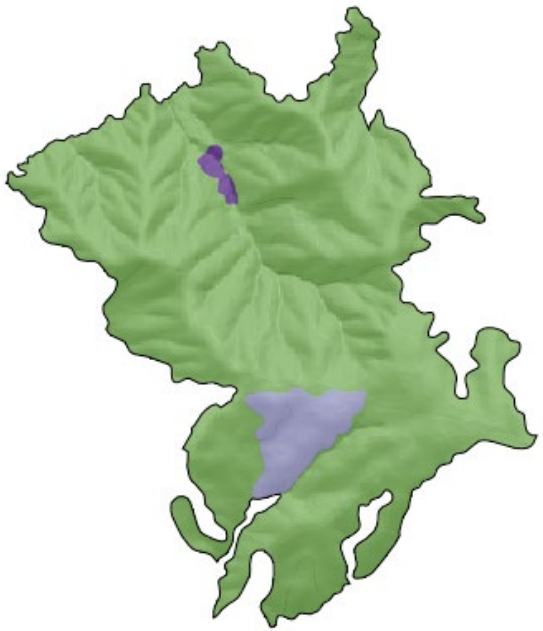
Project 6 is located approximately 0.65 mile north of the community of El Granada within the Denniston Creek Drainage, and east of Project No. 3.

Project 6 involves a combination of treatment methods, with grazing being the predominant treatment method (205 acres), followed by Rearrangement – Mastication/Mowing (11 acres), and Large Tree/Overstory Removal-Create Openings (1 acre).

PROJECT NO. 6

Environmental Review Requirements:

Environmental field surveys would be required prior to implementation to determine if sensitive resources occur within project area and can be avoided. If impact avoidance is not possible, several permits could be required including NEPA review as this project occurs only on federal land, species and waters permitting, and cultural resources and tribal consultations.

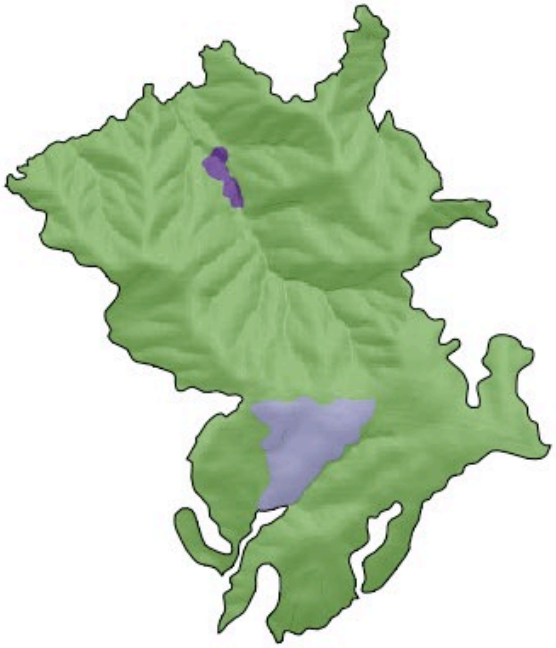


Maintenance/Reoccurrence Considerations:

It is recommended that a maintenance plan be developed for each project and annual inspections by a trained professional occur post treatment specifically focused on reoccurring maintenance. Some maintenance considerations may include, but are not limited to, the following:

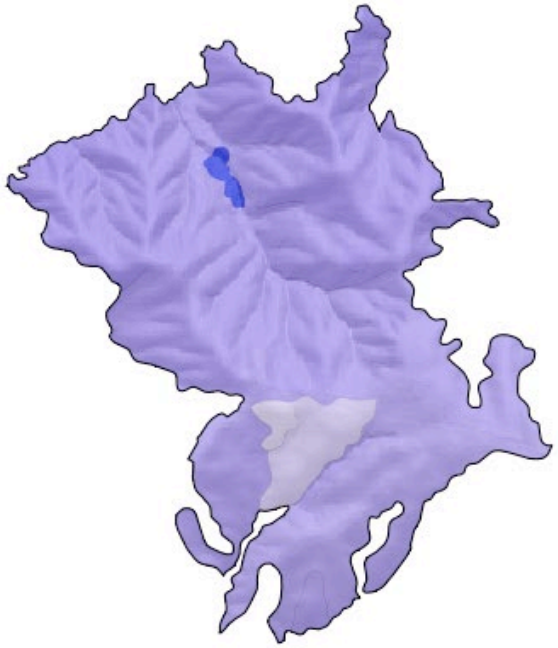
- Conduct goat grazing approximately every 1-2 years to prevent re-growth of vegetation. Goat grazing is effective on re-sprouts or young plants that grow back following initial treatment; however, require intensive management, temporary fencing, predator control, and observation to ensure they do not consume desirable vegetation or sensitive plant species/communities.
- Reoccurring maintenance for more intensive treatments such as large tree removal-overstory removal should occur on an approximately 3 to 5-year schedule.
- Time grazing and mastication/mowing treatments prior to weeds going to seed to minimize the spread of invasive weed species and remove material from site.
- Herbicide treatments may be required for cut eucalyptus stumps and for control of other invasives such as scotch broom, cape ivy, and jubata grass.
- Minimize ground disturbance when using mechanized equipment for large tree overstory and mastication to the extent possible to minimize soil erosion and spread of invasive weeds.
- In areas where ground disturbance occurs, revegetate immediately with native vegetation.

PROJECT NO. 6



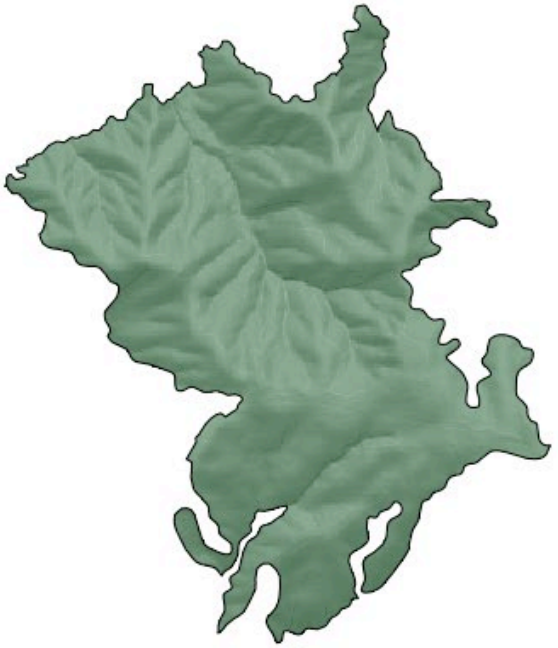
Treatment

- Grazing
- Large Tree Removal - Overstory Removal/Create Openings
- Rearrangement - Mastication or Mowing



TE / acre

- 100
- 200
- 300



Ownership

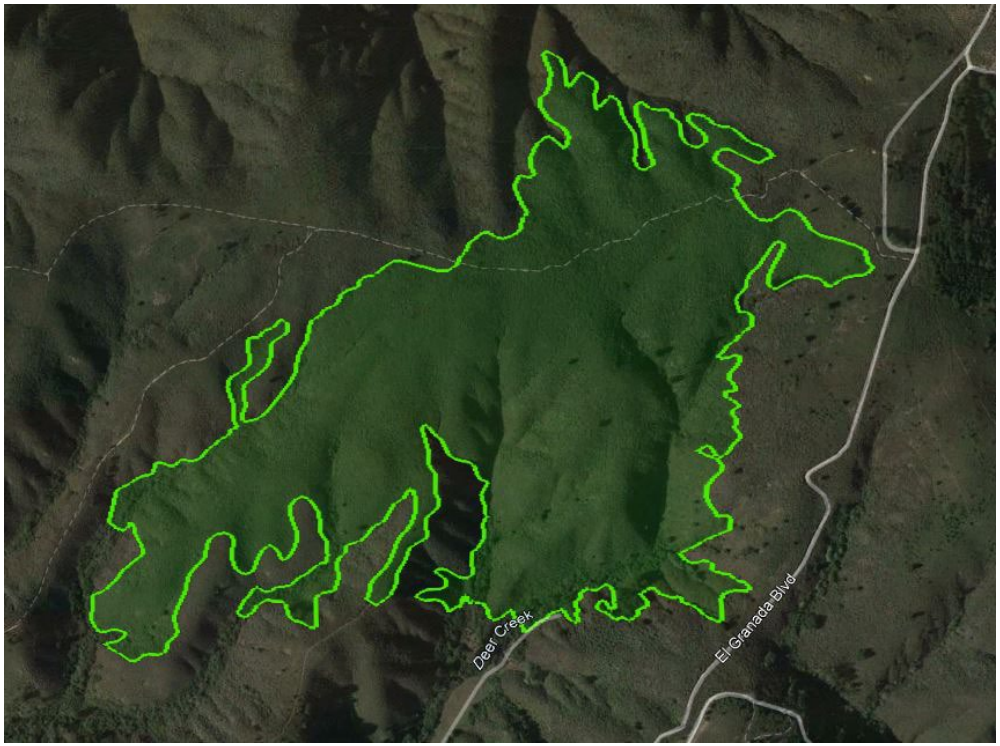
- National Park Service

PROJECT NO. 7

Action ID	Action Name	Action Type
7	North Deer Creek Drainage	Grazing, Hand Thinning -Chip/Pile, Rearrangement - Mastication/Mowing, and Large Tree/Ladder Fuel Removal

Action Metrics	
Treatment Effectiveness Score:	36,466
Cost Estimate:	$292,481 - $380,225
Acres:	210
Land Ownership	National Park Service (210 acres)
Responsible Party:	National Park Service

Project 7 General Location



Description of Action:

Project 7 is located entirely on National Park Service land on the west side of El Granada Boulevard, and north of Project No. 1 within the Deer Creek Drainage area.

Project 7 involves a combination of treatment methods, with grazing being the predominant treatment method (198 acres), followed by Hand Thinning – Chip/Pile (8 acres) within the Deer Creek Drainage and tributary to San Agustin Creek, Rearrangement – Mastication/Mowing (3 acres), and Large Tree/Ladder Fuel Removal (1 acre) along Deer Creek.

PROJECT NO. 7

Environmental Review Requirements:

Environmental field surveys would be required prior to implementation to determine if sensitive resources occur within project area and can be avoided. If impact avoidance is not possible, several permits could be required including NEPA review as this project occurs only on federal land, species and waters permitting, and cultural resources and tribal consultations.

Maintenance/Reoccurrence Considerations:

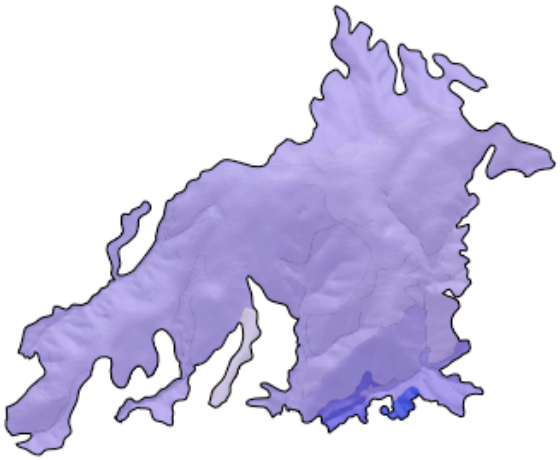
It is recommended that a maintenance plan be developed for each project and annual inspections by a trained professional occur post treatment specifically focused on reoccurring maintenance. Some maintenance considerations may include, but are not limited to, the following:

- Conduct goat grazing and hand thinning approximately every 1-2 years to prevent re-growth of vegetation. Goat grazing is effective on re-sprouts or young plants that grow back following initial treatment; however, require intensive management, temporary fencing, predator control, and observation to ensure they do not consume desirable vegetation or sensitive plant species/communities.
- Reoccurring maintenance for more intensive treatments such as large tree removal-ladder fuel removal should occur on an approximately 3 to 5-year schedule.
- Time hand thinning, grazing, and mastication/mowing treatments prior to weeds going to seed to minimize the spread of invasive weed species and remove material from site.
- Herbicide treatments may be required for cut eucalyptus stumps and for control of other invasives such as scotch broom, cape ivy, and jubata grass.
- Minimize ground disturbance when using mechanized equipment for large tree ladder fuel removal and mastication to the extent possible to minimize soil erosion and spread of invasive weeds.
- In areas where ground disturbance occurs, revegetate immediately with native vegetation.

PROJECT NO. 7

Treatment

- Grazing
- Hand thinning - Chip or Pile
- Large Tree Removal - Ladder Fuel Removal
- Rearrangement - Mastication or Mowing



TE / acre

- 100
- 200
- 300

Ownership

- National Park Service

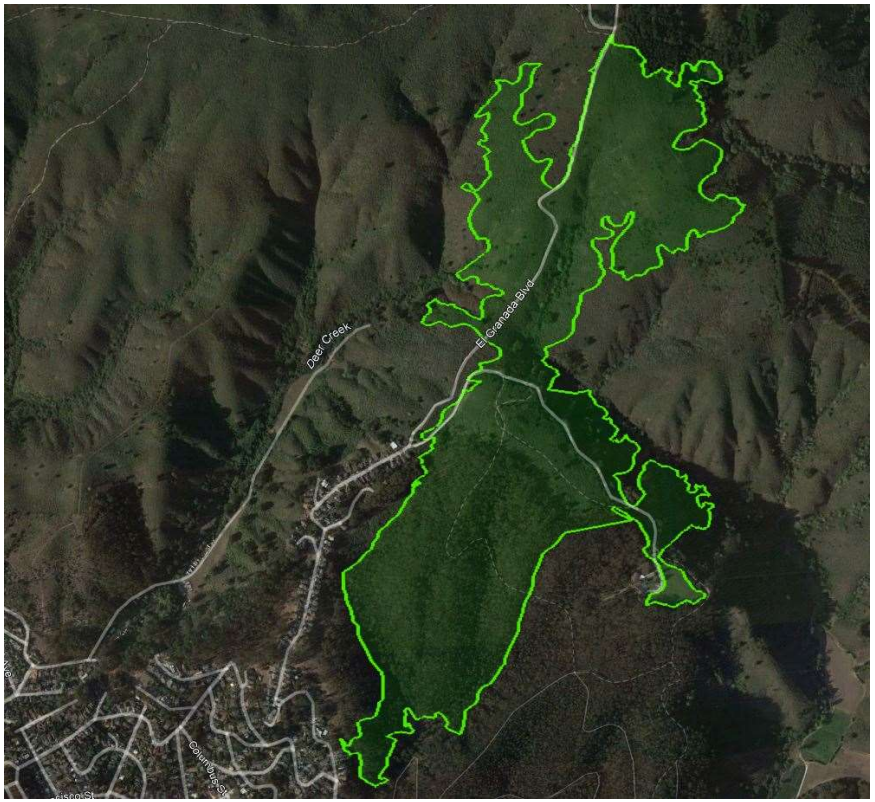
PROJECT NO. 8

Action ID	Action Name	Action Type
8	North Quarry Park	Large Tree/Ladder Fuel Removal, Grazing, Rearrangement - Mastication/Mowing, and Hand Thinning-Chip/Pile

Action Metrics

Treatment Effectiveness Score:	36,580
Cost Estimate:	$859,081-$1,116,805
Acres:	210
Land Ownership	National Park Service (89 acres) San Mateo County Parks and Recreation Department (119 acres) Private/Other (3 acres)
Responsible Party:	Multiple

Project 8 General Location



Description of Action:

Project 8 is located on the east side and north of El Granada Boulevard and encompasses the northern portion of Quarry Park.

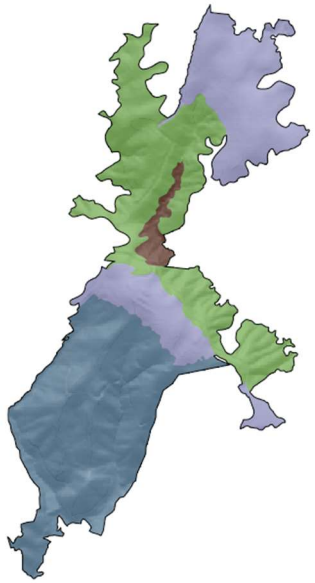
Project 8 involves a combination of treatment methods, including Large Tree/Ladder Fuel Removal (83 acres) within the eucalyptus grove within Quarry Park, Grazing (65 acres), Rearrangement-Mastication/Mowing (58 acres) north of Quarry Park, and Hand Thinning-Chip/Pile (5 acres) in an unnamed drainage east of Upper El Granada Boulevard.

PROJECT NO. 8

Environmental Review Requirements:

Environmental field surveys would be required prior to implementation to determine if sensitive resources occur within project area and can be avoided. If impact avoidance is not possible, several permits could be required including CEQA (private and County land) and NEPA (federal land) review, species and waters permitting, and cultural resources and tribal consultations.

Project area is within treatable landscape area as defined within the CalVTP. If all project impacts are within the scope of the Programmatic EIR prepared for the CalVTP program, the CEQA environmental review process can be streamlined.

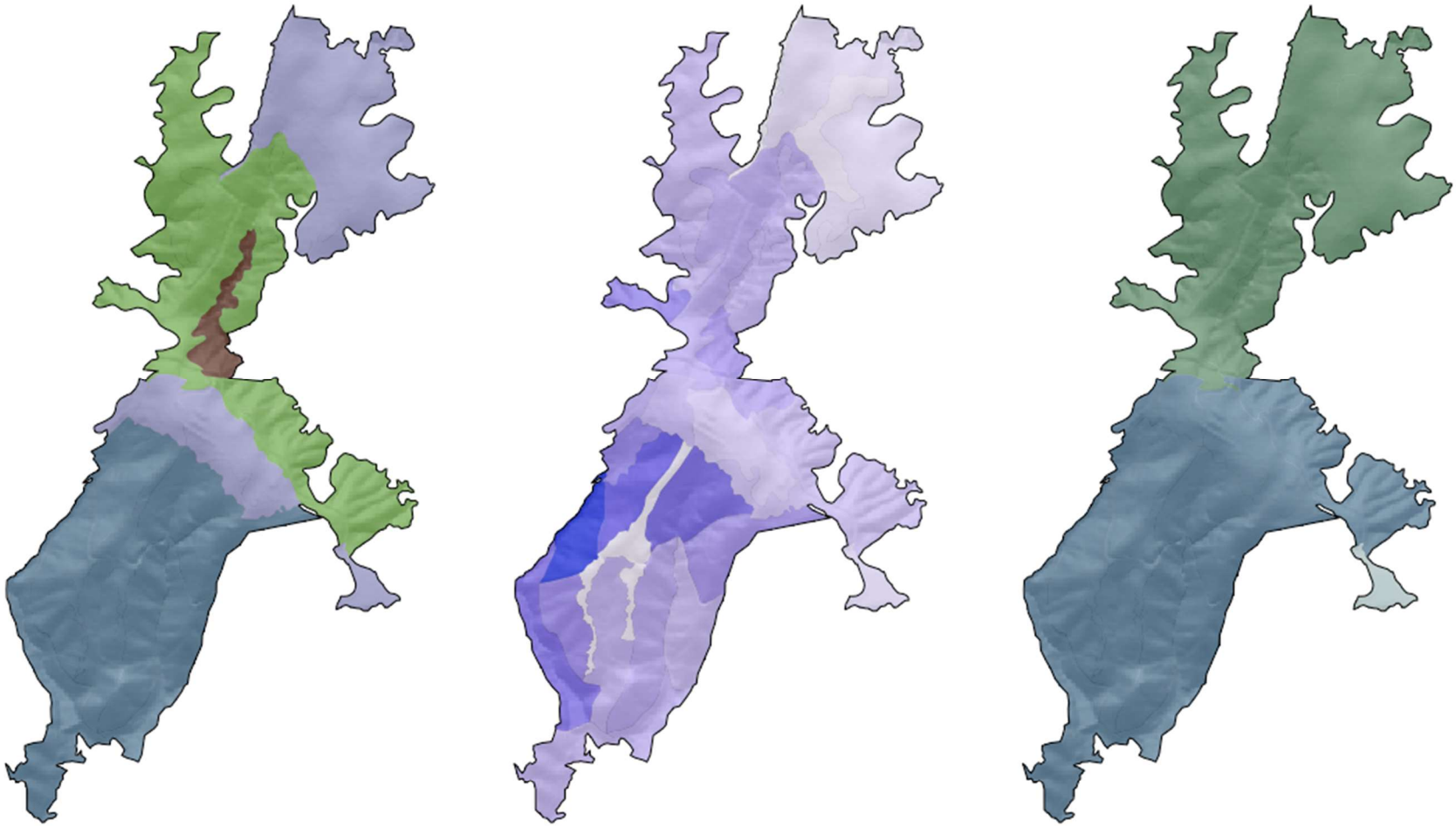


Maintenance/Reoccurrence Considerations:

It is recommended that a maintenance plan be developed for each project and annual inspections by a trained professional occur post treatment specifically focused on reoccurring maintenance. Some maintenance considerations may include, but are not limited to, the following:

- Conduct goat grazing and hand thinning approximately every 1-2 years to prevent re-growth of vegetation. Goat grazing is effective on re-sprouts or young plants that grow back following initial treatment; however, require intensive management, temporary fencing, predator control, and observation to ensure they do not consume desirable vegetation or sensitive plant species/communities.
- Reoccurring maintenance for more intensive treatments such as large tree removal-ladder fuel removal should occur on an approximately 3 to 5-year schedule.
- Time hand thinning, grazing, and mastication/mowing treatments prior to weeds going to seed to minimize the spread of invasive weed species and remove material from site.
- Herbicide treatments may be required for cut eucalyptus stumps and for control of other invasives such as scotch broom, cape ivy, and jubata grass.
- Minimize ground disturbance when using mechanized equipment for large tree ladder fuel removal and mastication to the extent possible to minimize soil erosion and spread of invasive weeds.
- In areas where ground disturbance occurs, revegetate immediately with native vegetation.

PROJECT NO. 8


Treatment
Grazing
Hand thinning - Chip or Pile
Large Tree Removal - Ladder Fuel Removal
Rearrangement - Mastication or Mowing
TE / acre
100
200
300
400
Ownership
National Park Service
Private/Other
San Mateo County Parks and Recreation Dept., County of

PROJECT NO. 9

Action ID	Action Name	Action Type
9	Frenchman's Creek Drainage	Grazing, Rearrangement - Mastication/Mowing, Large Tree/Ladder Fuel Removal, Hand Thinning-Chip/Pile, and Large Tree/Overstory Removal

Action Metrics

Treatment Effectiveness Score:	37,358
Cost Estimate:	$518,118-$673,553
Acres:	211
Land Ownership	Private/Other (211 acres)
Responsible Party:	Multiple

Project 9 General Location

Description of Action:

Project 9 is located east of the communities of El Granada and Miramar and northeast of the nurseries along Highway 1 within the northern portion of the Frenchman's Creek Drainage.

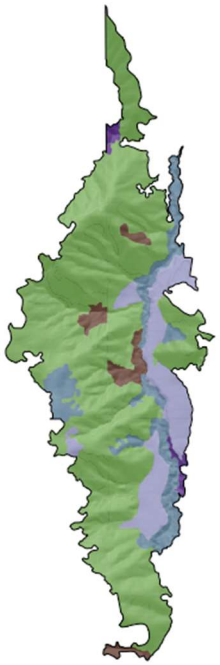
Project 9 involves a combination of treatment methods, including Grazing (152 acres), Rearrangement-Mastication/Mowing (26 acres), Large Tree/Ladder Fuel Removal (23 acres) along the Frenchman's Creek Drainage, Hand Thinning-Chip/Pile (8 acres), and Large Tree/Overstory Removal (2 acres)

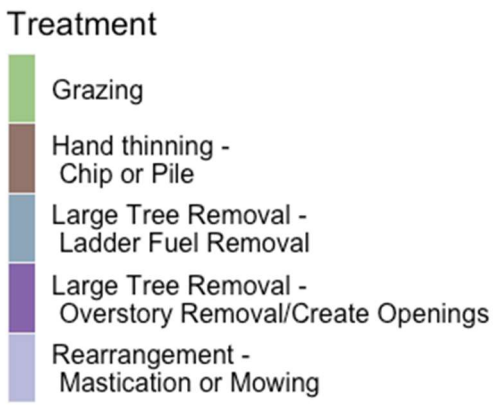
PROJECT NO. 9

Environmental Review Requirements:

Environmental field surveys would be required prior to implementation to determine if sensitive resources occur within project area and can be avoided. If impact avoidance is not possible, several permits could be required including CEQA review, species and waters permitting, and cultural resources and tribal consultations.

Project area is within treatable landscape area as defined within the CalVTP. If all project impacts are within the scope of the Programmatic EIR prepared for the CalVTP program, the CEQA environmental review process can be streamlined.



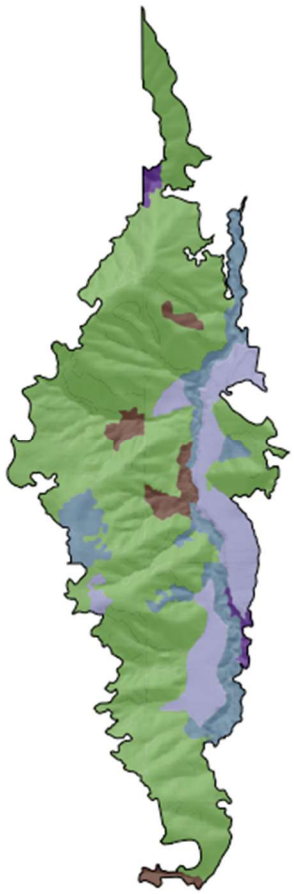


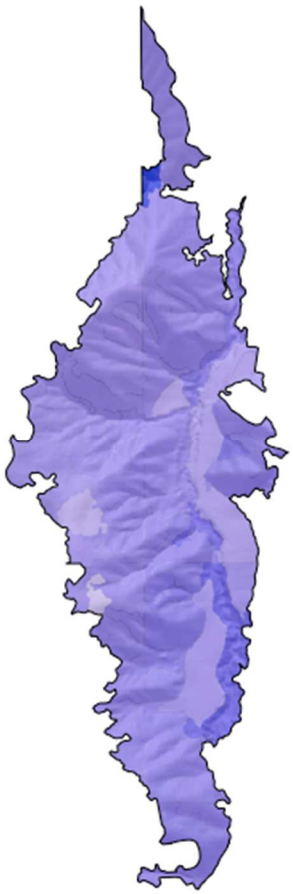
Maintenance/Reoccurrence Considerations:

It is recommended that a maintenance plan be developed for each project and annual inspections by a trained professional occur post treatment specifically focused on reoccurring maintenance. Some maintenance considerations may include, but are not limited to, the following:

- Conduct goat grazing and hand thinning approximately every 1-2 years to prevent re-growth of vegetation. Goat grazing is effective on re-sprouts or young plants that grow back following initial treatment; however, require intensive management, temporary fencing, predator control, and observation to ensure they do not consume desirable vegetation or sensitive plant species/communities.
- Reoccurring maintenance for more intensive treatments such as large tree removal-ladder fuel and overstory removal should occur on an approximately 3 to 5-year schedule.
- Time hand thinning, grazing, and mastication/mowing treatments prior to weeds going to seed to minimize the spread of invasive weed species and remove material from site.
- Herbicide treatments may be required for cut eucalyptus stumps and for control of other invasives such as scotch broom, cape ivy, and jubata grass.
- Minimize ground disturbance when using mechanized equipment for large tree overstory and ladder fuel removal and mastication to the extent possible to minimize soil erosion and spread of invasive weeds.
- In areas where ground disturbance occurs, revegetate immediately with native vegetation.

PROJECT NO. 9





Treatment

- Grazing
- Hand thinning - Chip or Pile
- Large Tree Removal - Ladder Fuel Removal
- Large Tree Removal - Overstory Removal/Create Openings
- Rearrangement - Mastication or Mowing

TE / acre

- 100
- 150
- 200
- 250

Ownership

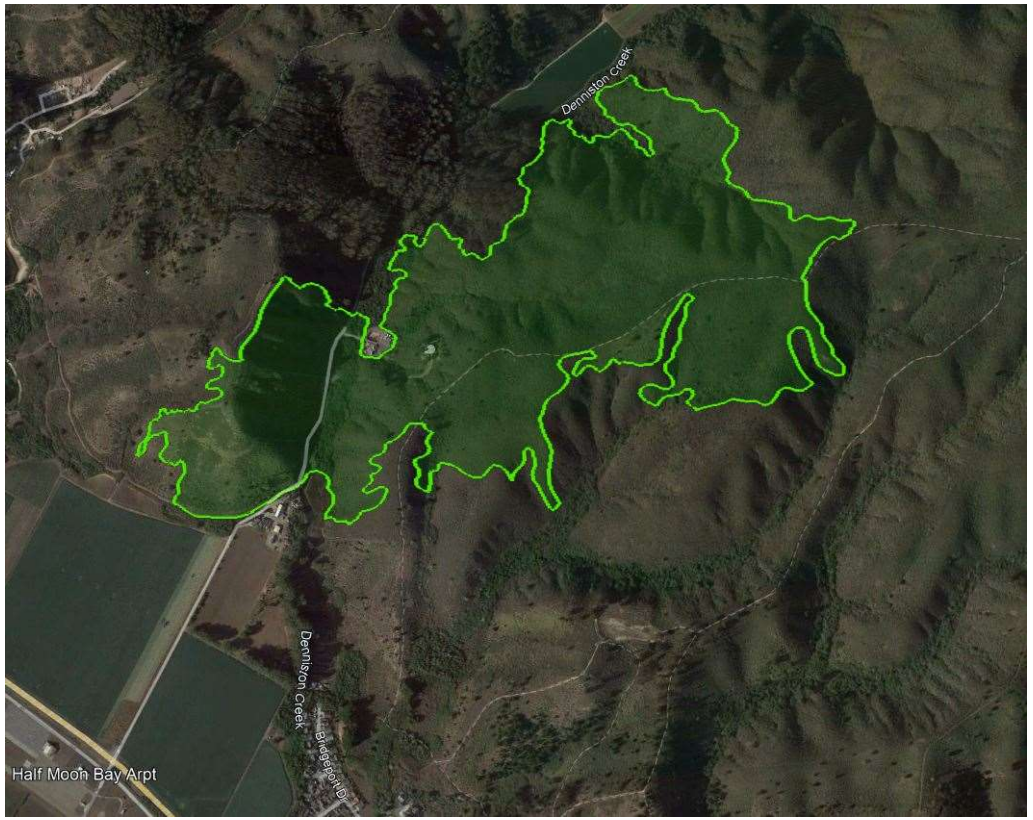
- Private/Other

PROJECT NO. 10

Action ID	Action Name	Action Type
10	South Denniston Creek Drainage	Grazing, Rearrangement - Mastication/Mowing, Hand Thinning – Chip/Pile, and Large Tree/Overstory Removal

Action Metrics	
Treatment Effectiveness Score:	35,516
Cost Estimate:	$620,335-$806,435
Acres:	223
Land Ownership	National Park Service (219 acres) Private/Other (4 acres)
Responsible Party:	Multiple

Project 10 General Location



Description of Action:

Project 10 is located immediately to the north of the agricultural fields west of the Clipper Ridge neighborhood and north of Highway 1. This project area is south of Project Nos. 3 and 6.

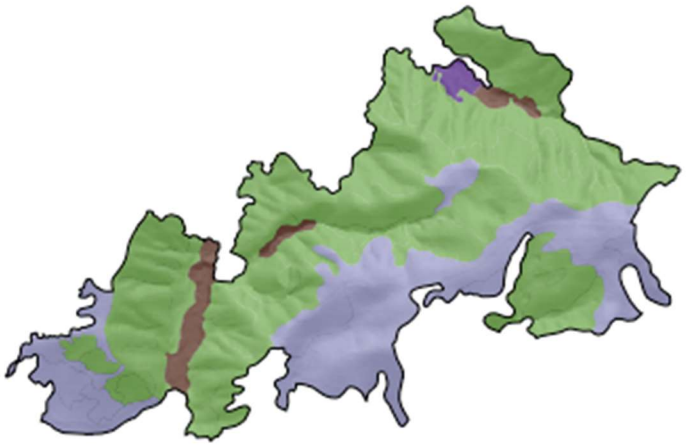
Project 10 involves a combination of treatment methods, with grazing being the predominant treatment method (147 acres), followed by Rearrangement – Mastication/Mowing (66 acres), Hand Thinning – Chip/Pile (8 acres), and Large Tree/Overstory Removal-Create Openings (2 acres).

PROJECT NO. 10

Environmental Review Requirements:

Environmental field surveys would be required prior to implementation to determine if sensitive resources occur within project area and can be avoided. If impact avoidance is not possible, several permits could be required including CEQA (private land) and NEPA (federal land) review, species and waters permitting, and cultural resources and tribal consultations.

Project area is within treatable landscape area as defined within the CalVTP. If all project impacts are within the scope of the Programmatic EIR prepared for the CalVTP program, the CEQA environmental review process can be streamlined.

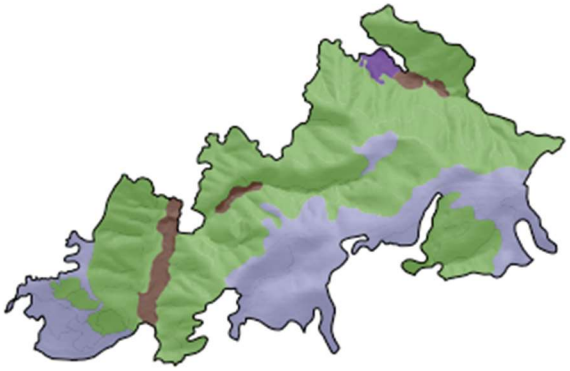


Maintenance/Reoccurrence Considerations:

It is recommended that a maintenance plan be developed for each project and annual inspections by a trained professional occur post treatment specifically focused on reoccurring maintenance. Some maintenance considerations may include, but are not limited to, the following:

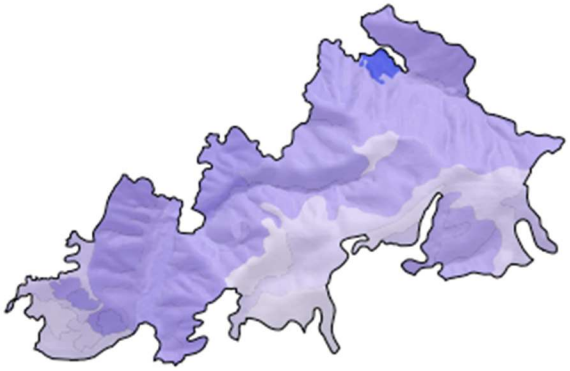
- Conduct goat grazing and hand thinning approximately every 1-2 years to prevent re-growth of vegetation. Goat grazing is effective on re-sprouts or young plants that grow back following initial treatment; however, require intensive management, temporary fencing, predator control, and observation to ensure they do not consume desirable vegetation or sensitive plant species/communities.
- Reoccurring maintenance for more intensive treatments such as large tree removal-overstory removal should occur on an approximately 3 to 5-year schedule.
- Time hand thinning, grazing, and mastication/mowing treatments prior to weeds going to seed to minimize the spread of invasive weed species and remove material from site.
- Herbicide treatments may be required for cut eucalyptus stumps and for control of other invasives such as scotch broom, cape ivy, and jubata grass.
- Minimize ground disturbance when using mechanized equipment for large tree overstory removal and mastication to the extent possible to minimize soil erosion and spread of invasive weeds.
- In areas where ground disturbance occurs, revegetate immediately with native vegetation.

PROJECT NO. 10



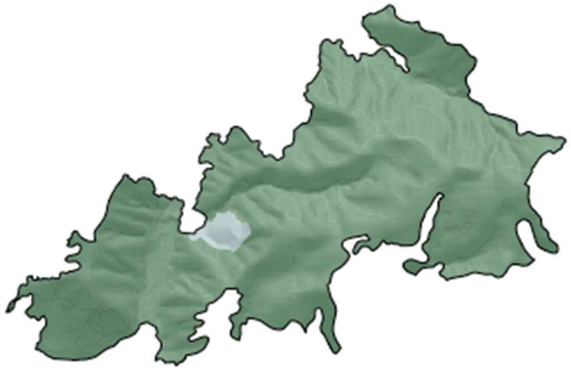
Treatment

- Grazing
- Hand thinning - Chip or Pile
- Large Tree Removal - Overstory Removal/Create Openings
- Rearrangement - Mastication or Mowing



TE / acre

- 100
- 200
- 300



Ownership

- National Park Service
- Private/Other

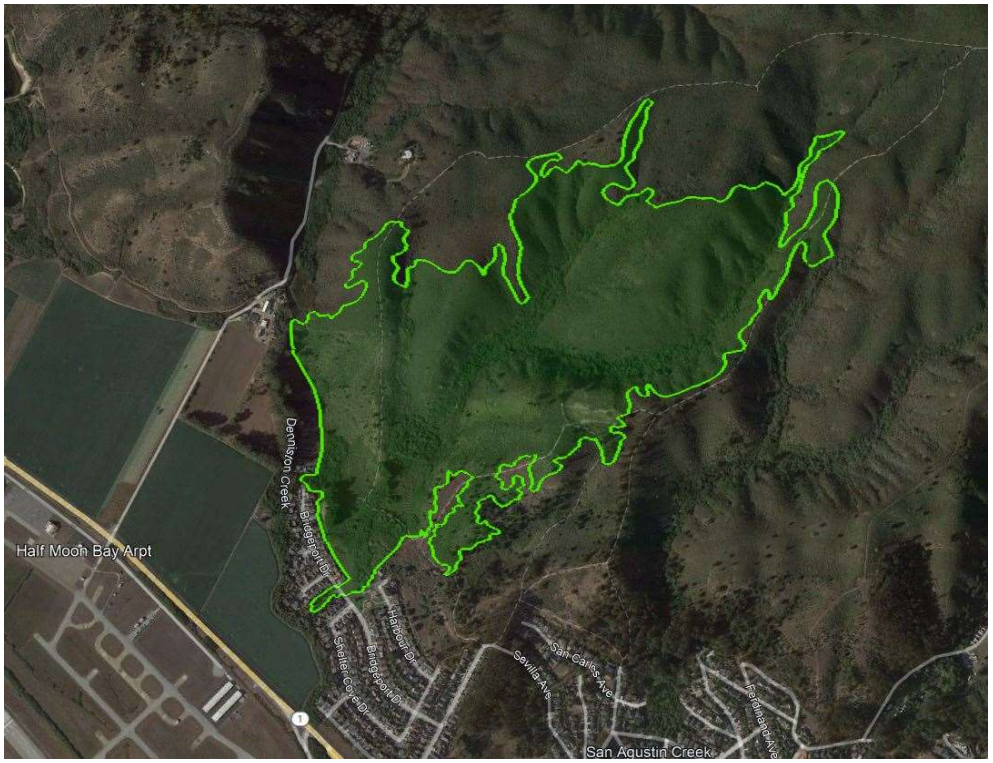
PROJECT NO. 11

Action ID	Action Name	Action Type
11	North of Clipper Ridge	Grazing, Rearrangement - Mastication/Mowing, and Hand Thinning-Chip/Pile

Action Metrics

Treatment Effectiveness Score:	33,809
Cost Estimate:	$821,486-$1,067,931
Acres:	202
Land Ownership	National Park Service (192 acres) Private/Other (10 acres)
Responsible Party:	Multiple

Project 11 General Location



Description of Action:

Project 11 is located north of the Clipper Ridge neighborhood, with Denniston Creek to the west, and Bridgepoint and Harbour Drives to the south.

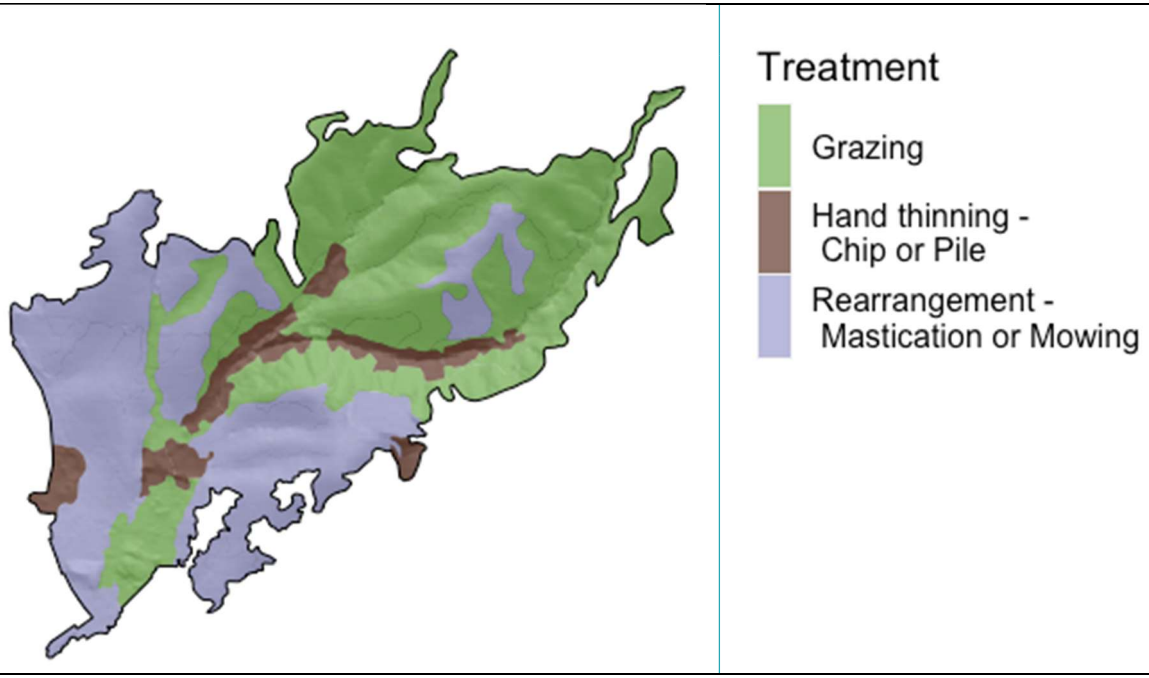
Project 11 involves a combination of treatment methods, including Grazing (99 acres), Rearrangement-Mastication/Mowing (85 acres), and Hand Thinning-Chip/Pile (18 acres) along drainage channels.

PROJECT NO. 11

Environmental Review Requirements:

Environmental field surveys would be required prior to implementation to determine if sensitive resources occur within project area and can be avoided. If impact avoidance is not possible, several permits could be required including CEQA (private land) and NEPA (federal land) review, species and waters permitting, and cultural resources and tribal consultations.

Project area is within treatable landscape area as defined within the CalVTP. If all project impacts are within the scope of the Programmatic EIR prepared for the CalVTP program, the CEQA environmental review process can be streamlined.

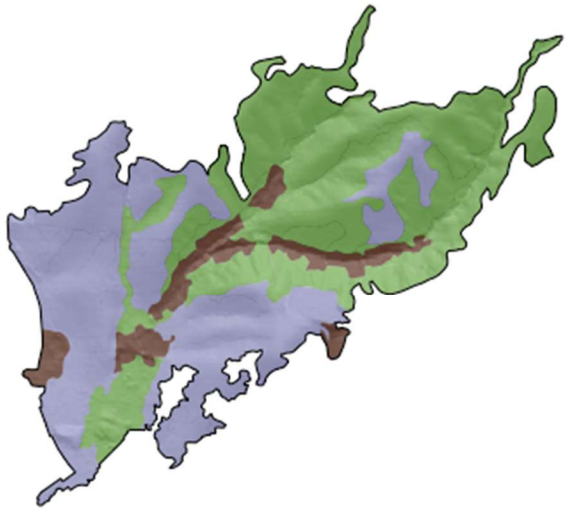


Maintenance/Reoccurrence Considerations:

It is recommended that a maintenance plan be developed for each project and annual inspections by a trained professional occur post treatment specifically focused on reoccurring maintenance. Some maintenance considerations may include, but are not limited to, the following:

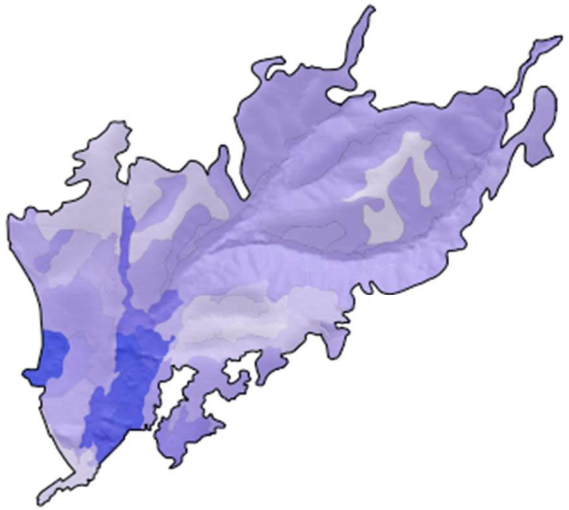
- Conduct goat grazing and hand thinning approximately every 1-2 years to prevent re-growth of vegetation. Goat grazing is effective on re-sprouts or young plants that grow back following initial treatment; however, require intensive management, temporary fencing, predator control, and observation to ensure they do not consume desirable vegetation or sensitive plant species/communities.
- Time grazing, hand thinning, and mastication/mowing treatments prior to weeds going to seed to minimize the spread of invasive weed species and remove material from site.
- Herbicide treatments may be required for cut eucalyptus stumps and for control of other invasives such as scotch broom, cape ivy, and jubata grass.
- Minimize ground disturbance when using mechanized equipment for mastication to the extent possible to minimize soil erosion and spread of invasive weeds.
- In areas where ground disturbance occurs, revegetate immediately with native vegetation.

PROJECT NO. 11



Treatment

- Grazing
- Hand thinning - Chip or Pile
- Rearrangement - Mastication or Mowing



TE / acre

- 100
- 200
- 300

Ownership

- National Park Service
- Private/Other

PROJECT NO. 12

Action ID	Action Name	Action Type
12	San Vicente Creek Drainage	Rearrangement - Mastication/Mowing, Large Tree/Ladder Fuel Removal, Grazing, and Hand Thinning-Chip/Pile

Action Metrics	
Treatment Effectiveness Score:	35,480
Cost Estimate:	$1,176,919-$1,529,994
Acres:	232
Land Ownership	National Park Service (162 acres) Private/Other (70 acres)
Responsible Party:	Multiple

Project 12 General Location

Description of Action:

Project 12 is located on the east side of the community of Montara, southeast of Moss Beach along Ranch Road and San Vicente Creek, and north of the Highway 1 agricultural fields between Moss Beach and El Granada.

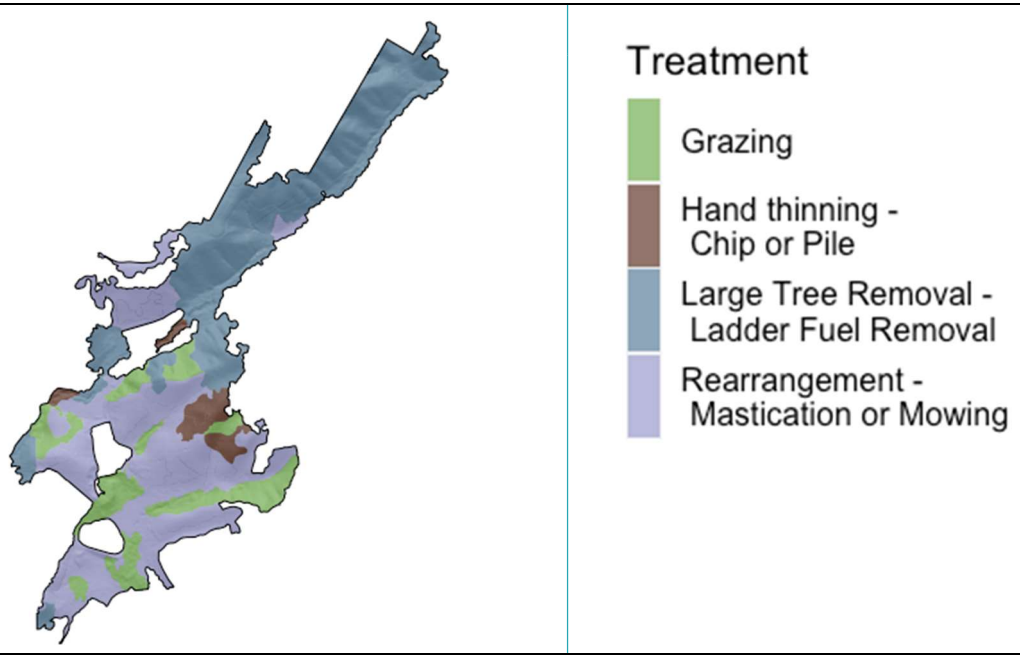
Project 12 involves a combination of treatment methods, including Rearrangement-Mastication/Mowing (94 acres) within coastal scrub areas, Large Tree/Ladder Fuel Removal (93 acres) within a eucalyptus grove along San Vicente Creek, Grazing (35 acres) and Hand Thinning-Chip/Pile (11 acres).

PROJECT NO. 12

Environmental Review Requirements:

Environmental field surveys would be required prior to implementation to determine if sensitive resources occur within project area and can be avoided. If impact avoidance is not possible, several permits could be required including CEQA (private land) and NEPA (federal land) review, species and waters permitting, and cultural resources and tribal consultations.

Project area is within treatable landscape area as defined within the CalVTP. If all project impacts are within the scope of the Programmatic EIR prepared for the CalVTP program, the CEQA environmental review process can be streamlined.

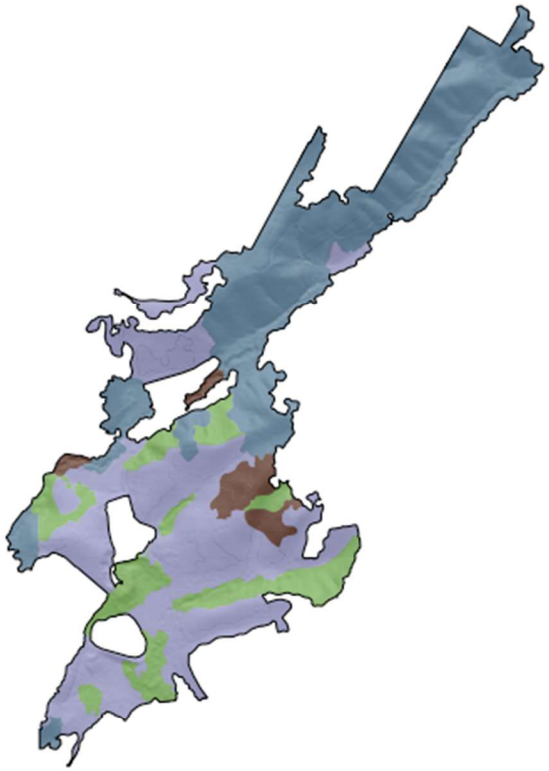


Maintenance/Reoccurrence Considerations:

It is recommended that a maintenance plan be developed for each project and annual inspections by a trained professional occur post treatment specifically focused on reoccurring maintenance. Some maintenance considerations may include, but are not limited to, the following:

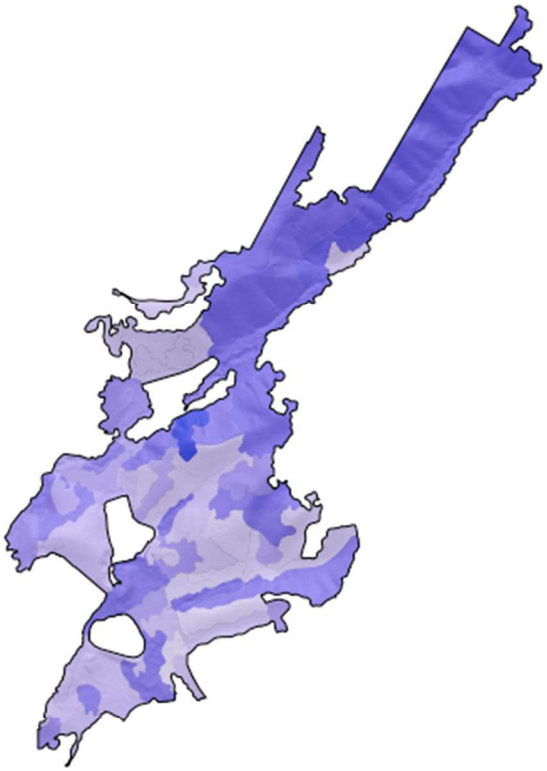
- Conduct goat grazing and hand thinning approximately every 1-2 years to prevent re-growth of vegetation. Goat grazing is effective on re-sprouts or young plants that grow back following initial treatment; however, require intensive management, temporary fencing, predator control, and observation to ensure they do not consume desirable vegetation or sensitive plant species/communities.
- Reoccurring maintenance for more intensive treatments such as large tree removal-ladder fuel removal should occur on an approximately 3 to 5-year schedule.
- Time hand thinning, grazing, and mastication/mowing treatments prior to weeds going to seed to minimize the spread of invasive weed species and remove material from site.
- Herbicide treatments may be required for cut eucalyptus stumps and for control of other invasives such as scotch broom, cape ivy, and jubata grass.
- Minimize ground disturbance when using mechanized equipment for large tree ladder fuel removal and mastication to the extent possible to minimize soil erosion and spread of invasive weeds.
- In areas where ground disturbance occurs, revegetate immediately with native vegetation.

PROJECT NO. 12



Treatment

- Grazing
- Hand thinning - Chip or Pile
- Large Tree Removal - Ladder Fuel Removal
- Rearrangement - Mastication or Mowing



TE / acre

- 50
- 100
- 150
- 200
- 250

Ownership

- National Park Service
- Private/Other

PROJECT NO. 13

Action ID	Action Name	Action Type
13	North Miramar	Grazing, Large Tree/Ladder Fuel Removal, Hand Thinning-Chip/Pile, Rearrangement - Mastication/Mowing, and Large Tree/Overstory Removal

Action Metrics

Treatment Effectiveness Score:	38,757
Cost Estimate:	$634,492-$824,839
Acres:	248
Land Ownership	Private/Other (248 acres)
Responsible Party:	Multiple

Project 13 General Location

Description of Action:

Project 13 is located east of Quarry Park and north of the community of Miramar along Purisima Way and Purisima Creek.

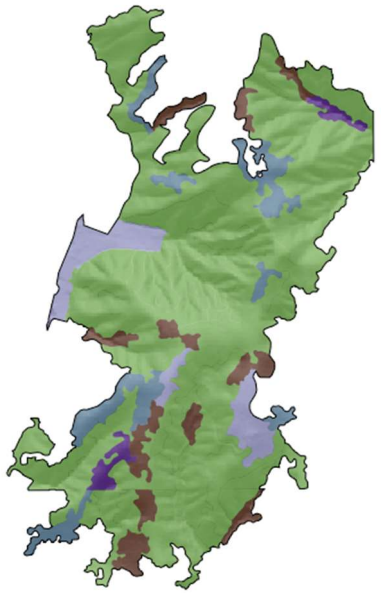
Project 13 involves a combination of treatment methods, including Grazing (193 acres), Large Tree/Ladder Fuel Removal (19 acres), Hand Thinning-Chip/Pile (17 acres), Rearrangement-Mastication/Mowing (15 acres), and Large Tree/Overstory Removal (4 acres)

PROJECT NO. 13

Environmental Review Requirements:

Environmental field surveys would be required prior to implementation to determine if sensitive resources occur within project area and can be avoided. If impact avoidance is not possible, several permits could be required including CEQA review, species and waters permitting, and cultural resources and tribal consultations.

Project area is within treatable landscape area as defined within the CalVTP. If all project impacts are within the scope of the Programmatic EIR prepared for the CalVTP program, the CEQA environmental review process can be streamlined.

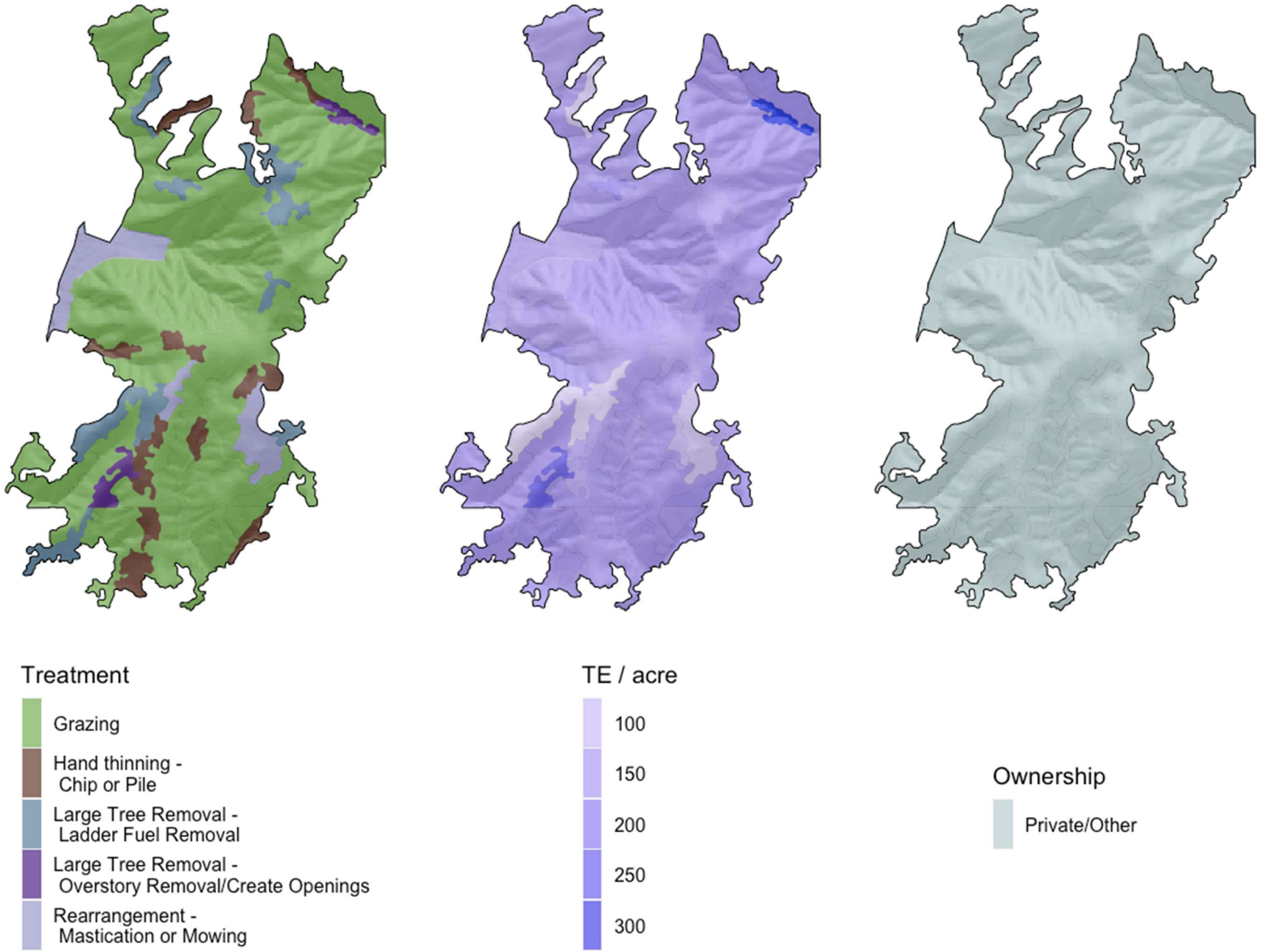


Maintenance/Reoccurrence Considerations:

It is recommended that a maintenance plan be developed for each project and annual inspections by a trained professional occur post treatment specifically focused on reoccurring maintenance. Some maintenance considerations may include, but are not limited to, the following:

- Conduct goat grazing and hand thinning approximately every 1-2 years to prevent re-growth of vegetation. Goat grazing is effective on re-sprouts or young plants that grow back following initial treatment; however, require intensive management, temporary fencing, predator control, and observation to ensure they do not consume desirable vegetation or sensitive plant species/communities.
- Reoccurring maintenance for more intensive treatments such as large tree removal-ladder fuel and overstory removal should occur on an approximately 3 to 5-year schedule.
- Time hand thinning, grazing, and mastication/mowing treatments prior to weeds going to seed to minimize the spread of invasive weed species and remove material from site.
- Herbicide treatments may be required for cut eucalyptus stumps and for control of other invasives such as scotch broom, cape ivy, and jubata grass.
- Minimize ground disturbance when using mechanized equipment for large tree overstory and ladder fuel removal and mastication to the extent possible to minimize soil erosion and spread of invasive weeds.
- In areas where ground disturbance occurs, revegetate immediately with native vegetation.

PROJECT NO. 13



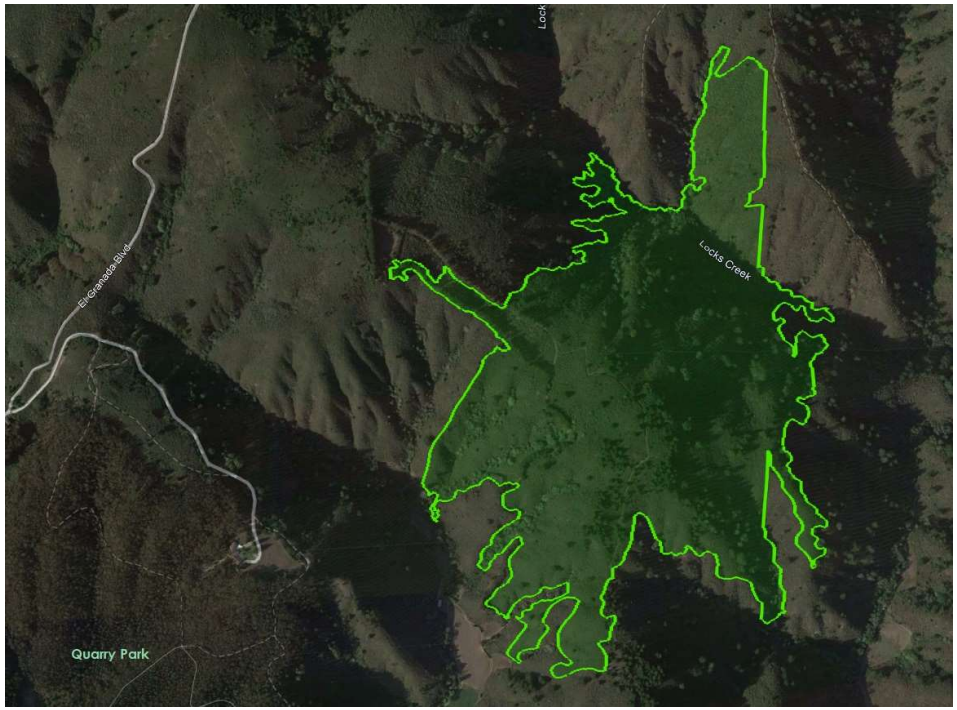
PROJECT NO. 14

Action ID	Action Name	Action Type
14	Between Purisima and Frenchman's Creek Drainages	Grazing, Large Tree/Overstory Removal, Hand Thinning – Chip/Pile, Large Tree/Ladder Fuel Removal, and Rearrangement – Mastication/Mowing

Action Metrics

Treatment Effectiveness Score:	34,270
Cost Estimate:	$676,908-$879,980
Acres:	217
Land Ownership	Private/Other (201 acres) Peninsula Open Space Trust (16 acres)
Responsible Party:	Multiple

Project 14 General Location



Description of Action:

Project 14 is located in an isolated area at the end of Purisima Way between the Purisima and Frenchman's Creek drainages and northeast of Quarry Park. Locks Creek traverses the northern portion of this project area.

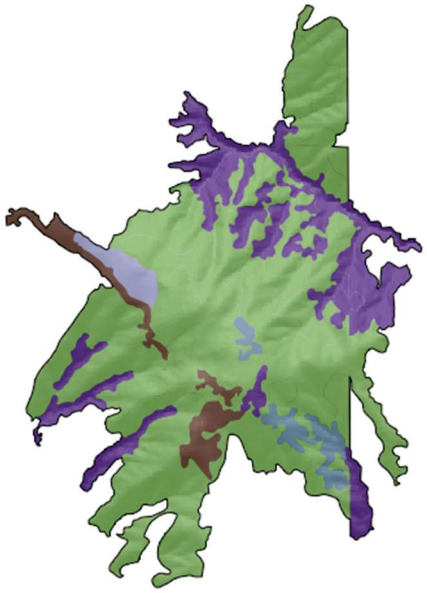
Project 14 involves a combination of treatment methods, with grazing being the predominant treatment method (153 acres), followed by Large Tree/Overstory Removal (44 acres) within Locks Creek and tributaries to Purisima Creek, Hand Thinning-Chip/Pile (10 acres), Large Tree/Ladder Fuel Removal (6 acres), and Rearrangement-Mastication/Mowing (4 acres).

PROJECT NO. 14

Environmental Review Requirements:

Environmental field surveys would be required prior to implementation to determine if sensitive resources occur within project area and can be avoided. If impact avoidance is not possible, several permits could be required including CEQA review, species and waters permitting, and cultural resources and tribal consultations.

Project area is within treatable landscape area as defined within the CalVTP. If all project impacts are within the scope of the Programmatic EIR prepared for the CalVTP program, the CEQA environmental review process can be streamlined.

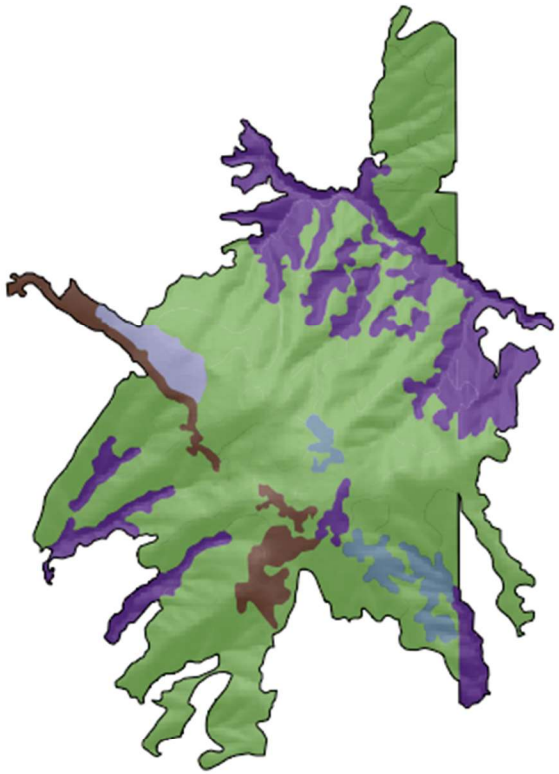


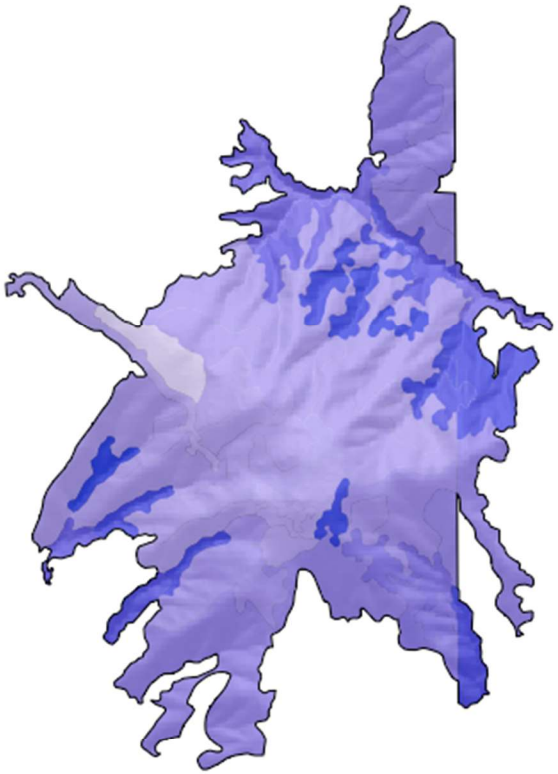
Maintenance/Reoccurrence Considerations:

It is recommended that a maintenance plan be developed for each project and annual inspections by a trained professional occur post treatment specifically focused on reoccurring maintenance. Some maintenance considerations may include, but are not limited to, the following:

- Conduct goat grazing and hand thinning approximately every 1-2 years to prevent re-growth of vegetation. Goat grazing is effective on re-sprouts or young plants that grow back following initial treatment; however, require intensive management, temporary fencing, predator control, and observation to ensure they do not consume desirable vegetation or sensitive plant species/communities.
- Reoccurring maintenance for more intensive treatments such as large tree removal-ladder fuel and overstory removal should occur on an approximately 3 to 5-year schedule.
- Time hand thinning, grazing, and mastication/mowing treatments prior to weeds going to seed to minimize the spread of invasive weed species and remove material from site.
- Herbicide treatments may be required for cut eucalyptus stumps and for control of other invasives such as scotch broom, cape ivy, and jubata grass.
- Minimize ground disturbance when using mechanized equipment for large tree overstory and ladder fuel removal and mastication to the extent possible to minimize soil erosion and spread of invasive weeds.
- In areas where ground disturbance occurs, revegetate immediately with native vegetation.

PROJECT NO. 14





Treatment

- Grazing
- Hand thinning - Chip or Pile
- Large Tree Removal - Ladder Fuel Removal
- Large Tree Removal - Overstory Removal/Create Openings
- Rearrangement - Mastication or Mowing

TE / acre

- 100
- 150
- 200
- 250

Ownership

- Peninsula Open Space Trust
- Private/Other

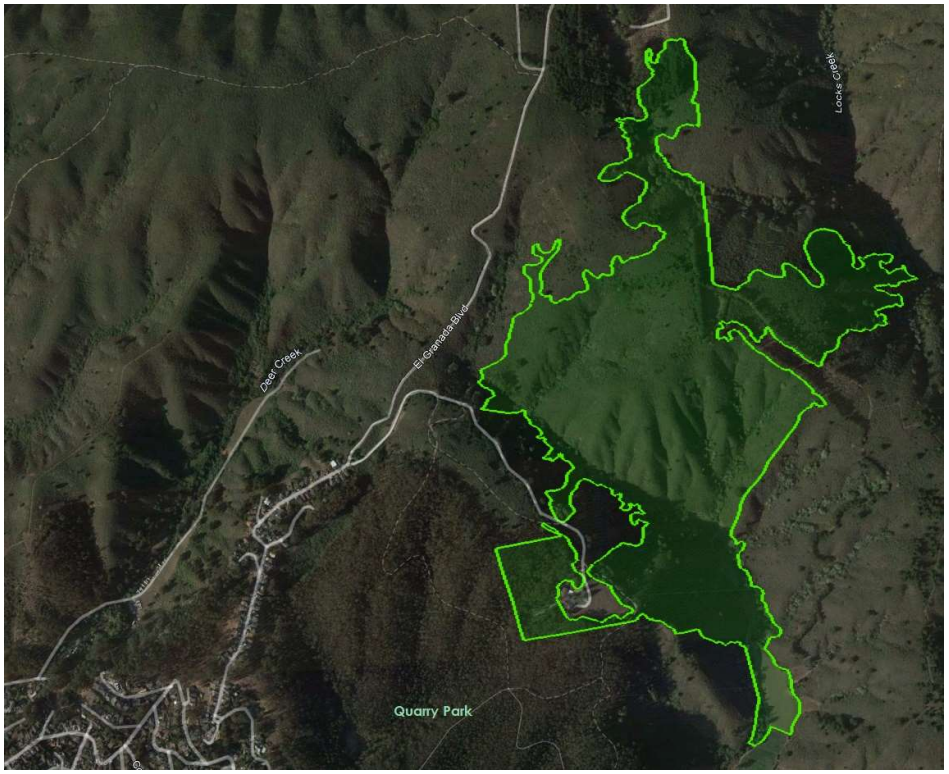
PROJECT NO. 15

Action ID	Action Name	Action Type
15	Northeast of Quarry Park and End of Purisima Way	Grazing, Large Tree/Ladder Fuel Removal, Rearrangement - Mastication/Mowing, Large Tree/Overstory Removal, and Hand Thinning-Chip/Pile

Action Metrics

Treatment Effectiveness Score:	32,540
Cost Estimate:	$605,030-$786,539
Acres:	208
Land Ownership	National Park Service (80 acres) San Mateo County Parks and Recreation Department (49 acres) Private/Other (73 acres) Peninsula Open Space Trust (5 acres)
Responsible Party:	Multiple

Project 15 General Location



Description of Action:

Project 15 is located on the northeast side of Quarry Park and begins at the end of Purisima Way in the community of Miramar. A portion of the project is within the northeastern side of Quarry Park.

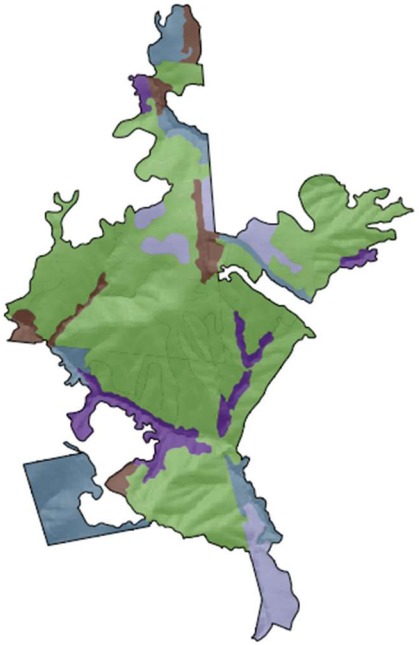
Project 15 involves a combination of treatment methods, with grazing being the predominant treatment method (142 acres), followed by Large Tree/Ladder Fuel Removal (26 acres) within the east side of Quarry Park and at the very northern tip of the project area, Rearrangement-Mastication/Mowing (15 acres) primarily on the southern end near Purisima Way, Large Tree/Overstory Removal (14 acres) just outside Quarry Parks northeast boundary and along Purisima Creek, and Hand Thinning-Chip/Pile (11 acres).

PROJECT NO. 15

Environmental Review Requirements:

Environmental field surveys would be required prior to implementation to determine if sensitive resources occur within project area and can be avoided. If impact avoidance is not possible, several permits could be required including CEQA (private and County land) and NEPA (federal land) review, species and waters permitting, and cultural resources and tribal consultations.

Project area is within treatable landscape area as defined within the CalVTP. If all project impacts are within the scope of the Programmatic EIR prepared for the CalVTP program, the CEQA environmental review process can be streamlined.

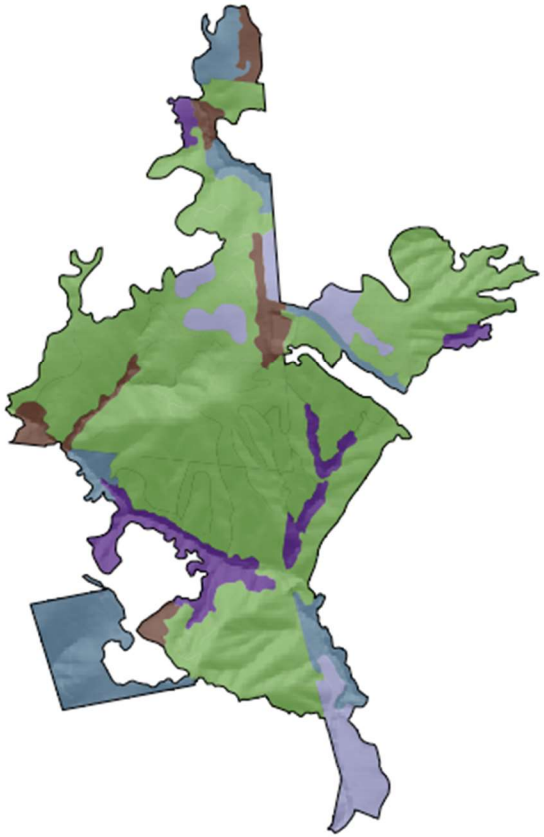


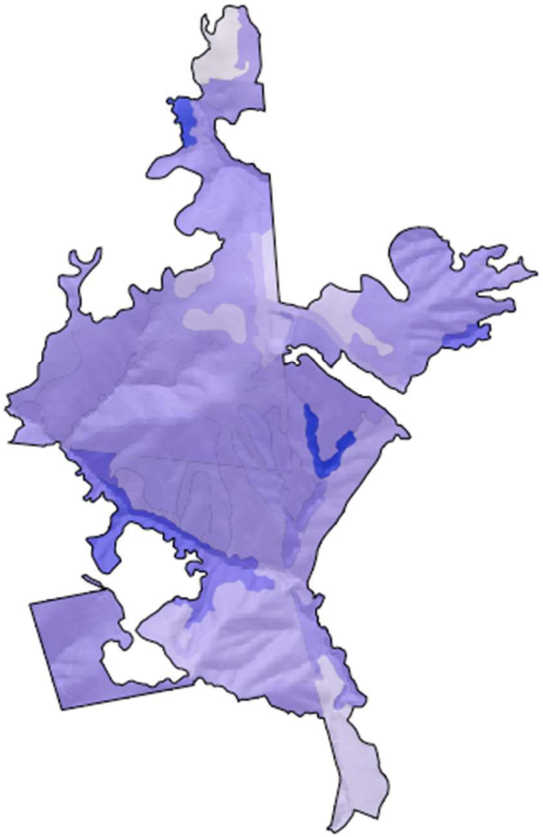
Maintenance/Reoccurrence Considerations:

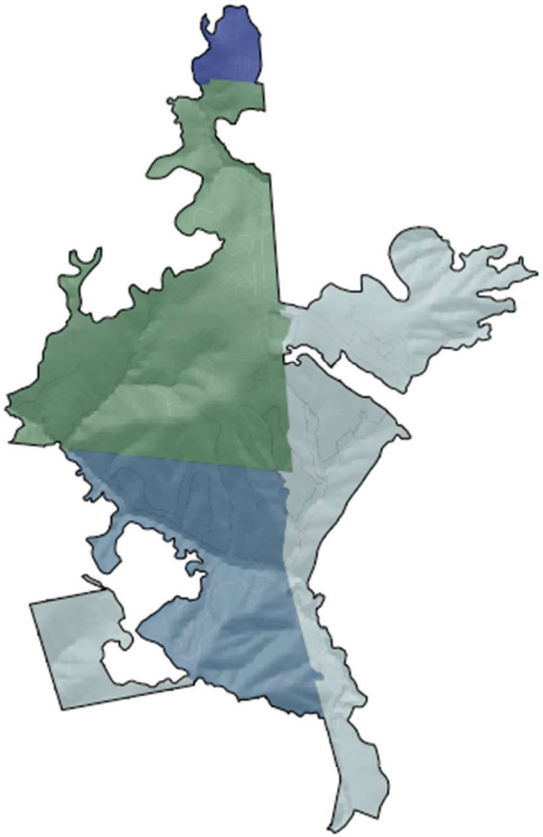
It is recommended that a maintenance plan be developed for each project and annual inspections by a trained professional occur post treatment specifically focused on reoccurring maintenance. Some maintenance considerations may include, but are not limited to, the following:

- Conduct goat grazing and hand thinning approximately every 1-2 years to prevent re-growth of vegetation. Goat grazing is effective on re-sprouts or young plants that grow back following initial treatment; however, require intensive management, temporary fencing, predator control, and observation to ensure they do not consume desirable vegetation or sensitive plant species/communities.
- Reoccurring maintenance for more intensive treatments such as large tree removal-ladder fuel and overstory removal should occur on an approximately 3 to 5-year schedule.
- Time hand thinning, grazing, and mastication/mowing treatments prior to weeds going to seed to minimize the spread of invasive weed species and remove material from site.
- Herbicide treatments may be required for cut eucalyptus stumps and for control of other invasives such as scotch broom, cape ivy, and jubata grass.
- Minimize ground disturbance when using mechanized equipment for large tree overstory and ladder fuel removal and mastication to the extent possible to minimize soil erosion and spread of invasive weeds.
- In areas where ground disturbance occurs, revegetate immediately with native vegetation.

PROJECT NO. 15







Treatment

- Grazing
- Hand thinning - Chip or Pile
- Large Tree Removal - Ladder Fuel Removal
- Large Tree Removal - Overstory Removal/Create Openings
- Rearrangement - Mastication or Mowing

TE / acre

- 100
- 200
- 300

Ownership

- National Park Service
- Peninsula Open Space Trust
- Private/Other
- San Mateo County Parks and Recreation Dept., County of

PROJECT NO. 16

Action ID	Action Name	Action Type
16	East Side of Quarry Park	Large Tree/Ladder Fuel Removal, Grazing, Hand Thinning-Chip/Pile, and Rearrangement - Mastication/Mowing

Action Metrics

Treatment Effectiveness Score:	29,907
Cost Estimate:	$798,180-$1,037,634
Acres:	201
Land Ownership	San Mateo County Parks and Recreation Department (154 acres) Private/Other (47 acres)
Responsible Party:	Multiple

Project 16 General Location

Description of Action:

Project 16 is located within the eastern portion of Quarry Park north of Magellan, Coronado, and Cortez Avenues to Purisima Way. Small areas of the project are located along the south side of Purisima Way north of the community of Miramar.

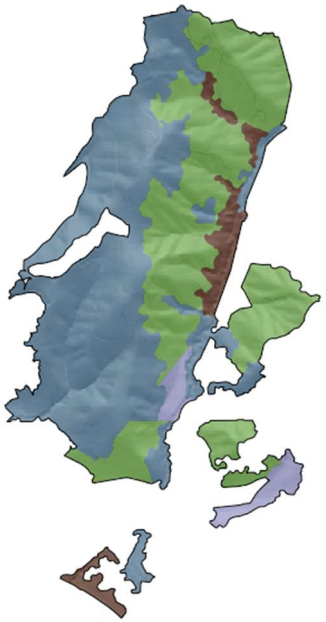
Project 16 involves a combination of treatment methods, including Large Tree/Ladder Fuel Removal (102 acres) within the eucalyptus grove of Quarry Park, Grazing (79 acres), Hand Thinning – Chip/Pile (12 acres), and Rearrangement-Mastication/Mowing (8 acres).

PROJECT NO. 16

Environmental Review Requirements:

Environmental field surveys would be required prior to implementation to determine if sensitive resources occur within project area and can be avoided. If impact avoidance is not possible, several permits could be required including CEQA review, species and waters permitting, and cultural resources and tribal consultations.

Project area is within treatable landscape area as defined within the CalVTP. If all project impacts are within the scope of the Programmatic EIR prepared for the CalVTP program, the CEQA environmental review process can be streamlined.

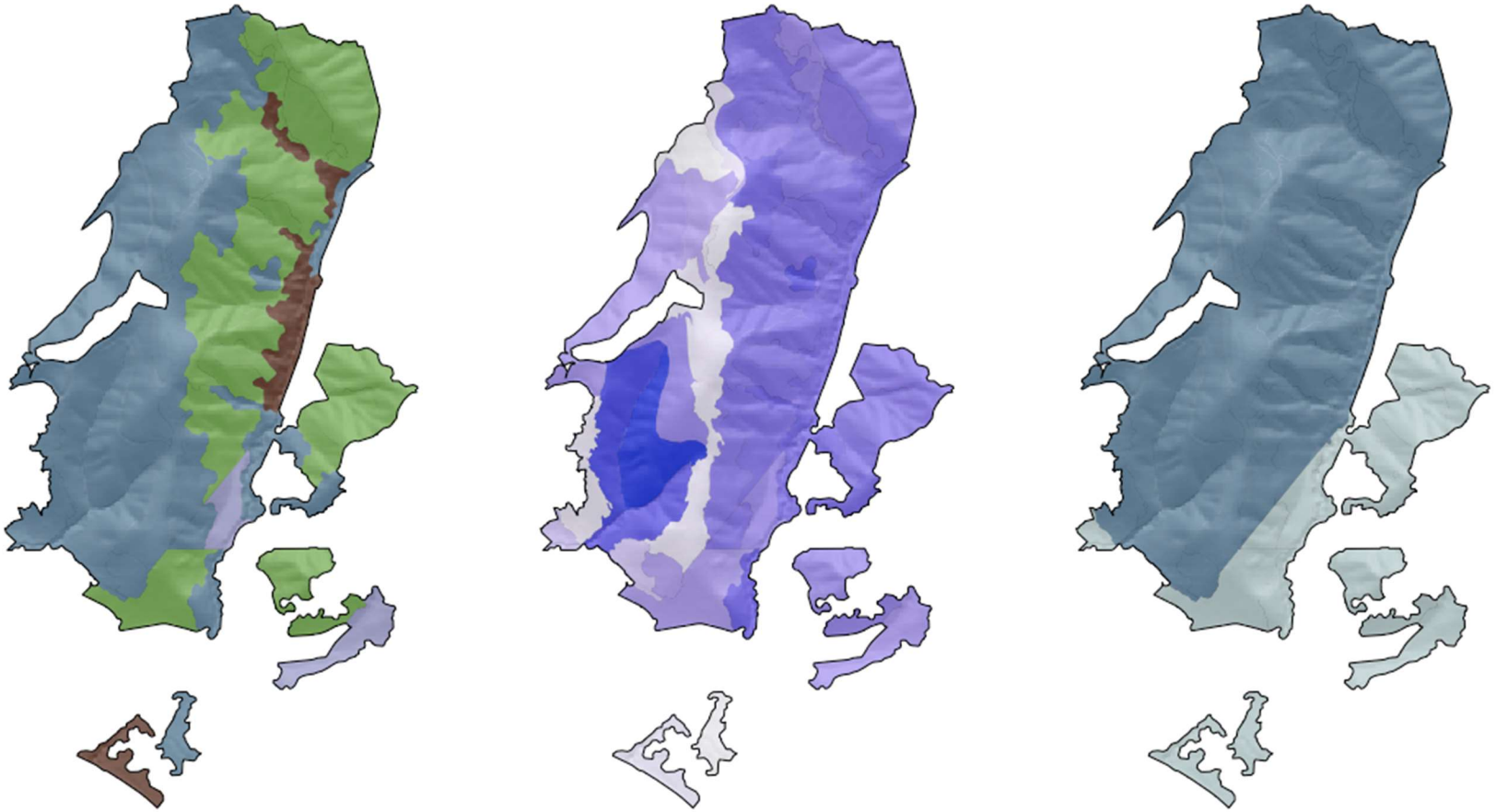


Maintenance/Reoccurrence Considerations:

It is recommended that a maintenance plan be developed for each project and annual inspections by a trained professional occur post treatment specifically focused on reoccurring maintenance. Some maintenance considerations may include, but are not limited to, the following:

- Conduct goat grazing and hand thinning approximately every 1-2 years to prevent re-growth of vegetation. Goat grazing is effective on re-sprouts or young plants that grow back following initial treatment; however, require intensive management, temporary fencing, predator control, and observation to ensure they do not consume desirable vegetation or sensitive plant species/communities.
- Reoccurring maintenance for more intensive treatments such as large tree removal-ladder fuel removal should occur on an approximately 3 to 5-year schedule.
- Time hand thinning, grazing, and mastication/mowing treatments prior to weeds going to seed to minimize the spread of invasive weed species and remove material from site.
- Herbicide treatments may be required for cut eucalyptus stumps and for control of other invasives such as scotch broom, cape ivy, and jubata grass.
- Minimize ground disturbance when using mechanized equipment for large tree ladder fuel removal and mastication to the extent possible to minimize soil erosion and spread of invasive weeds.
- In areas where ground disturbance occurs, revegetate immediately with native vegetation.

PROJECT NO. 16



PROJECT NO. 17

Action ID	Action Name	Action Type
17	North and East of Highway 1 Nurseries	Large Tree/Ladder Fuel Removal, Grazing, Hand Thinning-Chip/Pile, and Rearrangement - Mastication/Mowing

Action Metrics	
Treatment Effectiveness Score:	31,310
Cost Estimate:	$918,285-$1,193,770
Acres:	229
Land Ownership	Private/Other (229 acres)
Responsible Party:	Multiple

Project 17 General Location

Description of Action:

Project 17 is located north and east of the Rocket Farms and Schickenberg Nurseries with Terrace Avenue on the north side and Frenchman's Creek to the south.

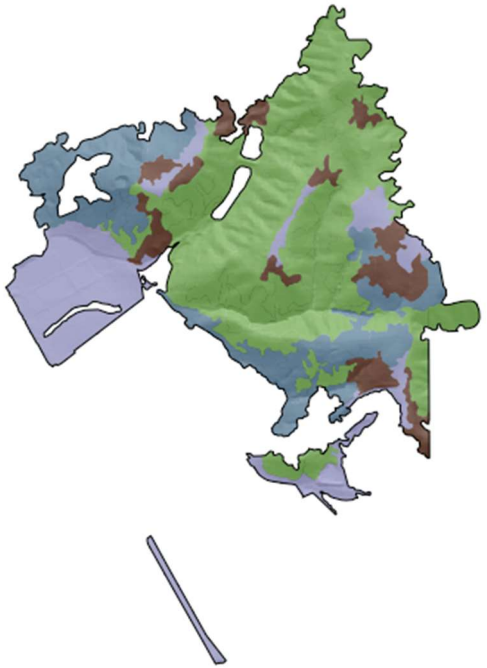
Project 17 involves a combination of treatment methods, with grazing being the predominant treatment method (117 acres), followed by Large Tree/Ladder Fuel Removal (46 acres) near the homes around Terrace Avenue and Miramar Drive and east of the nurseries around Hermosa Drive, Rearrangement-Mastication/Mowing (44 acres), and Hand Thinning – Chip/Pile (22 acres).

PROJECT NO. 17

Environmental Review Requirements:

Environmental field surveys would be required prior to implementation to determine if sensitive resources occur within project area and can be avoided. If impact avoidance is not possible, several permits could be required including CEQA review, species and waters permitting, and cultural resources and tribal consultations.

Project area is within treatable landscape area as defined within the CalVTP. If all project impacts are within the scope of the Programmatic EIR prepared for the CalVTP program, the CEQA environmental review process can be streamlined.

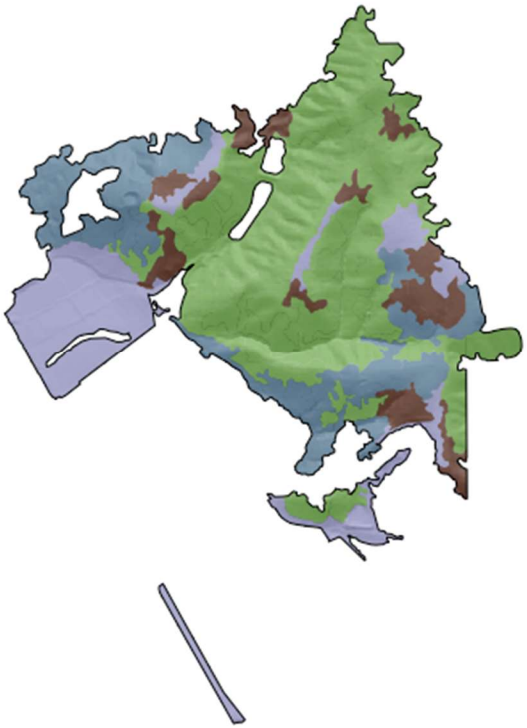


Maintenance/Reoccurrence Considerations:

It is recommended that a maintenance plan be developed for each project and annual inspections by a trained professional occur post treatment specifically focused on reoccurring maintenance. Some maintenance considerations may include, but are not limited to, the following:

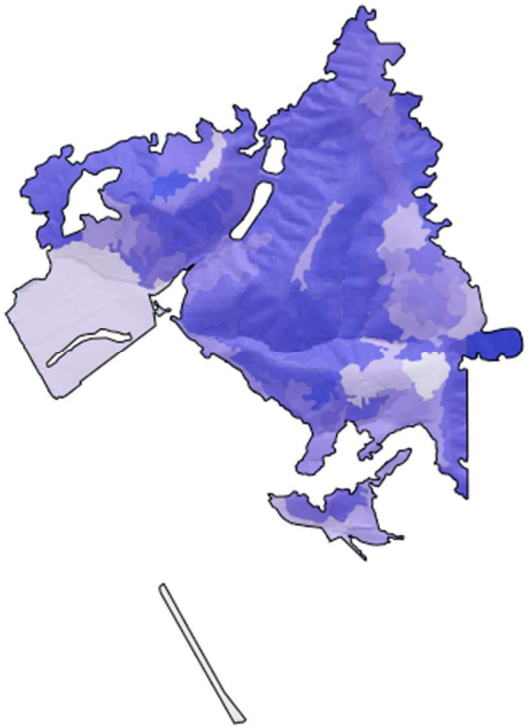
- Conduct goat grazing and hand thinning approximately every 1-2 years to prevent re-growth of vegetation. Goat grazing is effective on re-sprouts or young plants that grow back following initial treatment; however, require intensive management, temporary fencing, predator control, and observation to ensure they do not consume desirable vegetation or sensitive plant species/communities.
- Reoccurring maintenance for more intensive treatments such as large tree removal-ladder fuel removal should occur on an approximately 3 to 5-year schedule.
- Time hand thinning, grazing, and mastication/mowing treatments prior to weeds going to seed to minimize the spread of invasive weed species and remove material from site.
- Herbicide treatments may be required for cut eucalyptus stumps and for control of other invasives such as scotch broom, cape ivy, and jubata grass.
- Minimize ground disturbance when using mechanized equipment for large tree ladder fuel removal and mastication to the extent possible to minimize soil erosion and spread of invasive weeds.
- In areas where ground disturbance occurs, revegetate immediately with native vegetation.

PROJECT NO. 17



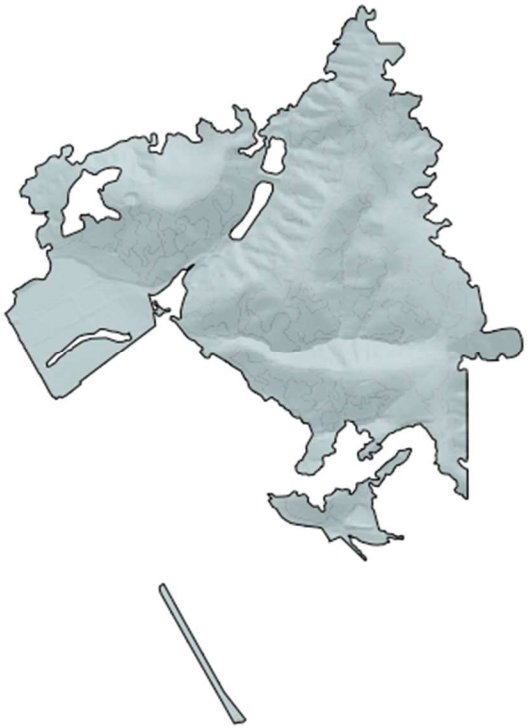
Treatment

- Grazing
- Hand thinning - Chip or Pile
- Large Tree Removal - Ladder Fuel Removal
- Rearrangement - Mastication or Mowing



TE / acre

- 50
- 100
- 150
- 200



Ownership

- Private/Other