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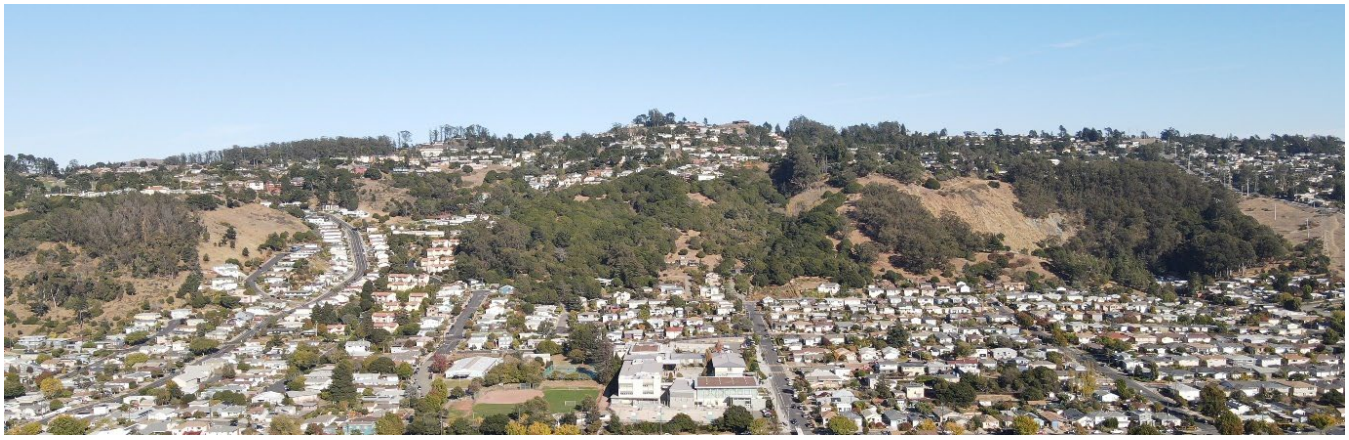
HILLSIDE NATURAL AREA FIRE RESILIENCE AND FOREST CONSERVATION MANAGEMENT PLAN

EL CERRITO, CALIFORNIA



LSA

December 2024

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EL CERRITO, CALIFORNIA

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EXECUTIVE SUMMARY

INTRODUCTION

The Hillside Natural Area (HNA) (Figure 1) is a valuable open-space asset in El Cerrito that is popular with residents and visitors for its recreational opportunities, scenic vistas, and natural landscape. Over the last few years, community concerns regarding fire risk in the HNA and surrounding communities have significantly increased. The City of El Cerrito (City) has responded with ongoing and increased vegetation maintenance activities, completing work largely based on past planning efforts. A new plan is needed to guide more robust, comprehensive, and balanced management of the HNA.

This Hillside Natural Area Fire Resilience and Forest Conservation Management Plan (Plan) provides a science-based framework and strategy to guide the City's management of the HNA and to aid in securing grant funding for priority management activities. Representing a locally driven solution in partnership with community groups from El Cerrito, the Plan draws upon a site-specific assessment of conditions and constraints and formulates goals, objectives, and actions that are specific, measurable, achievable, relevant, and prioritized for implementation. This Plan represents a focus on forest conservation, fuel reduction, and vegetation management of the City-owned open space for the purposes of fire prevention. However, it is important to recognize that addressing growing fire risks must also include actions residents can take in their homes and neighborhoods, such as home hardening by making structures less prone to ignition and creating defensible space around structures to prevent a fire from reaching the structure. The City embraces its leadership role in bringing diverse interests together to align and integrate fire prevention activities, coordinate investments in future resilience, and educate and engage community members.

VISION

Based on stakeholder feedback provided at community workshops and through a public survey, the following vision for the HNA was developed. El Cerrito's HNA is:

- A **premier recreational open space** offering multiple benefits of outdoor recreation, to be enjoyed by residents and visitors.
- A **fire-resilient, healthy natural landscape** where the risk of fire can be managed with reduced fuel loads and the effective maintenance of strategic fuel breaks that enhance mitigation efforts in the event of a wildland fire situation.
- A **natural, native-dominated plant community** where non-native and invasive species are managed and natural ecosystem function is high, supporting a variety of native, endemic, and rare species.
- Embedded into **neighborhoods that are acutely aware of and responsive to risks of wildland fire** and that embrace defensive space and home hardening to make buildings and infrastructure more fire resistant.

- **Maintained by joint efforts of the City and its residents** and supported by outside funding from local, State, federal, and private partnerships.

- **Managed adaptively to respond to changing conservation priorities and ecological conditions (due to climate change)**. Adaptive management supports the natural development of a climate- and fire-resilient natural landscape that provides crucial ecosystem services for the El Cerrito community.

HOW WE GOT HERE

COMMUNITY ENGAGEMENT

The City of El Cerrito planned an equitable and inclusive community engagement process with multiple opportunities for the broader community to provide input. **The Stakeholder Advisory Group (SAG)** served as a bridge between the community and City staff. **Public workshops** raised awareness of the planning process and gathered priorities. Through facilitated breakout group discussions, stakeholders vetted the proposed management activities and assessment results. The public participated in an **online survey** yielding 358 responses. The City's **project website**[1] provided community members and stakeholders with project specific documents and information, including an overview of the Plan's purpose and progress, workshop dates and locations, access to the online survey, and the opportunity to directly engage with the planning team.

TECHNICAL STUDIES AND ASSESSMENTS

The following technical studies were prepared to support development and implementation of the Plan:

- A **Biological Resources Assessment** (Appendix A) identifies special-status species and their habitats, wetlands and other regulated waters, and other potential biological resource constraints to the Plan development (Figure 1). The report also provides recommended measures to address potential impacts to biological resources.

- The **Fire Risk Assessment** (Appendix B) identifies and develops a map of the vegetative fuel types in the HNA and its immediate environs. Using data on weather, topography, and fuel characteristics, fire behavior was modeled to assess the locations of long flame lengths, where tree crown scorch is likely, and where the resulting embers would land. Fire modeling and expert opinion of the local fire department personnel were combined to assess fire threat and risk, strategies, and opportunities. Vegetation management prescriptions are designed to be consistent with the overall goal of reducing fire risk and incorporating best management practices (BMPs) and procedures.

- A **Cultural Resources Evaluation** (Appendix C) includes the findings of a field survey, results from Native American consultation/outreach efforts, and review of records of the California Inventory of Historic Resources, National Register of Historic Places (NRHP), California Register of Historic Places (CRHR), California Historical Landmarks, and California Points of Historical Interest. The report provides project-specific recommendations in conjunction with Native American concerns, as well as potential effects of project implementation.

[1] https://www.el-cerrito.org/1650/Hillside-Natural-Area-Plan

- The **Fire Road and Trail Conditions Report** (Appendix D) evaluates the conditions of the existing fire roads and trails, surface and access restrictions, maintenance needs, and potential expansion opportunities.

RECOMMENDATIONS

This summary of recommendations presents a prioritized list of actions to reduce the risks and impacts of severe fire events in the HNA (Table 1). The recommended actions are designed to minimize fire threats and vulnerabilities, while at the same time protecting the recreational and ecological values that the HNA offers. These actions are based on current best practices to protect and improve ecosystem function, conserve native plant and animal communities, minimize soil erosion, and enhance recreational possibilities.

The following actions and recommendations incorporate the feedback received from community engagement touchpoints and the findings of the studies and assessments conducted for the Plan, as well as best practices.

Table 1: Summary of Management Actions, Priority, Location, Prescriptions and Implementation Cost Categories

Action	Priority	Location	Prescription	Lead Department	Cost Category[2]
1: Create Defensible Space (Objective 1.1)	**Highest**	Within 100 feet of dwelling structures immediately adjacent to the HNA.	Where dwelling structures are closer than 100 feet from the HNA, the City will manage portions of the HNA within this distance to create a defensible space by maintaining vegetation. The City will promote Contra Costa County Measure X as a funding source for private property owners to manage the portions of their properties within this distance.	El Cerrito Fire Department	$$ one-time $ ongoing
2: Establish Shaded Fuel Breaks (Objective 1.2)	**High**	A 100- feet wide shaded fuel break along the entire perimeter of the HNA, beginning at the property boundary (where feasible i.e. the presence of a drainage or other topographic features may prohibit full 100' feet.)	Establish and maintain a shaded fuel break by removing or pruning trees, shrubs, brush, and other vegetative growth. A canopy of large native trees will be maintained where possible. All work will be accomplished by use of hand crews or mechanical equipment; supported by chippers and/or burning as determined appropriate on a case-by-case basis, while conserving native vegetation.	El Cerrito Fire Department El Cerrito Public Works Department	$$$ one-time $ ongoing
3: Remove Eucalyptus And Non-Native Conifers (Objective 1.3)	**High-medium, depending on location and cost**	1. The eucalyptus stand at Motorcycle Hill 2. The extensive eucalyptus stand at Quarry Hill 3. Eucalyptus and other non-native trees between Kent Court and Buckingham Drive 4. Non-native invasive trees on the Madera property 5. The Ken Smith eucalyptus grove and potentially along riparian corridors (likely requires permit from CDFW).	Stand removal involves the felling of all standing trees and prevention of resprouting from the stump. Landings are typically needed to sort, store, and chip cut trees into mulch and spread or remove the material. Stump treatments may include herbicides and tarping. Small logs and branches may be burned or chipped. Include follow-up treatments for latent seedling and weed management.	El Cerrito Public Works Department El Cerrito Fire Department	$$$$ one-time $ ongoing

[2] Costs are expected to vary substantially. The categories represented here indicate a relative scale of costs, from Low ($, in the $1,000s) to High ($$$$, exceeding $100,000). Costs also depend on the size and slope of the treatment area, the size of the trees to be removed, and additional considerations (equipment access) and slash treatments (including chipping and/or burning). Individualized projects will be designed by the City based on input from contractors and other experts, and cost estimates will be available prior to contracting and implementation.

Table 1: Summary of Management Actions, Priority, Location, Prescriptions and Implementation Cost Categories

Action	Priority	Location	Prescription	Lead Department	Cost Category[2]
4: Manage A Sustainable System Of Fire Roads & Trails (Objective 1.4)	**High-medium, depending on location**	Improvements to the fire road access at Potrero Avenue and King Court, addition of service access to Motorcycle Hill, conversion of Ken Smith trail into a fire road with turnaround, and improvement of existing roads to enhance emergency equipment response.	Improved fire roads and trails are needed to facilitate implementing vegetation treatment projects and provide firefighting equipment and personnel access to various parts of the HNA. Existing unimproved surface fire trails will be widened and recontoured where necessary to provide vehicle access to treatment areas, as well as for emergency vehicle and maintenance access while preserving native vegetation and preventing weed spread where practicable.	El Cerrito Public Works Department El Cerrito Fire Department	$$$ one-time $ ongoing
5: Actively Manage Threats To Native Oak Species (Objective 2.1)	**High-Medium**	Throughout the existing oak woodlands at the HNA.	SOD is present in the HNA but has not reached a high level of infection. Disease monitoring and selective tree removal is a critical component of this Plan. Conduct a complete inventory of all mature oak and bay laurel trees for monitoring the progression of SOD within the HNA. Best management practices include limiting the movement of host material or infested soil.	El Cerrito Public Works Department	$$ ongoing
6: Remove Invasives (Objective 2.2)	**Medium**	Throughout the HNA, wherever they are found. Single infestations are targeted first, followed by spot treatments and follow-up maintenance projects.	Remove invasive plants mostly by hand and prevent re-invasion where practicable. Mechanical treatments (grinding, shredding, chipping, mulching, or mowing) of understory shrubs or small trees in some places. Prioritize invasive species removal in healthy native plant communities	El Cerrito Public Works Department	$$ ongoing
7: Restore And Re-Establish Native Species (Objective 2.3)	**Medium**	Prioritize areas where invasive species removals are complete. This includes the removal of eucalyptus and conifer stands at Motorcycle Hill and Quarry Hill, but also shrub and grassland patches throughout the HNA where invasive species have been removed.	Promote passive restoration of plants from the existing native seedbank wherever possible. In some cases, active restoration of native plants is necessary following invasive plant control. Active restoration includes the initial reintroduction of the native, site-adapted	El Cerrito Public Works Department	$-$$$ one-time $ ongoing

Table 1: Summary of Management Actions, Priority, Location, Prescriptions and Implementation Cost Categories

Action	Priority	Location	Prescription	Lead Department	Cost Category[2]
			species (grasses and shrubs). Conserving native grasslands and other sensitive natural communities, enhancing, and expanding them is an important part of achieving this goal.		
8: Monitor Key Performance Indicators (Objectives 3.1 – 3.3)	**Medium**	Monitoring at the HNA will include the key indicators resiliency, recreation, plan review, and public relations.	Use monitoring to adapt management practices for each of these key indicators: ● Fire Behavior: Inspect fuel breaks at the HNA annually. Inspections of defensible space is another metric of the neighborhood's resilience. ● Biodiversity: Regularly monitor the HNA for the abundance and presence of key special-status species, including monarch butterfly, and monitor native plant communities, weed cover, and wildlife populations as funding allows. ● Fire-Adapted Communities: Conduct FlamMap (or equivalent) analysis of fire risk and behavior every 5–10 years as a means to pinpoint areas of deficiencies and target vegetation treatments. ● Trail Monitoring: Inspect all trails at least once per year to evaluate surface conditions. ● Plan Review: Provide a review and, if necessary, update to the Plan every 5 years. ● Public Relations: Provide multiple avenues for a community engagement and feedback process that allows the community and stakeholders to support and be informed of the City's management of the HNA.	El Cerrito Public Works Department El Cerrito Fire Department	$ ongoing

CDFW = California Department of Fish and Wildlife
City = City of El Cerrito
feet = foot/feet
HNA = Hillside Natural Area
SOD = Sudden Oak Death

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FIGURES

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LIST OF ABBREVIATIONS AND ACRONYMS

AB	Assembly Bill
ATV	all-terrain vehicle
BAAQMD	Bay Area Air Quality Management District
BMP	best management practice
CAL FIRE	California Department of Forestry and Fire Protection
Cal-IPC	California Invasive Plant Council
CalVeg	Classification and Assessment with Landsat of Visible Ecological Groupings
Cascadia	Cascadia Consulting Group
CDFW	California Department of Fish and Wildlife
CDPR	California Department of Pesticide Regulation
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
City	City of El Cerrito
CNDDB	California Natural Diversity Database
CO	carbon monoxide
COMTF	California Oak Mortality Task Force
Consultant	LSA Associates, Inc.
CRHR	California Register of Historic Places
CRPR	California Rare Plant Rank
CWPP	Community Wildfire Protection Plan
DBH	diameter at breast height
EA	Environmental Assessment
EBMUD	East Bay Municipal Utility District
EPA	United States Environmental Protection Agency
EQC	Environmental Quality Committee (City of El Cerrito)
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act
FHRP	Fire Hazard Reduction Plan

ft	feet
GIS	geographic information system
GPS	Global Positioning System
GSOB	goldspotted oak borer
GVWR	Gross Vehicular Weight Rating
HNA	Hillside Natural Area
IS	Initial Study
lbs	pounds
LiDAR	Light Detection and Ranging
MND	Mitigated Negative Declaration
MOB	Mediterranean oak borer
mph	miles per hour
NAHC	Native American Heritage Commission
NEPA	National Environmental Policy Act
NO_2	nitrogen dioxide
NRHP	National Register of Historic Places
O_3	ozone
PFIRS	Prescribed Fire Information Reporting System
PG&E	Pacific Gas and Electric Company
Plan	Hillside Natural Area Fire Resilience and Forest Conservation Management Plan
PM_{10}	particulate Matter less than 10 microns in diameter
RAWS	Remote Automatic Weather Station
RWQCB	Regional Water Quality Control Board
SAG	Stakeholder Advisory Group
SAS	Solano Archaeological Services LLC
SMP	Smoke Management Plan
SO_2	sulfur dioxide
SOD	Sudden Oak Death
UFC	Urban Forestry Committee (City of El Cerrito)
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture

INTRODUCTION

The **Hillside Natural Area** (HNA) (Figure 1) is a valuable open space asset within El Cerrito that is popular with residents and visitors for its recreational opportunities, its scenic vistas, and the biodiversity and natural beauty of its natural landscape. The HNA is heavily vegetated and can present a fire hazard to the surrounding residential areas and to the City of El Cerrito (City) as a whole. There is a strong consensus in the science community that **climate change** extends the periods of fire risk and enhances the likelihood of fires throughout the San Francisco Bay Area (Bay Area). Over the last few years, **community concerns** regarding fire risk in the HNA and surrounding communities have significantly increased. The City has responded with ongoing and increased vegetation maintenance activities, completing work largely based on past planning efforts. A new **Hillside Natural Area Fire Resilience and Forest Conservation Management Plan** (Plan) is needed to guide more robust, comprehensive, and balanced management of the HNA. The present Plan is intended to further guide the City's management and aid in securing grant funding for high-priority management activities.

The Plan provides a science-based framework and strategy to improve fire resilience and forest health in the HNA and the surrounding neighborhoods and residential areas. It represents a **locally driven solution** in partnership with community groups from El Cerrito. The Plan draws upon a site-specific assessment of conditions and constraints and formulates goals and objectives that are specific, measurable, achievable, relevant, and prioritized for implementation. It also aids in securing grant funding for priority management activities.

Building the HNA's resilience to fires means also restoring the **health of the native plant communities**. Native vegetation that is properly managed to avoid fuel accumulation and invasion by flammable non-native plants is key to reducing the risk to residential neighborhoods and livelihoods. This Plan represents a focus on forest conservation, fuel reduction, and proper vegetation management of the City-owned open space for the purposes of fire prevention. However, it is also important to recognize that addressing growing fire risks must also include actions residents take in their homes and neighborhoods, such as home hardening by making structures less prone to ignition, and creating defensible space around structures to prevent a fire from reaching the structure. The City embraces its leadership role in bringing diverse interests together to align and integrate fire prevention activities, coordinate investments in future resilience, and educate and engage community members.

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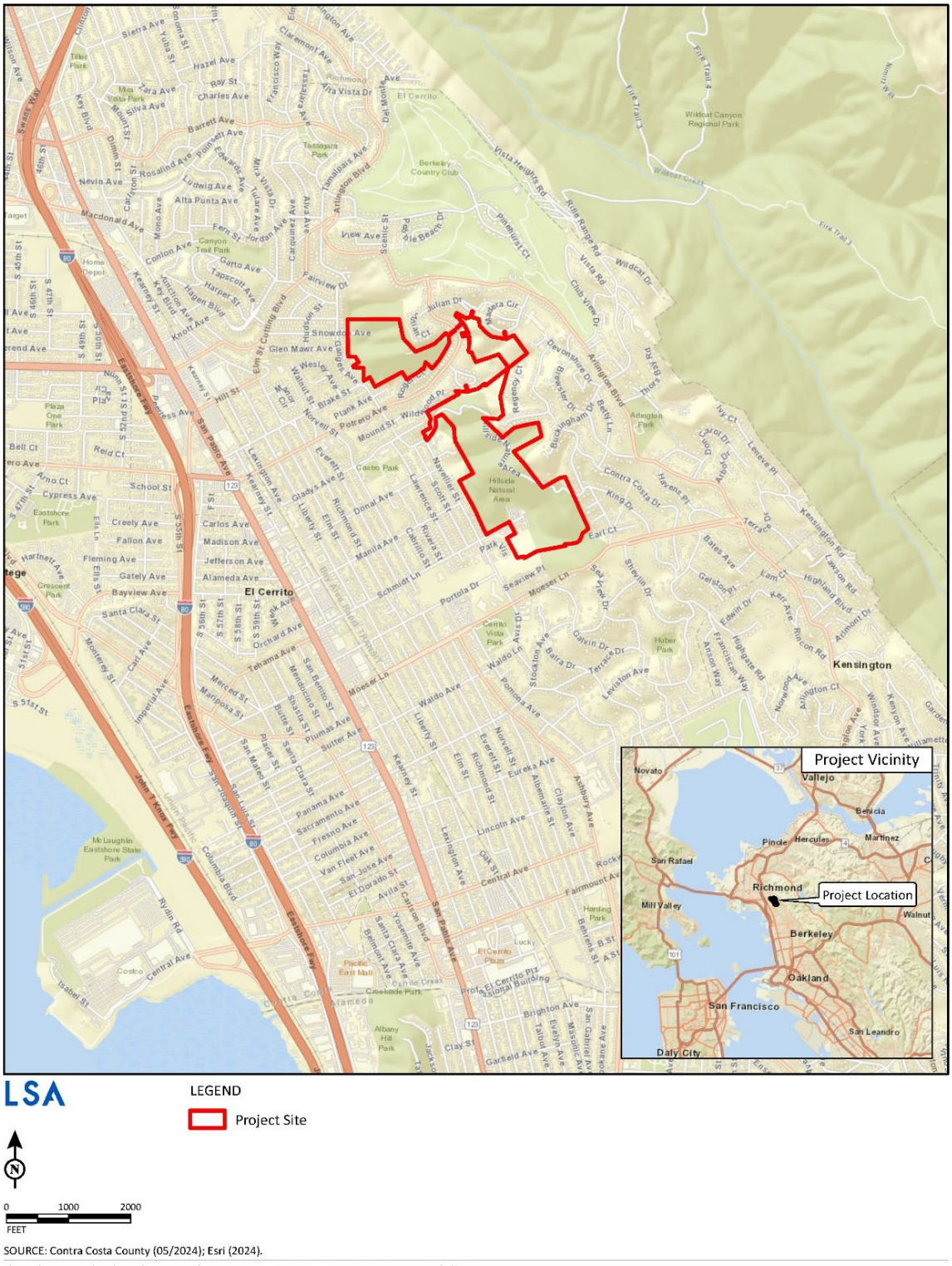

Figure 1: Regional Location, Hillside Natural Area, El Cerrito

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BACKGROUND

Fire is considered a natural part of the ecosystem in the East Bay, but the region also has a long history of destructive wildfire. Triggered by three major fires in summer 1986, El Cerrito community members voiced an increased concern for fire safety to the surrounding homes. The catastrophic Oakland Tunnel Fire raged through the hills in October 1991 and consumed 2.5 square miles of mostly residential neighborhoods. Twenty-five people were killed and 150 were injured. The fire destroyed 2,843 single-family dwellings and 437 apartment and condominium units and 2,000 automobiles. Ten thousand people were evacuated.

The City has responded to the community's fire concerns with ongoing and increased vegetation maintenance activities, completing work largely based on planning initiated in the 1990s. In addition, home hardening and Firewise landscaping are recommended as the most effective ways to increase the fire resilience of neighborhoods. The history of wildfire planning in El Cerrito is reflected in several major planning guidance documents since the late 1980s, described further below.

EL CERRITO HILLSIDE NATURAL AREA VEGETATION MANAGEMENT PLAN (1987)

The El Cerrito Hillside Natural Area Vegetation Plan (LSA 1987[3]) was developed by the City to address the fire risk of the HNA by reducing fuel loads and establishing fuel breaks in the HNA. The HNA Vegetation Management Plan is aimed primarily at managing hazardous fire conditions and the two main variables that affect the intensity of a fire: fuel levels and weather. The Vegetation Management Plan also addressed erosion control standards, exotic species, management of El Cerrito Memorial Grove, and maintaining the health of native vegetation. While this plan provided preliminary proposals for fire prevention and management, it did not provide a fire risk analysis or present fuel modification recommendations. Additionally, the effort did not include a review of potential environmental impacts to allow for full implementation of the plan in compliance with the California Environmental Quality Act (CEQA).

WHY DO WE NEED THIS PLAN?

Elevated fire risk concerns established the need for improved management practices.

The City of El Cerrito is actively responding by thinning eucalyptus groves, reducing ladder fuel, and removing dead trees.

The City has limited funding to implement more comprehensive fire risk management activities.

An updated plan is needed that will address and balance fire resilience with native forest conservation and will help secure grant funding.

[3] Sources for citations made within the text of this document are listed alphabetically in the References section (page 95).

EL CERRITO HILLSIDE NATURAL AREA FIRE HAZARD REDUCTION PLAN

In 1992, the City began development of the El Cerrito Hillside Natural Area Fire Hazard Reduction Plan (FHRP) based in part on the 1987 plan. The plan incorporated a Fire Hazard Analysis (ESA 1993a) and an HNA Environmental Assessment (EA) (ESA 1993b) that addressed the wildland/urban interface that links the HNA and surrounding adjacent residential neighborhoods. It applied current empirical and modeling methods designed to quantitatively assess the fire hazards within the HNA. The analysis provided recommendations for an array of fuel modification treatments and on-site infrastructure actions to reduce fire hazard to the HNA and adjacent residences. Following the completion of the Fire Hazard Analysis, the City produced a Preliminary EA to identify potential environmental impacts that could result from implementation of the recommended treatments within various portions of the HNA. Several issues were identified as requiring further study, including geology and soils; sensitive plant species; sensitive natural communities, and endangered, threatened, or sensitive animal species. The FHRP proposed several fire management techniques and new or improved infrastructure systems (fire roads and water delivery systems) for better management of fire potential within the HNA.

In 1994, the City prepared the "Fire Hazard Reduction Plan: Initial Study And Mitigated Negative Declaration" (ESA 1994) to evaluate potential significant impacts and identify mitigation measures for the FHRP. Subsequently, the City adopted the FHRP and approved the Mitigated Negative Declaration (MND) and Mitigation Monitoring Program as the CEQA documents (City Council Resolution 94-103).

EL CERRITO – KENSINGTON WILDFIRE ACTION PLAN

The El Cerrito – Kensington Wildfire Action Plan (Diablo Fire Safe Council 2017) is an appendix to the Contra Costa Countywide Community Wildfire Protection Plan (CWPP) and follows the standards for CWPPs established by the federal Healthy Forest Restoration Act, including (1) Identifying and prioritizing fuel reduction opportunities across the county, (2) addressing structural ignitability and (3) collaborating with stakeholders. The plan complements local agreements and existing plans for fire protection for a coordinated effort in determining appropriate fire management actions. The Contra Costa Countywide CWPP is the result of an area-wide planning effort. The El Cerrito Kensington Fire Action Plan looks at similar issues but allows for a more detailed investigation and customized recommendations for the El Cerrito and Kensington communities. The first countywide CWPP in 2009 began with compilation of existing documents, analysis of fire behavior potential (based on fuels, topography, and historical weather conditions), and collaboration with homeowners, representatives of special interest groups, and agency officials. In 2014–2015, an updated plan was revised through a similar area-wide effort that reviewed the plan, updated relevant sections, and refined priority actions. The goal of the plan is to reduce hazard through increased information and education about fires, hazardous fuels reduction, actions to reduce dwelling structure ignitability, and other recommendations to assist emergency preparedness and fire suppression efforts. Most importantly, it facilitates a coordinated effort among the various stakeholders. The El Cerrito Kensington Fire Action Plan is a multi-year guiding document that will facilitate the implementation of present and future mitigation efforts.

2015 EL CERRITO URBAN GREENING PLAN AND 2019 PARKS AND RECREATION FACILITIES MASTER PLAN

The City's 2015 Urban Greening Plan (El Cerrito 2015) identified the need for more robust, comprehensive, and balanced vegetation management practices. Additionally, in 2019, the El Cerrito Parks & Recreation Facilities Master Plan specifically called for action to "support the El Cerrito-Kensington Wildfire Action Plan goals and policies by creating defensible spaces, increasing weed abatement, and managing dead or diseased trees and other vegetation, especially in the Hillside Natural Area."

El Cerrito voters passed Measure H in 2019 to maintain and improve recreation services and parks. A portion of the funds support HNA maintenance activities, and the City has since increased its fire fuel reduction and vegetation management activities, in part with these maintenance funds.

2021 RESOLUTION DECLARING WILDFIRE PREVENTION AND SAFETY A TOP PRIORITY

In 2021, the City Council passed a "Resolution Declaring Wildfire Prevention and Safety as a Top Priority for the City of El Cerrito and Encouraging a Variety of Strategies to Prevent and Abate Fire Hazards." This resolution assures residents and businesses that fire prevention is a top priority, and that discussions and efforts will continue locally and regionally on how best to prevent and abate fire hazards in El Cerrito, including, but not limited to:

- Seeking grants and other resources for fire prevention and mitigation;
- Planning for evacuation in case of a disaster;
- Updating the Vegetation Management Policy to encourage the removal of flammable vegetation near homes;
- Updating building and fire codes as necessary to make dwelling structures more resistant to fire; and
- Reducing fuel loads in the HNA.

CONCURRENT PLANNING EFFORTS

Other plans that are related and in development include:

- City of El Cerrito Climate Action and Adaptation Plan
- 2024 Contra Costa County Local Hazard Mitigation Plan
- City of El Cerrito Safety Element

WHAT IS FIRE RESILIENCE?

The term "fire" in this Plan generally refers to a destructive wildland fire that consumes plants and vegetation debris in natural areas.[4] This Plan uses the terminology of fire resilience to reference a condition of natural areas that are resistant to fire ignition and spread, resilient to damage, and recover quickly after a fire, because these fires are minor. Ecological resilience characterizes the ecosystem's ability to recover to its original state. However, in the face of climate change and ongoing human influences (invasive species, ignition sources, fire intervals, recreational uses, etc.), returning to pre-disturbance conditions (i.e., the conditions before a major fire occurred) is often not desirable, especially when fuel loads and poor forest conditions led to the fire. Thus, the HNA will require intentional management to a new functionality that will be sustainable under future conditions.

This Plan promotes "adaptive resilience" in managing fuel conditions and vegetation. The goal is to support a native species-dominated landscape that is adapted to anticipated future conditions, including fire, without posing a significant risk to the surrounding neighborhoods and communities. The current forest and non-forested habitats at the HNA are heavily dominated by invasive species (especially eucalyptus, which covers over 33 percent of the site). Approximately 29 acres of oak woodlands remain, but they are dense and even-aged and have been invaded by non-native plants. Increasing the resilience of existing oak woodlands to climate impacts includes protection of oak woodlands from fire, restoration of native perennial grasses and forbs, climate-informed management of vegetation, and restricting the transmission of pathogens. Overall, oaks are well adapted to survive disturbances such as drought and fire, but climate change and other stressors may limit their ability to recover from future disturbances.

FOREST CONSERVATION

Biodiversity is essential for the ecological processes that support all life on Earth, including humans. Clean air and water, nutrients, temperature regulation, protection from floods and fires, and food are all products of this biodiversity. There are also health benefits from being surrounded by nature. Challenges to the HNA's biodiversity include maintaining habitat for rare, threatened, or endemic species while controlling and eliminating invasive species that displace native plants and change ecosystem functions, fire behavior, and severity. Reducing the severity of fires also lowers carbon emissions and reduces tree mortality and soil loss that can have long-lasting effects on forest recovery and biodiversity. This Plan aims to avoid or reduce long-term, large-magnitude, or broad-scale biodiversity losses through management actions intended to decrease HNA-wide natural disturbance frequency, extent, intensity, or severity, as well as to guide management actions so that they retain and support biodiversity in the HNA.

PURPOSE

Rising global temperatures and community concerns regarding the risk of fire make the development of an updated Plan with the required environmental analysis necessary. The primary

[4] Other types of fire, such as those consuming flammable gasses or liquids, are not considered primary wildland fires under this Plan but may occur as a result of industrial or residential structures being ignited by a fire spreading from a wildland area.

purpose of the Plan is to guide the City of El Cerrito in performing the most effective, sustainable, and cost-efficient fuel reduction and forest conservation activities.

The City desired to establish and adopt a comprehensive fire hazard reduction and forest conservation plan that will guide maintenance activities and improve eligibility for grant funding for the City's HNA. The Hillside Natural Area Fire Resilience and Forest Conservation Management Plan aims to:

1. Identify and protect critical resource areas, such as sensitive natural communities, wetlands and riparian zones, and special-status species that may occur in the HNA.

2. Guide the City's fire fuel reduction, native forest conservation, and fire prevention activities by providing specific, measurable, achievable, reasonable, and time-sensitive prescriptions for forest management. Some of these activities will be conducted within the City's current scope and budget for fire risk reduction; others will require additional funding.

3. Provide compliance with CEQA via an Initial Study (IS) as a preliminary tool to identify and mitigate potential impacts of Plan implementation, resulting in an anticipated Mitigated Negative Declaration (MND). This will ensure compliance with State and federal grant guidelines.

4. Evaluate fire road and trail network conditions.

Key Considerations of this Plan

Natural areas provide essential habitats for wildlife, protect water resources, and offer opportunities for recreation and education. Effective management of these areas requires strategic planning to ensure their long-term preservation and balance multiple uses. It also lays out a step-by-step Plan that can be followed over time. Key considerations for the Plan include:

- **A Science-Based Framework**: At a fundamental level, it is important to understand the natural resources in the area, including vegetation, wildlife, water resources, topography, weather, and geological features. This information can help guide decisions about how to best protect and manage these resources. This Plan relies on scientifically collected data, peer-reviewed literature, and proven ecological knowledge, including Traditional Ecological Knowledge (i.e., the ongoing accumulation of knowledge about a specific ecosystem that is derived by Indigenous people through their direct contact and manipulation of the environment). The science-based framework not only relies on data on species and ecological processes, but also acknowledges the human dimensions of conservation and forest management (i.e., human health, relationship with nature, and ecosystem services).

- **Stakeholder Involvement and Recognition**: Engaging stakeholders, including local communities, land managers, elected officials, neighbors, and conservation organizations, is critical to the success of natural areas management. Stakeholders provide valuable insights and perspectives on the resources and challenges in the area and can help identify potential conflicts and

solutions. This Plan was developed with extensive stakeholder input, and its success largely depends on continued community engagement.

- **Balancing Multiple Uses/Values**: Natural areas in urban settings often have multiple uses, including recreation and wildlife habitat, but they can also impose significant burdens for risk mitigation, especially fire. Strategic planning must balance these uses to ensure that the natural resources are protected while still providing benefits to the community.

- **Ecologically Sound Practices**: Fuel reduction projects can affect the biological diversity of the HNA. This Plan approves and promotes only methods and approaches that maintain, enhance, and restore native plant community structure and ecological function. This Plan and the associated CEQA compliance document provides an extensive list of avoidance, minimization and—if needed—mitigation measures designed to eliminate or mitigate adverse impacts during or following implementation of the Plan's actions.

- **Defensible Space:** Defensible space, coupled with ignition-resistant construction, is essential to reducing fire risk to neighborhoods. Defensible space is the buffer around a building in which vegetation is managed for fire. Currently, 100 feet of defensible space are required by law (see also Assembly Bill [AB] 3074, passed into law in 2020, pertaining to the new ember-resistant zone within 0 to 5 feet of a home). While defensible space is primarily a concern for homeowners on their property, this Plan recognizes the importance of a managed vegetation beyond their property boundary to reduce flame length, fire progression, and embers before they reach the property line.

- **Invasive Species Management**: Invasive species can have a negative impact on natural areas by outcompeting native species and altering ecosystems. Effective strategic planning should include strategies for managing and controlling invasive species, such as early detection and rapid response, biological control, and education and outreach.

- **Climate Change Adaptation**: Climate change is having a significant impact on natural areas, affecting temperature, precipitation patterns, and the distribution of wildlife and vegetation. Strategic planning must consider the effects of climate change and incorporate strategies for adapting to these changes, such as restoring habitats and improving the resilience of ecosystems.

- **Future Funding and Resources**: Implementing a strategic plan for natural areas management requires funding and resources, including staff, equipment, and materials. Strategic planning should identify potential sources of funding and resources and prioritize the allocation of these resources to ensure effective implementation. The Plan provides a framework for grant applications and strategic allocation of resources. The City continues funding important maintenance activities in the HNA. However, many of actions listed in this Plan will be dependent on future grants. A major purpose of this Plan is to support the City's applications for grant funding in the future.

What this Plan Does Not Include

- This Plan offers broad guidance on specific actions and priorities, but it does not include detailed prescriptions that may be needed to manage and implement individual projects. Project specific details will be developed in concert with contractors and in detailed bid specifications through the City's procurement process.

- While the City recognized the importance of ongoing maintenance to the Plan's successful implementation, this Plan does not contain specific descriptions of maintenance activities or intervals. It is anticipated that future maintenance will be subject to funding and resource availabilities.

- While the Plan acknowledges the role of private residence owners in reducing the risk around their dwelling structures, this Plan focuses on City-owned lands exclusively.[5]

- The City recognizes the role engaged volunteers can play in managing and monitoring the HNA. However, this Plan is limited to the actions and responsibilities of the City and its staff, which bear the ultimate responsibility for the management of the HNA.

- Finally, the Plan does not recommend how the City will integrate data, local knowledge, or volunteer work by citizen scientists and others who may conduct management or scientific studies of the HNA. The City has no control over these efforts but encourages stakeholder groups to share their knowledge and collaborate with City staff and consultants retained for future assessments and monitoring.

Plan Funding Acknowledgement

This Plan was developed with support from a $166,750 State Coastal Conservancy grant. The Coastal Conservancy is a California State agency established in 1976 to protect and improve natural lands and waterways, to help people get to and enjoy the outdoors, and to sustain local economies along California's coast. It acts with others to protect, restore, and increase public access to California's coast, ocean, coastal watersheds, and San Francisco Bay Area. Its vision is of a beautiful, restored, and accessible coast for current and future generations of Californians.

PLANNING PROCESS

The planning process emphasized a collaborative effort with representatives of the community.

Planning Team

The City of El Cerrito has retained the services of LSA Associates, Inc. (LSA or Consultant) to provide technical expertise and engagement support to the City's Plan development. The team includes the following professionals.

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[5] Make El Cerrito Fire Safe (makeelcerritofiresafe.com) provides education for the public on how to fire-harden their structures and create defensible space around their homes.

City of El Cerrito

- **Yvetteh Ortiz** is the Public Works Director/City Engineer
- **Karineh Samkian** is a Senior Program Manager in the Public Works Department.
- **Stephen Prée** is the Environmental Programs Manager/City Arborist in the Public Works Department.
- **Eric Saylors** is the Fire Chief.
- **Chase Beckman** is the Battalion Chief for the El Cerrito-Kensington Fire Department.

Consultants:

- **Steve Kohlmann, Ph.D.,** is Project Manager and team lead for LSA.
- **Dan Sidle**, **MS,** is Assistant Project Manager/Associate Biologist with LSA.
- **Jason Coleman**, **M.A., R.P.A.**, is the Owner and Principal of Solano Archaeological Services LLC (SAS)
- **Carol Rice, MS,** is the Principal of Wildland Resilience Management, a Nevada Corporation.
- **Maddie Seibert, MMS**, is the lead outreach associate for Cascadia Consulting Group (Cascadia).

Stakeholder Advisory Group (SAG)

The City sought early and frequent consultation with a select group of stakeholders, including experts and engaged community members. Their interest, enthusiasm, and helpful suggestions were crucial in developing this Plan. The SAG consisted of the following individuals:

Name	Representing
Austin, Pam	El Cerrito Trail Trekkers
Bialy, Fred	El Cerrito Environmental Quality Committee
Hrubes, Robert	El Cerrito Urban Forest Committee
Liese, Audrey	Friends of Five Creeks
Million, Holly	Diablo Fire Safe Council
Miner, Mark	El Cerrito Environmental Quality Committee
Mitchell, Robin	El Cerrito Urban Forest Committee
Richmond, Brian	Make El Cerrito Fire Safe
Schwartz, Susan	Friends of Five Creeks
Tyler, Troy	Park and Recreation Commission

Site Assessments

LSA coordinated all required studies pursuant to CEQA, including the identification of special-status species and their habitats, wetlands and other regulated waters, and other potential biological

resource constraints to discretionary actions, such as vegetation management and fuels reduction. LSA conducted biological field surveys and reviewed existing documents and databases, searching for evidence of special-status species presence, sensitive natural communities, rare plants, and the existence of other sensitive areas, such as wetlands. LSA produced the **Biological Resources Assessment** (Appendix A) to identify special-status species and their habitats, wetlands and other regulated waters, and other potential biological resource constraints to the Plan's development. The report also provides recommended mitigation measures to address potential impacts to biological resources.

The HNA and much of its environs are classified as a Very High Fire Risk Severity Zone by the California Department of Forestry and Fire Protection (CAL FIRE)[6]. LSA's **Fire Risk Assessment** (Appendix B) identified and developed a map of the vegetative fuel types in the HNA and its immediate environs (expanding as much as 500 feet into adjacent neighborhoods). Using remotely sensed data, these maps show vegetation type, surface fuel model, canopy density, canopy height, ladder fuel index, and height of the tree canopy base. An experienced fire ecologist assessed the accuracy of remotely sensed data and maps of previous plans. The ignition sources and fire history around the HNA were also investigated, linking the uses of the area to potential ignition risks. Using the information on weather, topography, and fuel characteristics, fire behavior was modeled on a spatial basis to assess the locations of long flame lengths, where tree crown scorch is likely, and where the resulting embers would land. This information is a foundational consideration for the recommendations on vegetation treatments (both initial treatments and ongoing maintenance), need for access, or other improvements to the HNA. The results of fire modeling and expert opinions of the local fire department personnel were used to form conclusions regarding fire threat and risk, strategies, and opportunities. Vegetation management prescriptions were designed to be consistent with the overall goal of reducing fire risk and incorporating best management practices (BMPs) and procedures.

The **Cultural Resources Evaluation** (Appendix C) included the findings of the field survey, results from Native American consultation/outreach, and review of records of the California Inventory of Historic Resources, National Register of Historic Places (NRHP), California Register of Historic Places (CRHR), California Historical Landmarks, and California Points of Historical Interest. The report provides project-specific recommendations based on resource CRHR evaluations in conjunction with Native American concerns, as well as the potential effects of project implementation. In addition, the report also included protocols for the inadvertent discovery of cultural resources and appropriate mitigation measures for the avoidance of potentially significant occurrences. The City conducted outreach to the relevant tribal entities and held a meeting with the Confederated Villages of Lisjan on October 18, 2023, to discuss this planning process. The tribe's main concern was that further analysis would be needed if any ground disturbance occurs near creeks. The tribe commented that there may have been temporary camps near the water source.

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6 Fire Hazard Severity Zones including both Local Responsibility Areas and State Responsibility Areas. Layer compiled by CCRCD /ACRCD using CAL FIRE FRAP produced data. Available online at https://alameda-and-contra-costa-county-regional-priority-plan-ccrcd.hub.arcgis.com/datasets/7a5b784db052402f94e50d528760b44c_0/explore?location=37.937104%2C-122.274266%2C15.00.

In addition to fire-relevant assessments, LSA also conducted an evaluation of the current conditions of the existing fire road and trails network, surface and access restrictions, maintenance needs and potential expansion of trails (refer to the **Fire Road and Trail Conditions Report** [Appendix D]).

Community Engagement

City staff provided updates and sought comments at the Urban Forestry Committee (UFC), the Environmental Quality Committee (EQC), and the Parks and Recreation Commission meetings. The City further planned an equitable and inclusive community engagement process with multiple opportunities for the SAG and the broader community to provide input at each key project phase. The community identified goals, priorities, and implementation considerations for the Plan's management activities. The engagement was divided into three phases, offering various opportunities to engage across platforms.

Stakeholder Advisory Group

The SAG served as a bridge between the broader community and City leadership in shaping the HNA Fire Resilience and Forest Conservation Management Plan. The City hosted the first SAG meeting at Hana Gardens Senior Center on October 16, 2023. Attendees had the opportunity to contribute insights on vision, goals, and technical aspects while considering diverse perspectives from the outset. By leveraging the advantages of in-person engagement, the initial SAG meeting played a crucial role in building consensus and setting a positive tone for ongoing collaboration in the Plan's development. The SAG members in attendance consisted of members representing the following committees and organizations: Parks and Recreation Commission, EQC, UFC, El Cerrito Trail Trekkers, Friends of Five Creeks, and Make El Cerrito Fire Safe. A second SAG meeting was held virtually on April 24, 2024, where the recommended actions of this Plan were discussed.

Public Workshops

The first public workshop, attended by 33 participants in person, raised awareness of the Plan's planning process and gathered priorities. Through facilitated breakout group discussions, stakeholders vetted the proposed management activities and assessment results. During the second public workshop, attended by 24 participants in person, the planning team summarized the Plan's recommendations, answered questions, and encouraged participants to provide comments during the public comment period.

Online Public Survey

The public participated in an online survey administered through SurveyMonkey from November 15, 2023, to January 5, 2024, yielding 358 responses. The City's webpage for the planning effort provided a link to access the survey. In addition, City staff promoted the survey by placing signs at the entrances of the HNA, including it in the City newsletter and on the City's website, announcing it at events for senior citizens, and advertising it to various community groups, such as the Rotary Club of El Cerrito and local parent-teacher associations. The City also brought a printed version of the survey to senior citizen events at El Cerrito Community Center for attendees to fill out in person. The survey was provided in English, Spanish, and Simplified Chinese.

Project Website (https://www.el-cerrito.org/1650/Hillside-Natural-Area-Plan)

The City's project website provides community members and stakeholders with project-specific documents and information, including an overview of the Plan's purpose and progress, workshop dates and locations, access to the online survey, and the opportunity to directly engage with the planning team. During the public comment period, 24 individuals/organizations provided comments on the website.

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PART 1: THE HILLSIDE NATURAL AREA

PROJECT SITE DESCRIPTION

Location

The project site is located within El Cerrito, California (Figure 1), near North Berkeley and Oakland Hills. El Cerrito is located between the Tilden Park Nature Area and unincorporated Contra Costa County to the east, the cities of Albany and Berkeley to the south, the city of Richmond and the San Francisco Bay to the west, and the city of Richmond and unincorporated Contra Costa County to the north. The HNA is approximately 107.18 acres and is divided into three sections: Hillside Natural Area North ("Motorcycle Hill;" 24.22 acres), Madera Property (9.53 acres) and Hillside Natural Area South (73.43 acres). Elevations range from approximately 150 and 650 feet above sea level. The area surrounding the HNA is a primarily residential area. Outside the boundary, there is also an assisted living home, Stege Sanitary District, City and government offices, churches, schools, and various commercial businesses. A number of trails and service roads run through the HNA that are used for recreation, maintenance and emergency access. The HNA is the City's largest community-serving recreation facility.

Management Units

Previous management plans (e.g., LSA 1987, ESA 1994) identified up to 13 management zones. Additions to the HNA in recent years (e.g., the acquisition of the Madera property) made a revision of the management units necessary. In addition, the previous prescriptions for each of these units were often by vegetation community and therefore identical for several units, creating unnecessary complexity. In addition, the public trail system weaves through the entire HNA, with varying degrees of public use, and was not considered in the previous plans. To simplify the overall management, this Plan only recognizes three management units, which are based on general topography, vegetation characteristics, fire risk, and public access (Figure 1). Table A presents the Assessor's Parcel Numbers and lot sizes for each management unit.

- **Hillside Natural Area North/Motorcycle Hill:** This area lies at the end of Snowden Avenue and is often referred to as Motorcycle Hill, due to its historic use as a motorcycle hill racing area in the early 1900s (see Figure 9, provided later in this document). The HNA North Management Unit is approximately 24.22 acres. The area predominantly slopes to the south, with steep slopes prevailing throughout the management unit. The unit surrounds a former water storage tank site, previously operated by the East Bay Municipal Utility District (EBMUD), which is now a circular gravel lot. The management unit is bordered by residential areas on the south, east, and west. To the north lies a wooded, undeveloped parcel that is privately owned and not part of the HNA; this parcel contains a densely forested riparian corridor that is highly flammable. Due to the existence of an extensive stand of eucalyptus trees on the slopes and top of Motorcycle Hill, as well as grassland and smaller stands of native shrubs and oak trees, this parcel could pose a fire risk to adjacent properties. There is currently no fire break between the HNA North unit and the adjacent undeveloped 14.9-acre private parcel.

Table A: Parcel Sizes and APNs for the Management Units of the HNA

HNA North		Madera Property		HNA South	
APN	Size (acres)	APN	Size (acres)	APN	Size (acres)
505-040-004	11.16	505-421-020	1.45	505-403-018	0.85
505-040-005	4.36	505-142-012	0.42	505-130-002	6.35
502-154-014	0.35	505-142-013	0.06	505-070-035	8.03
505-050-004	4.15	505-142-014	7.61	505-080-013	2.91
505-061-024	0.18			505-080-015	3.17
505-061-025	0.17			505-080-010	3.38
505-061-026	0.17			505-122-025	3.54
505-061-027	0.16			505-080-004	2.33
505-061-028	0.16			505-080-005	2.38
505-061-029	0.22			505-090-017	4.93
505-401-014	3.15			505-090-016	5.07
				505-090-015	11.09
				503-160-029	7.66
				503-170-001	6.45
				505-110-003	5.30
Total	**24.22**	***Total***	**9.53**	***Total***	**73.43**
				Total HNA	**107.18**

Source: *Hillside Natural Area Fire Resilience and Forest Conservation Management Plan* (LSA 2024).
APN = Assessor's Parcel Number
HNA = Hillside Natural Area

- **Madera Property:** The Madera property is the smallest management unit (9.53 acres) and is located at the northeast corner of the HNA. The Madera Management Unit contains small stands of non-native pines, a 2-acre oak woodland, and extensive shrub and grasslands (including purple needlegrass [*Stipa pulchra*] patches). At its southeastern border, several woodrat houses are present.

- **Hillside Natural Area South:** This area is the largest management unit, comprising 73.43 acres. This unit contains several large stands of native oak, a former quarry with steep slopes and exposed bedrock, and a large stand of non-native eucalyptus in the southeast corner. The Quarry Hill, Ken Smith, and Wildwood eucalyptus groves are also located in this management unit. The unit also has two major drainages with riparian forest corridors and is the centerpiece of the trail system. The City of El Cerrito Recycling and Environmental Resource Center (Recycling Center) is centrally located near the quarry. The unit is bordered by a 10.8-acre stretch of grassland to the south, where a Pacific Gas and Electric Company (PG&E) transmission line is located along Moeser Lane. With the exception of the transmission corridor and the recycling center, the HNA South unit borders residential lots and streets. Although not part of the HNA, the PG&E transmission line traversing the grassland parcel is perceived by the public as a risk factor, as a malfunction could lead to wildland ignitions.

History of Vegetation Management at the HNA

Historically, the El Cerrito Fire Department was primarily responsible for vegetation management for fuels reduction throughout the HNA, including limbing-up trees, tree removal, mowing, and ground

fuels reduction. Since at least 2010, volunteer groups like Friends of Five Creeks and the El Cerrito Green Teams have removed French broom (*Cytisus monspessulana*) and other invasive shrubs and plants such as Crofton weed (*Ageratina adenophora*) at various locations throughout the HNA, including the Madera Property, which was acquired by the City in 2015 with public and private grants after residents initiated the acquisition.

Service road maintenance has been managed by the City's Public Works Department, including repairs funded by a Federal Emergency Management Agency (FEMA) grant in 2018. In 2019, El Cerrito voters passed Measure H, a special tax that helps fund the maintenance of City parks and open space, vegetation management, and fire fuel reductions. This work has been managed primarily by the Public Works Department.

Current management activities include the routine removal of dead and dying Monterey pine (*Pinus radiata*) and Sudden Oak Death (SOD) infected coast live oak (*Quercus agrifolia*) trees; mowing invasive grasses and broadleaf weeds along access roads; thinning of eucalyptus (*Eucalyptus spp*.) stands in the Wildwood and Quarry Hill eucalyptus groves periodically as funds are available; mastication of French broom and invasive woody plants at the Madera property; mastication of eucalyptus debris and poison oak (*Toxicodendron diversilobum*) at the Quarry Hill grove; and removal of storm-damaged/hazard trees throughout the HNA. In areas of limited access and steep terrain, such as Motorcycle Hill, invasive or dead trees have been felled and piled in place for future controlled burning. City staff and volunteers have participated annually in the SOD survey, aka SOD Blitz, since 2012. SOD was first detected near the HNA in 2015. As of the 2023 SOD survey, fewer than 12 trees in or near the HNA are known to be infected with the pathogen.

Environmental Conditions

Climate

Summer days in El Cerrito are moderately warm and often foggy or breezy; temperatures normally range from lows in the 40s and to highs in the 70s, with an occasional high reaching 80 degrees Fahrenheit. Humidity can drop to the single digits in the summer and fall. The annual average precipitation is 25 inches. The rainy period lasts from October to May. February is usually the wettest month, with an average rainfall of 3.9 inches. July is the only month with no rain. March through August is relatively windy, with average wind speeds of more than 8.0 miles per hour (mph). The windiest month of the year in El Cerrito is June, with an average hourly wind speed of 9.2 mph. The calmest month of the year in El Cerrito is October, with an average hourly wind speed of 6.9 mph. The HNA lies in a relatively protected area and can be subject to occasional episodes of still, stagnant air formed by stationary highs during summer months. This overall weather pattern—characterized by continuous high temperatures and low relative humidities—enhances the possibility of ignition, extreme fire behavior, and extreme resistance to fire control.

Wind and Topography

Topographic features—such as slope and aspect (orientation with respect to sun and wind) and the overall form of the land—have a profound effect on fire behavior. Topography affects a fire's intensity, direction, and rate of spread. An area's topography also affects local winds, which are either "bent" or intensified by topographic features. Topographic features can also induce daily

upslope and downslope winds (Figure 2). The speed, regularity, and direction of these winds (and other winds) directly influence the direction of fire spread and the shape of the flaming front. The topography of the HNA (Figures 3 and 4) is characterized as west-facing slopes that receive full afternoon sun when it is the hottest. The slopes are generally steep; a steeper slope will result in a faster-moving fire with longer flame lengths. Any slope can potentially increase the amount of heat a dwelling structure will be subject to during a fire. There are two drainages in HNA South, running from northeast to southwest, which can funnel heat up and down the hillside during a fire. Two very steep slopes (45–90 degrees) exist in the HNA; one is an exposed rock face in HNA South that rises up from the area near the Recycling Center on Schmidt Lane (formerly a quarry), and one is at Motorcycle Hill (HNA North) at the end of Snowden Avenue.

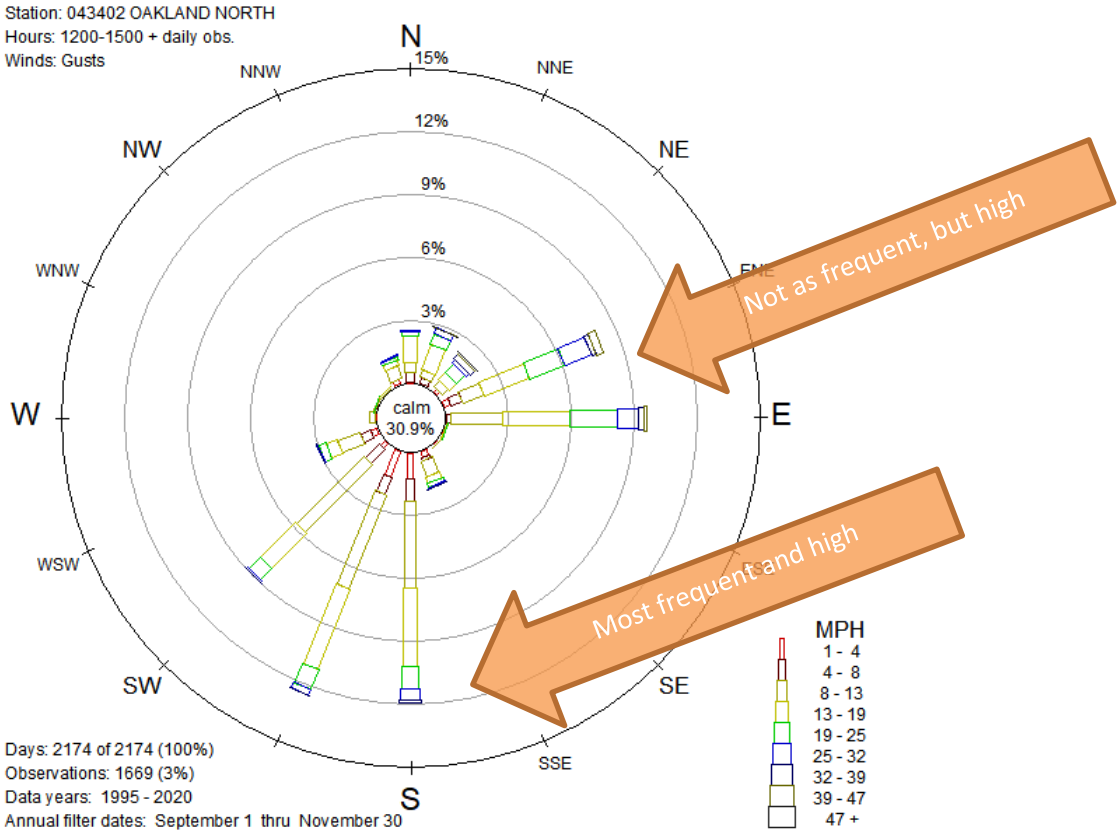

Figure 2: Wind Direction and Speed Frequency September through November, 1995-2020

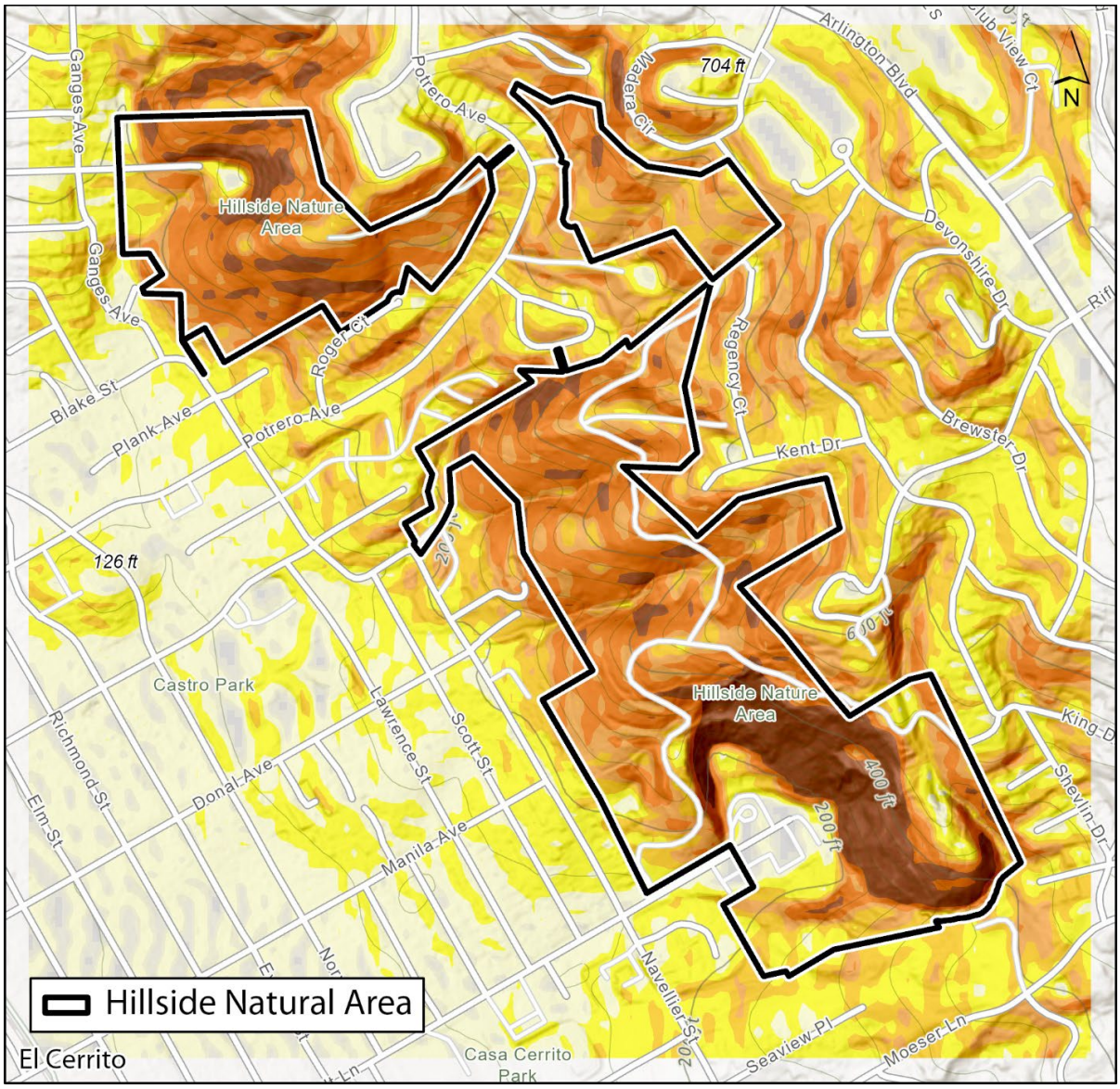

Figure 3: Slope Map

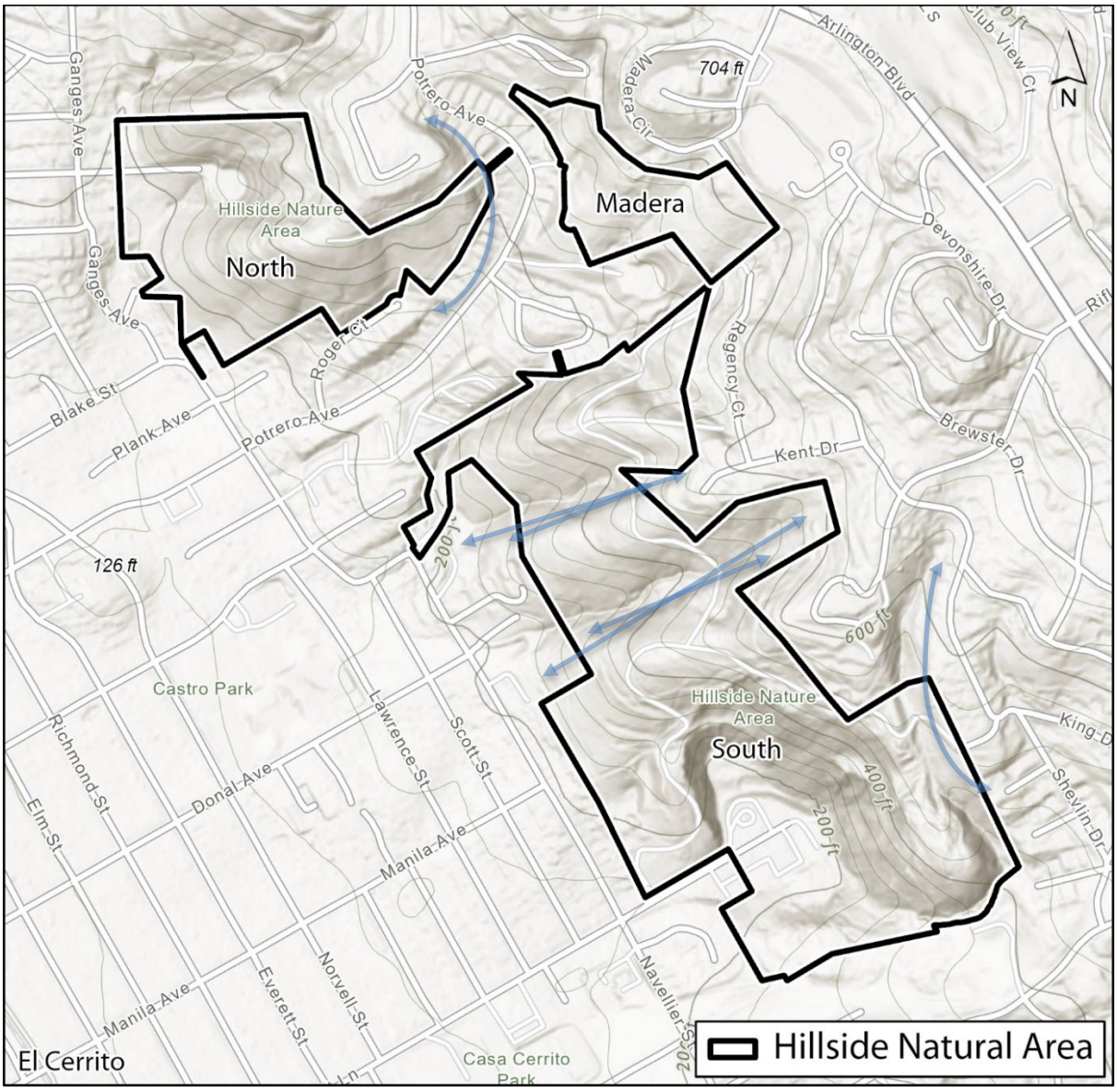

Figure 4: Topographic Map

Dominating westerly winds could produce strong upslope and erratic winds, as shown on Figures 2 and 4. For example, winds from the easterly direction occur slightly more than 10 percent of the days, but the speeds are relatively strong, averaging 32–39 mph. In contrast, winds from the south are more common, at roughly 12 percent and are similarly strong. However, winds from the south blow with speeds less than 20 mph, whereas winds from the east are greater than 20 mph slightly less than half the time. The winds that create the most severe fire danger typically blow from the north, usually in October. Winds from the east and north bring low humidity and elevated fire danger; winds from easterly or northerly directions occur less than 30 percent of the time.

Geology and Soils

The HNA's geology is a complex assemblage of metamorphic rock (blueschist, Tiburon melange, Angel Island nappe, and Alcatraz nappe), overlaid in areas by the Northbrae rhyolite, a lava layer. The HNA is also characterized by several landslides (e.g., Potrero Avenue, Moeser Lane). The Hayward Fault, a northwest-southeast-trending right-lateral strike-slip fault, runs just above the HNA. The Hayward Fault is part of the San Andreas Fault System.

Soils on the project site consist of approximately 50 to 75 percent Rock Outcrop-Xerorthents and 25 to 50 percent Xerothents soils (USDA 2023; Figure 5). These soils are typically shallow (4 to 10 inches) and excessively drained, with a high potential for erosion where vegetation is removed. Given the relatively steep slope, exposure of bare soil could initiate surface erosion. Shrink-swell potential is generally low due to the low clay component within this Soil Map Unit. Permeability is moderate and the available water holding capacity is less than 1.5 inches. Vegetation controls much of the surface water through detention and absorption, thereby reducing the erosion potential.

The former quarry has little to no soil covering the bedrock. Cut and Fill Land-Los Osos Complex underlies the Madera property and HNA South; it is the result of mechanical manipulation of strongly sloping to moderately steep soils on uplands for urban use. Soils are either a heavy clay loam, silty clay, or clay. As much as 20 percent can be shale and sandstone; exposed cuts consist of interbedded shale and fine-grained sandstone. This complex is well drained and runoff is rapid, causing a significant potential for erosion.

Drainages

Several stream/drainage channels are present in the HNA (Figure 6). Some of these drainages occur within concrete v-ditches. Streams/drainages are likely to be considered jurisdictional features by the United States Army Corps of Engineers (USACE) and Regional Water Quality Control Board (RWQCB) and subject to regulation under Section 404 and 401 of the Clean Water Act and/or the California Porter Cologne Water Quality Control Act. No other potential waters of the United States/State, such as seasonal wetlands or seeps, were observed during the reconnaissance-level field survey.

Vegetation Communities

Vegetation in the HNA is characterized by native and non-native grassland, riparian scrub and woodland, oak woodland, and other scrub and "soft" chaparral, in addition to extensive introduced landscaping and naturalized non-native species such as eucalyptus and pine. LSA inventoried over 190 plant species that have been reported to commonly occur in the HNA (see Appendix E for a complete plant list). The majority of those are native, but most of the non-native species are considered invasive. There are six major vegetation cover types within the HNA (Figure 6, Appendix A and B):

- **Eucalyptus and Pine Groves** are the most prevalent vegetation types at the project site, totaling over 36.2 acres (33.8 percent of the HNA). Eucalyptus groves are present in four locations at the HNA. The largest grove is located above and along the southeast rim of the quarry (Quarry Hill grove). The Ken Smith grove is northwest of the quarry. A linear grove of eucalyptus follows the

Map Unit	Description
CnE	CUT AND FILL LAND-LOS OSOS COMPLEX, 9 TO 30 PERCENT SLOPES
CoE	CUT AND FILL LAND-MILLSHOLM COMPLEX, 9 TO 30 PERCENT SLOPES
CoF	CUT AND FILL LAND-MILLSHOLM COMPLEX, 30 TO 50 PERCENT SLOPES
GcF	GILROY CLAY LOAM, 30 TO 50 PERCENT SLOPES
Qa	QUARRY
Re	ROCK OUTCROP-XERORTHENTS ASSOCIATION
TaC	TIERRA LOAM, 2 TO 9 PERCENT SLOPES

LSA

LEGEND

Project Site

Soil Map Units

N

0 300 600

FEET

SOURCE: NRCS (10/2023); Contra Costa County (05/2024); Nearmap (07/2023).

Figure 5: Soils

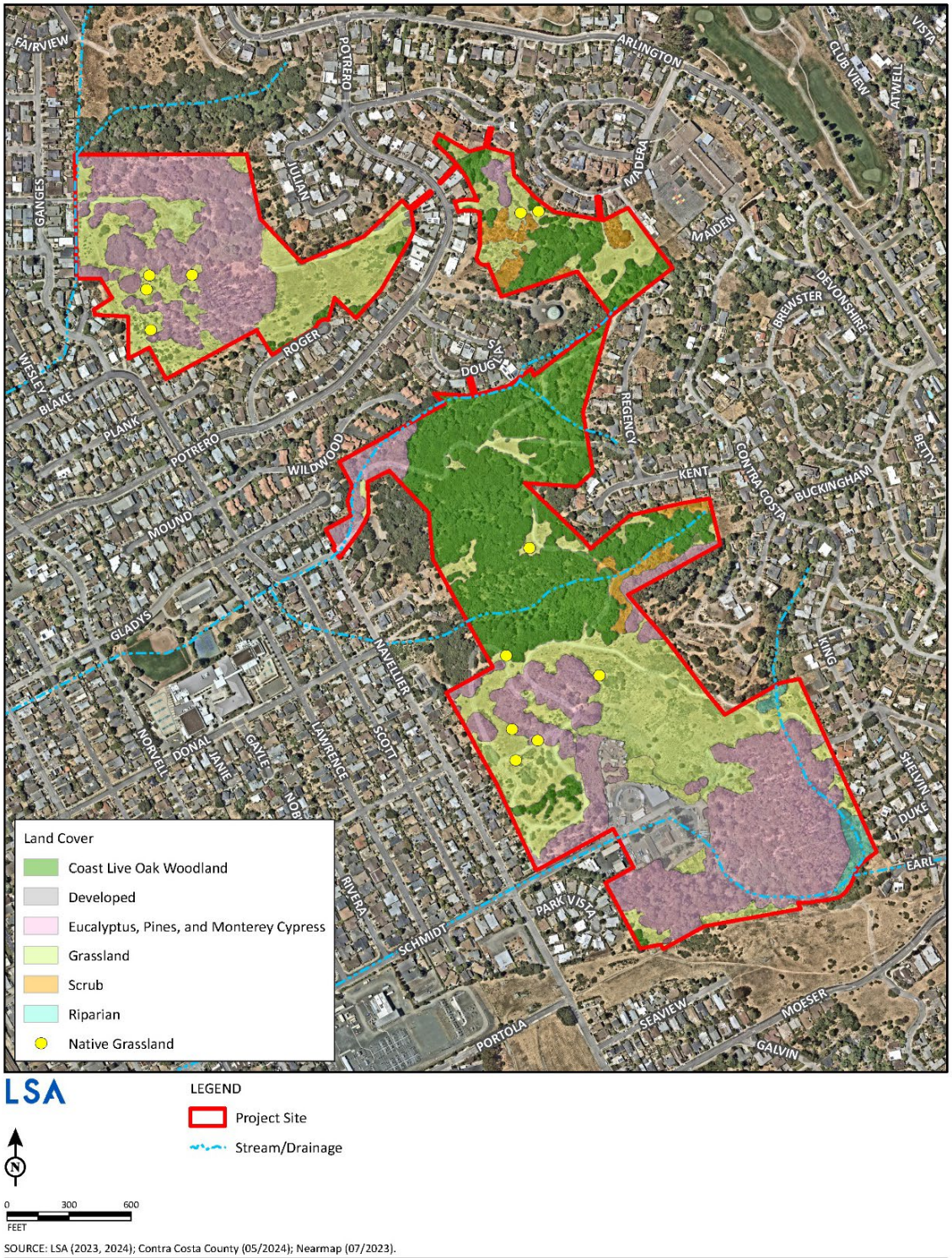

Figure 6: Land Cover Types and Major Drainages

drainage south of Wildwood Place. Finally, a large stand of eucalyptus is located southwest of Julian Court adjacent to the former EBMUD reservoir site at Snowden Avenue, north of Motorcycle Hill. Blue gum (*Eucalyptus globulus*) and yellow gum (*Eucalyptus viminalis*) dominate the groves, followed by conifers and oaks. A few red ironbark eucalyptus (*Eucalyptus sideroxylon*) are scattered on the southwestern slopes of Motorcycle Hill and throughout the HNA. Monterey pine is the most common pine species at the HNA and occurs in scattered locations throughout the HNA.

Where openings in the canopy allow sufficient light to penetrate to the grove floor, understory plants may develop. Understory vegetation in eucalyptus stands is commonly restricted to poison oak, toyon, and a light cover of grasses, some herbs, and non-native thistles (see Nelson 2016 for a discussion of allelopathy in eucalyptus stands). Also, live ground cover is usually low beneath eucalyptus canopies due to the large amounts of leaf and bark litter deposited by the trees. Due to the high oil content of eucalyptus debris, decomposition is very slow and the resulting accumulated material produces high fuel volumes. The presence of high fuel volumes makes potential fire initiated in or carried into eucalyptus extremely hazardous in certain high-wind, high-temperature situations.

The Quarry Hill eucalyptus grove was planted around 1910 by the quarry operator to minimize slippage of quarry overburden. In 1972, uncommonly cold weather resulted in the death of eucalyptus tree crowns over hundreds of acres throughout the East Bay hills. Although the crowns of many trees were damaged at the HNA, few actually died, and resprouting from the trunk and branches occurred. Sprouting also occurred from the stumps of the trees that were cut. The result was an increased density of eucalyptus stands at the HNA.

- **Ruderal/Non-Native Grassland** (33.47 acres, 31.2 percent of the HNA) consists primarily of non-native annual grassland species, with patches of perennial grassland and ruderal plant species. Grassland vegetation consists primarily of introduced annuals such as wild oats (*Avena spp.*), soft chess (*Bromus mollis*), ripgut brome, (*Bromus diandrus*), Italian ryegrass (*Lolium multiflorum*), and foxtail barley (*Hordeum leporinum*). A variety of annual and perennial forbs are also a major component of the grassland. In some locations, the grassland cover type is dominated by invasive, exotic species such as Italian, star, and bull thistles (*Carduus dycnocephalus, Centaurea spp.*, and *Cirsium vulgare*, respectively), fennel (*Foeniculum vulgar*e), field bindweed (*Convolvulus arvensis*), burclover (*Medicago polymorpha*), cut-leaved geranium (*Geranium dissector*), and mustards (*Brassica spp.*). French broom is frequent in grassland on the east-west ridges above Navellier Street, along the west border above Navellier Street, and in the grassland around the Madera connector.

- **Native Grasslands** consist of small, dispersed patches of native graminoids, including perennial bunchgrasses. These are generally rare but fairly common in certain areas, such as El Cerrito Memorial Grove and the Julian Fuel Break, which supports a healthy stand of purple needlegrass. Needlegrass grassland within the HNA is dominated by native perennial bunchgrasses such as purple needlegrass*,* foothill needlegrass (*Stipa lepida*), oatgrass (*Danthonia californica)*, June grass (*Koeleria cristata*), red fescue (*Festuca rubra*), bent grass (*Agrostis* spp.), and creeping wild rye (*Elymus triticoides*). Native herbaceous species observed

within the native grasslands include soap root (*Chlorogalum pomeridianum*), golden rod (*Solidago velutina*), hayfield tarweed (*Hemizonia congesta* subsp. *luzulifolia*), and bracken fern (*Pteridium aquilinum*). Several other native grassland plant species, such as blue-eyed grass (*Sisyrinchium bellum*), narrowleaf mule ears (*Wyethia angustifolia*), and arroyo lupine (*Lupinus succulentus*), have been observed at the project site (Friends of Five Creeks 2014). Native wildflowers commonly interspersed among the grasses include lupine species (*Lupinus* spp.), California poppy (*Eschscholzia californica*), common fiddleneck (*Amsinckia intermedia*), blue dicks (*Dipterostemon capitatus),* Ithuriel's spear (*Tirteleia laxa*) and checkerbloom (*Sidalcea malvaeflora*). The presence and relative abundance of native annual and perennial herbs is influenced by the level of historic and recent disturbance at a particular site (LSA 1987). Most native grasslands are considered sensitive natural communities under CEQA.

- **Coast Live Oak Woodland** (28.7 acres, 26.8 percent of the HNA) is dominated by coast live oak, with California bay (*Umbellularia californica*) and California buckeye (*Aesculus californica*) in the overstory and native shrubs, vines, and grasses in the understory. Dense stands of oak woodland are located in the drainages and on north-facing slopes. Stands of native oaks in the HNA appear to be of roughly the same age, with a uniform, dense canopy and, in places, little understory. As in many coast live oak forests in California, the HNA has relatively low numbers of coast live oak (seedlings and saplings, and the sapling size class is particularly underrepresented [Muick and Bartolome 1987; Bolsinger 1988]). Small numbers of elderberry (*Sambucus mexicana*) are also present in the oak woodland. The primary driver of the woodland understory is the availability of water and sunlight. Poison oak, blackberry (*Rubus* spp.), hazelnut (*Corylus cornuta* var. *californic*a), toyon (*Heteromeles arbutifolia*), and other shrubs are common. Common herbaceous species include wood fern (*Dryopteris arguta*), California polypody (*Polypodium californicum*), sword fern (*Polystichum munitum* [rare]), goldback fern (*Pentagramma triangularis*), soap root (*Chloragalum pomeridianum*), and honeysuckle (*Lonicera hispidula*). Melic grass (*Melica* spp.) is common along trails.

- **North Franciscan Coastal Scrub** comprises 2.6 acres (2.4 percent of the HNA) and is dominated by coyote brush. California sage (*Artemisia californica*), coffeeberry (*Rhamnus californica*), poison oak, and bush monkey flower (*Mimulus aurantiacus*) can also be found intermixed within the coastal scrub habitat. Invasive French broom and localized Crofton weed are also major constituents throughout the HNA. Stands of northern Franciscan coastal scrub are found throughout the HNA, but they mainly occupy the steeper portions of the south- and west-facing slopes along the eastern boundary of the HNA.

- **Riparian Woodland**. Riparian woodland occurs along the streams and drainages and occupies a relatively small acreage in the HNA. Tree species observed include willows (*Salix* spp.), cottonwood (*Populus fremontii*), alder (*Alnus* spp.), California bay, California buckeye, and coast live oak. Riparian woodland occurs in the drainages northwest of Earl Court, southwest of Kent Court, north of Buckingham Drive, east of Gladys Avenue, and in the upper portion of the Wildwood drainage. Other species occurring in the riparian woodland include arroyo willow (*Salix lasiolepis*), elderberry and non-native Himalayan blackberry (*Rubus armeniacus*). All of these species, with the exception of coast live oak, indicate the presence of water in the moist canyon bottom environment. Riparian woodland is characteristically wet. Ground fuels decay

quickly as a result of this moisture, thus reducing the fire hazard of riparian woodland vegetation. Riparian woodland is considered a sensitive plant community.

- **Rock Outcrops** are present in small areas throughout the HNA. Species observed at the outcrops include naked-stem buckwheat (*Eriogonum nudum*), California poppy (*Eschscholzia californica*), coyote mint (*Monardella villosa*), and various non-native plants (e.g., vetches [Vicia spp.], Pride of Madeira [*Echium candicans*], French broom, Monterey pine, and eucalyptus seedlings). The disturbed quarry walls have proven to be a hostile environment for the development of vegetative cover. Pampas grass (*Cortaderia selloana*) has sparsely covered the walls, with a density of approximately 25 percent.

- **Streams/Drainages** flow in the southwest direction into culverts beneath the adjacent residential area to the southwest. Common plants in these drainages are arroyo willow and non-native Himalayan blackberry. Some of the drainages occur within concrete v-ditches and become natural stream channels further downstream within the project site.

Canopy Cover and Tree Benefits

The i-Tree Canopy estimation methodology (i-Tree Canopy 2023) was used to estimate the change in average tree canopy cover from 1935 to 2023, based on aerial photographs. The canopy cover analysis was based on 100 randomly selected points distributed throughout the HNA. Each point was classified from the historical (1935) and current (2023) aerial image as either tree or non-tree ground cover. The HNA's overall canopy cover by trees was relatively low in 1935 (30 percent) and almost certainly included a large percentage of small trees and shrubs. These were, however, difficult to identify based on the grainy black-and-white imagery produced in 1935. By 2023, tree cover had almost doubled (i.e., 55 percent; Table B), and the majority of non-tree/shrub cover today is herbaceous vegetation.

Table B: Vegetative Cover Comparison 1935 vs. 2023, Hillside Natural Area

Cover Class	percent Cover ± SE	
	1935	2023
Tree	30.00 ± 4.58	55.00 ± 4.97
Non-Tree	70.00 ± 4.58	45.00 ± 4.97
Total	100.00	100.00

Source: i-Tree Canopy. n.d. i-Tree Software Suite v7.0. Website: http://www.itreetools.org (accessed January 19, 2024).

In 2013, the City conducted a canopy assessment of the HNA (City of El Cerrito 2013). Coast live oak (31.4 percent), blue gum (17.74 percent) and willow trees (6.55 percent) represent 55 percent of an overall estimated tree population of 13,307 trees. Over 19 different species were identified, including French broom, an invasive shrub that has an estimated 6,327 stems (+/- 193). Approximately 25 percent of all trees in the HNA belong to highly flammable species (e.g., pines, eucalyptus). According to that survey, trees in the HNA absorb an estimated 7,190 pounds (lbs) of air pollutants annually, at a value of $26,606. The HNA is currently storing 2,688 tons of carbon,

valued at $55,608. An additional 89 tons ($1,833) of carbon is sequestered annually. Thus, the total value of ecosystem services provided by the HNA exceeds $84,000 annually (Table C).

Table C: Hillside Natural Area Ecosystem Benefits

	Ecosystem Benefits	Units	Value
Pollution (lbs)	CO (lbs)	206	$132.00
	NO_2 (lbs)	1,200	$5,134.00
	O_3 (lbs)	3,000	$13,430.00
	SO_2 (lbs)	384	$423.00
	PM_{10} (lbs)	2,400	$7,497.00
	Subtotal	7,190	$26,616.00
Carbon (tons)	**Storage (tons)**	**2,688**	**$55,608.00**
	Sequestration (tons)	**891**	**$833.00**
	Subtotal	**3,579**	**$56,441.00**
		Grand Total	**$84,047.00**

Source: City of El Cerrito (2013).
CO = carbon monoxide
lbs = pounds
NO_2 = nitrogen dioxide
O_3 = ozone
PM_{10} = particulate matter less than 10 microns in diameter
SO_2 = sulfur dioxide

Canopy cover and canopy height also affect fire behavior. Canopy cover is closely related to the forest's ability to slow wind speeds close to the ground because of the friction the foliage and tree boles (trunks) provide. The canopy height influences the distance that embers are distributed across the landscape, with taller trees associated with longer ember-cast. The values and spatial patterns of each are shown in Figures 7 and 8, below.

Wildlife

Several common wildlife species inhabit the project site. Most of the bird species observed were foraging in the oak woodland and scrub habitats. A few birds, such as turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*), American crow (*Corvus brachyrhynchos*), and common raven (*C. corax*) were observed flying over the project site. No active bird nests were identified during the reconnaissance-level field surveys, which were conducted in the late summer and early fall of 2023, but a few inactive stick nests were found in trees. Numerous resident birds were observed foraging at the project site, suggesting that they likely nested on or near the project site. Non-native fox squirrel (*Sciurus niger*) nests were also observed in the oak trees. Foraging black-tailed deer (*Odocoileus hemionus*) and Botta's pocket gopher (*Thomomys bottae*) burrows were observed in the non-native grasslands.

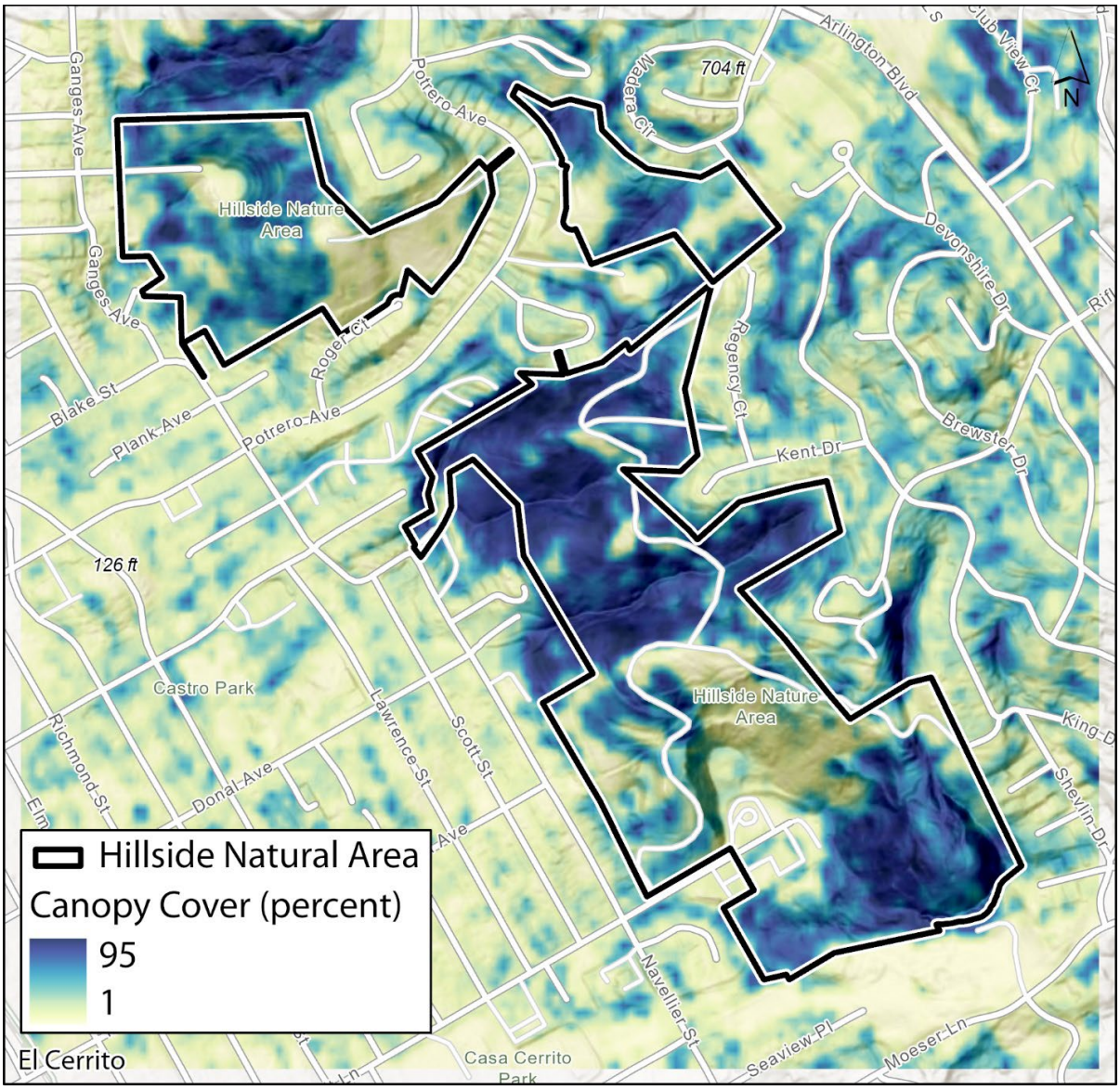

Figure 7: Canopy Cover Map

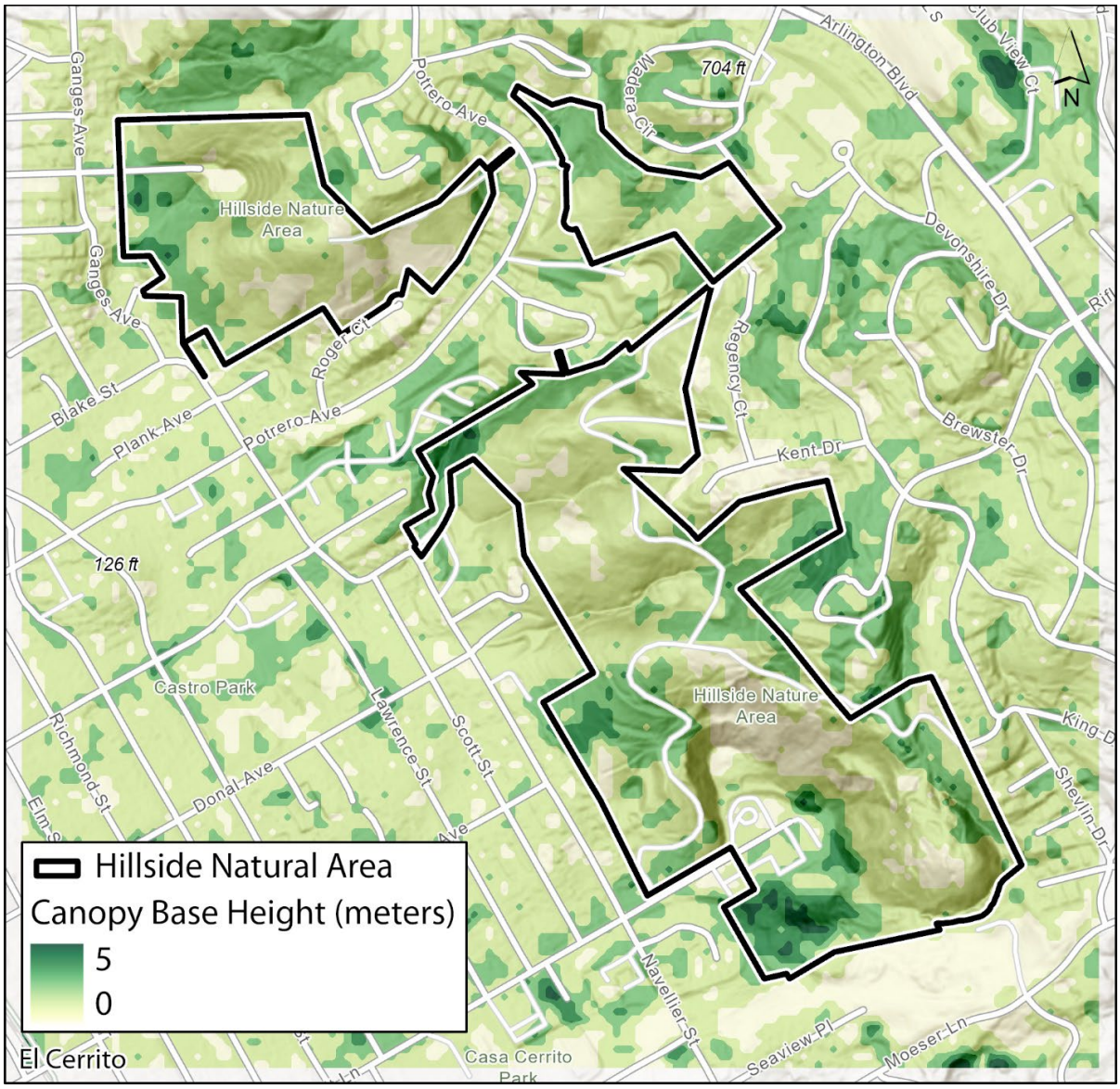

Figure 8: Canopy Height Map

Historical Conditions

Vegetation

Human habitation of the East Bay hillslopes and the vicinity of the HNA intensified approximately 4,000–5,000 years ago when sea levels receded and tidal marshes emerged. Woody vegetation consisted mainly of scrubby oaks and other hardwoods interspersed with patches of coastal scrub, chapparal, and native grasslands. The Spaniard Don José Canizares visited the San Francisco Bay in August 1775 and described the East Bay as "broken hill country with very little woodland, bay trees and oaks here and there making up what there is." He characterized San Pablo Bay as "bordered by rough hill country without trees except for woodlands in two coves to the southwest, the rest is barren, irregular, and of melancholy aspect" (Cunningham 2010).

Ecological studies in the Californian coastal ranges have failed to uncover any clear soil or climate factors explaining the extensive grassland and shrubland distribution patterns. The low incidence of naturally occurring lightning fires suggest that the East Bay landscape would have been dominated by dense woody shrubland and forest cover. Woody communities of coastal California have weak resilience to high fire frequency and are readily displaced by annual grasses and forbs under high fire frequency. Natural fire frequencies are not high enough to maintain these landscapes in the mixtures of shrublands and grasslands that were observed in historical times. Rather, it is hypothesized that these landscape mosaics were readily produced with human ignitions (Keeley 2022). Cultural ecological research and archaeobotanical studies (Cuthrell 2013) suggest that a substantial fraction of the landscape was converted from shrubland to grassland by fire.

Indigenous Land Use

The people living in central coastal California at the time of Euro-American contact were grouped into the Costanoan language family (also referred to as Ohlone), which occupied the coastal area from San Francisco Bay to south of Monterey Bay. Intact shrublands provided limited resources for Native Americans, and thus there was ample motivation for using fire to reduce this vegetation to an open mosaic of shrubland/grassland. The Costanoans carefully managed the landscape to enhance wildlife habitat and plants through cultural burns. Fire was an important tool to reduce shrub encroachment on grasslands rich in edible seeds and bulbs, and to keep favorable habitat conditions for large grazers, such as black-tailed deer (*Odocoileus hemionus*) and elk (*Cervus elaphus*). Cuthrell's (2013) archaeobotanical studies suggest that during the late Holocene (ca. AD 1000–1300), Indigenous peoples relied heavily on grassland seed foods. At archaeological sites, culturally or ecologically fire-associated plants are often found in proportions higher than would be expected in the absence of anthropogenic burning. In addition, wood charcoal remnants are often composed of taxa that are compatible with low-intensity fire, in sharp contrast to the fire-susceptible trees and shrubs that dominate the landscape today. A synthetic interpretation of botanical data supports the hypothesis of frequent anthropogenic landscape burning.

The practice of cultural burning was well recorded. From his camp near the Presidio in October 1816, Adelbert von Chamisso, a German botanist appointed to a Russian expedition, reported that "all night, great fires burned on the back of the harbor; the natives are in the habit of burning the grass, to further its growth." Cultural burning occurred primarily in the late autumn. This burning also eased the gathering of acorns, a staple food for the Costanoans. Other plants utilized

ethnographically include nuts of buckeye, laurel and hazelnut trees, seeds of various plants, numerous berries, and roots. Animals consumed by the Costanoan included deer, elk, antelope, grizzly bear, sea lion, whale, various small mammals, numerous species of birds and waterfowl, and several species of fish, including steelhead, salmon, and sturgeon. The Costanoan people traded mussels, abalone shells, salt, and dried abalone with neighbors to the east and obtained piñon nuts, obsidian, and other items in return (Levy 1978).

With the establishment of seven Spanish missions within traditional Costanoan territory beginning in 1769, native peoples experienced dramatic cultural changes. The introduction of Spanish administration led to the relocation of many native Californians from their villages to missions for the purpose of being "converted" and to serve as laborers. By 1810, the Indigenous people of present-day Contra Costa and surrounding counties had been entirely relocated to the missions. By 1935, for all practical purposes, the Costanoan language was extinct and, by 1968, fewer than 200 people could claim probable Costanoan/Ohlone descent (Levy 1978). Today, however, the Ohlone people are reinvesting in their culture and traditional lifeways. Through newfound political, economic, and social influence, Costanoan peoples constitute a thriving native community within the broader context of present-day California.

Grazing

The large expanse of grasslands supported vast herds of livestock kept during the Mission Era by the Spanish colonizers. For example, Mission San Jose in Fremont recorded 24,000 head of livestock on 20,000 acres of land in 1832. The territory of the Mission Dolores extended across the San Francisco Bay to where San Leandro, Alameda, Oakland, Berkeley, and El Cerrito are found today. Jedediah Smith reported that in 1827, the herds of cattle were nearly as numerous as the buffalo on the plains of Missouri (Burcham 1957). By 1834, estimates of the number of mission cattle were reported to be between 142,000 and 423,000 head (Burcham 1957). With the end of the Spanish period and the secularization of the missions in 1836, Spain began issuing land grants for private ranchers, initiating the Rancho period. By the 1840s, cattle ranching was well established throughout the coastal areas from San Francisco Bay southward.

As a result of the Gold Rush (1848–1860), the demand for beef was so high that local ranchers could not keep up with the demand and large herds were driven into California from Texas and other southwestern states, as well as Mexico. In addition, thousands of livestock were brought into California from the Midwest. More than 150,000 head of cattle entered the state from that area during 1852 and 1853 alone (Burcham 1957). The high stocking rates resulted in overutilization of rangelands and widespread degradation of the landscape. Year-long grazing and overstocking proved to be detrimental to native perennial grassland plants, which were replaced by non-native annuals that make up the majority of today's grasslands in California. In the early 1900s, most of the hills around El Cerrito were bare (Figure 9), and very few trees existed due to the high level of livestock grazing and deforestation during the Gold Rush.

Photograph courtesy of the El Cerrito Historical Society. Note the absence of trees and shrubs on the Hillside Natural Area.

Figure 9: Photograph of Motorcycle National Hill Climb (1928)

Eucalyptus

The California Tree Culture Act of 1868 encouraged the planting of trees, paying landowners $1 per tree planted and nurtured for 4 years. Eucalyptus trees were first introduced into California in 1853 as an ornamental species (Groenedaal 1983) but were soon planted throughout the East Bay hills as windbreaks and shade trees, along roadsides and in towns, to add beauty to a California landscape that was largely bare of trees. However, their main purpose was as a source of fast-growing lumber. The vast majority of eucalyptus species planted were blue gums, selected for their speed of growth.

Australian eucalyptus were promoted heavily as a source of high-quality hardwood and promised to ease the "Hardwood Famine," which was caused by rebuilding efforts following the 1906 earthquake. In 1911, Frank Colton Havens' "Mahogany Eucalyptus & Land Company" hailed eucalypts as "of more glorious hardness" than teak, mahogany, ebony, hickory, or oak, with wood suitable for cabinets, railroad ties, dock pilings, boats, paving blocks, telephone poles, and violins. However, it was soon discovered that blue gum made inferior lumber due to splitting and warping. Havens abandoned the tree plantations just 2 years later, in 1913, after planting 14 miles of the Berkeley-Oakland ridgeline with some 3 million trees. Today, the remnants of the plantations are over 100 years old, and some trees have reached impressive dimensions.

Cultural Resources

Archival research, outreach to the Native American community, and an intensive field survey did not document indications of prehistoric activities in the project area (see Appendix C). The Tribal Chair

of the Confederated Villages of Lisjan Nation and the City met and discussed the Plan's development and anticipated outcomes. Although the Native American Heritage Commission (NAHC) noted that a culturally significant property was known to be present near the project area, none of the tribal contacts and representatives have expressed concerns regarding this possible site. In addition, an intensive field survey did not identify potentially sensitive landforms or significant level terrain in the project area, suggesting it retains a low level of sensitivity for containing traces of early Native American occupation. Concerning historic-period resources, historic mapping, aerial photographs, archival research, and the field survey indicated that no developments occurred in the project area. No work is planned near creek bottoms, where potentially undocumented artifacts could be disturbed. Consequently, there is a low level of sensitivity for the project area to exhibit potentially significant historic-era sites, features, or artifacts.

TRAIL CONDITIONS

The HNA has a network of existing roads and trails that support a variety of uses, including emergency access, hiking, dog walking, running, mountain biking,[7] birdwatching, etc. Several trails are fire access roads maintained by the City. Portions of the trail system require upgrades to enhance their serviceability (Figure 10).

Existing and Potential Fire Roads

Based on mapped trail features and information provided by the El Cerrito Trail Trekkers, the AllTrails App,[8] and Friends of Five Creeks, a brief description including the length and location of each existing and potential fire road that also acts as a trail is included below. Trail names were collected from El Cerrito Trail Trekkers and AllTrails. Figure 10 exhibits all trails and fire roads.

Hillside Natural Area North

- **Motorcycle Hill Trail:** The Motorcycle Hill Trail is a 0.57-mile one-way trail with steep switchbacks. The trail starts at Blake Street and ends at Potrero Avenue. The top of Motorcycle Hill, also accessible from Potrero Avenue using a relatively flat trail, provides scenic views of the East Bay cities and coast. This space may be appropriate to establish a landing and staging area for vegetation treatments and later as a picnic area. The fire road from Potrero Avenue to this space should be maintained for use as a fire road. Ice plant may also be removed from this upper area. A large eucalyptus grove is located south of the Motorcycle Hill Trail. The Motorcycle Hill Trail is very steep and likely challenging for the average hiker. Purple needle grass and soap root were observed along the trail and will need to be maintained as sensitive species. Eucalyptus trees to be removed can also be found along this trail.

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7 While signage is currently inconsistent, mountain biking is allowed in the HNA as long as it is not motorized. Future plans may evaluate bicycle use on trails.

8 AllTrails. 2019. AllTrails: Hike, bike, and run (10.4.2) (mobile app). App Store. Website: https://apps.apple.com/ca/app/alltrails-hike-bike-run/id405075943.

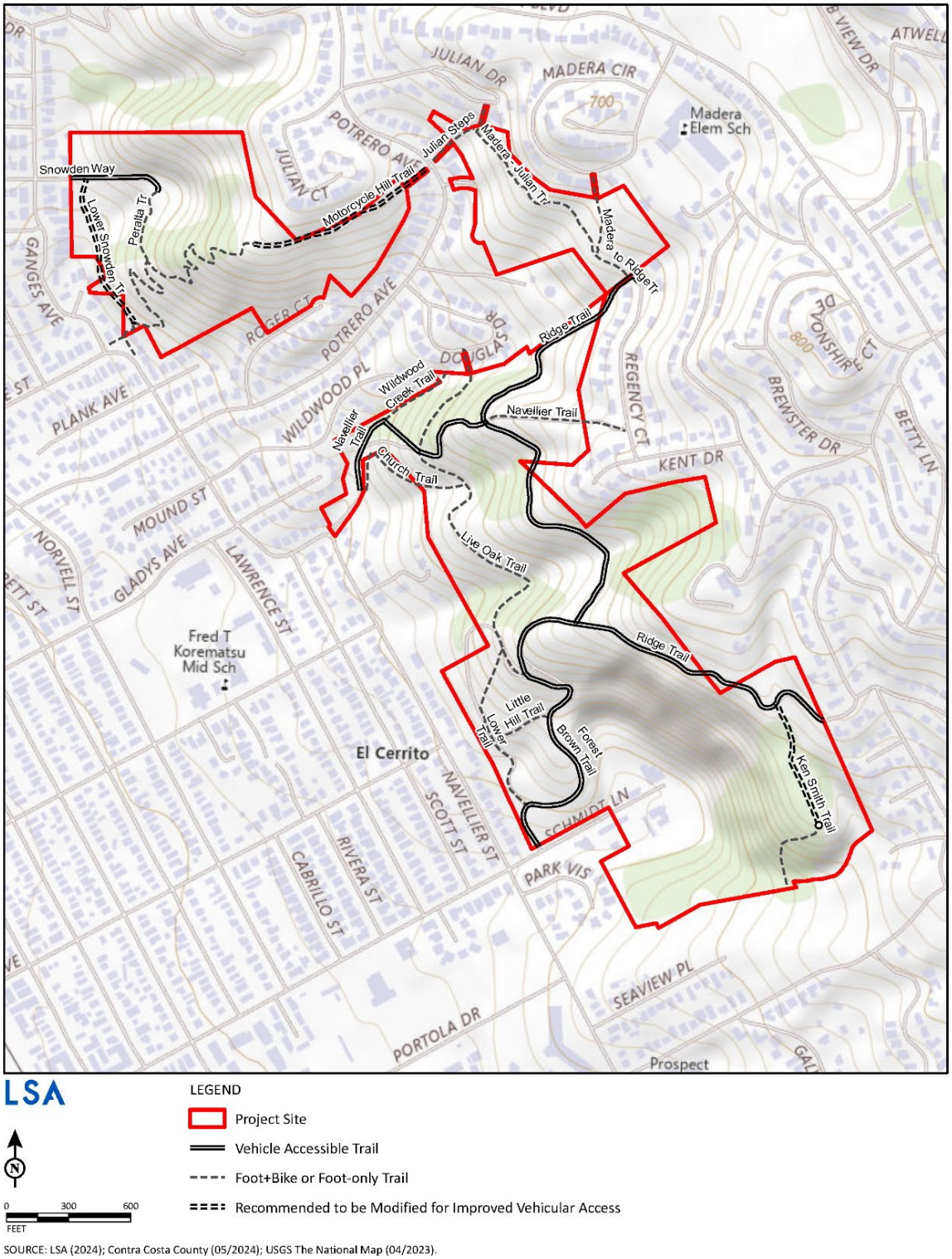

Figure 10: Hillside Natural Area Trails and Fire Roads

- **Castro Trail (also known as Lower Snowden Trail):** This is a 0.14-mile, one-way, and approximately 2-foot-wide trail that starts at Snowden Avenue and connects to the Motorcycle Hill Trail. It is possible to expand for full fire apparatus access.

Madera Property

- There are no current or potential fire roads on this management unit.

Hillside Natural Area South

- **Ridge Fire Road:** This is a 0.75-mile, one-way road that starts at King Court and ends at Regency Court.
- **Navellier Fire Road:** This is a 0.35-mile, one-way road that connects Navellier Street to Regency Court and overlaps with the Ridge Fire Road. The trailhead is a paved road between 1432 and 1440 Navellier Street, turning into a fire road. Th trail crosses Ridge Fire Road and Live Oak Trail and ends near the mouth of Regency Court.
- **Ken Smith Trail:** This is a 0.19-mile, one-way road that is approximately 10 to 15 feet wide at the start, near Ridge Fire Road, but dissipates into a dead end toward the south. The trail could be expanded to provide fire apparatus access but needs terminal turnaround.
- **Forest Brown Fire Road:** This is a 0.34-mile, one-way road that has an entrance on Schmidt Lane and climbs to Ridge Fire Road.

Trails

Hillside Natural Area North

- **Peralta Trail:** This is a 0.10-mile, one-way, and relatively unmaintained trail that starts at the former EBMUD tank site at the end of a 15-foot-wide paved fire road and connects to the Motorcycle Hill Trail.

Madera Property

- **Madera-Julian Trail:** This is a 0.21-mile, one-way trail that starts at the concrete steps at 1625 Julian Drive and ends at the Ridge Fire Road below Madera Circle. It is also accessible by a 0.1-mile trail starting at 1556 Madera Circle.

Hillside Natural Area South

- **Wildwood Creek Trail:** This is a 0.05-mile, one-way trail that branches off into a dead end from Navellier Fire Road alongside the partially channelized Wildwood Creek trailhead from Navellier Fire Road right after the first big turn going uphill.
- **The Lower Trail:** This is a 0.16-mile trail that connects Forest Brown Fire Road to the Live Oak Trail and the Little Hill Trail. The northern section past the Little Hill Trail splits the trail into one well-maintained segment and another segment not maintained as a public trail, which ends at a fenced-off area.

- **The Little Hill Trail:** This is a 0.05-mile, one-way trail that connects the Lower Trail to the Live Oak Trail.

- **Church Trail:** This is a 0.14-mile, one-way trail that connects Navellier Fire Road to the Live Oak Trail. Segments of this trail are as narrow as 1–2 feet wide with an eroded segment near the Live Oak Trail.

- **Live Oak Trail:** This is a 0.41-mile, one-way trail that connects Douglas Drive to Forest Brown Fire Road. The trailhead is at 1524 Douglas Drive. The trail crosses Navellier Fire Road and runs south, roughly parallel to Ridge Fire Road, to Forest Brown Fire Road. A portion of the trail includes the sign-posted Rotary Interpretive Trail and the trail is incorporated within the Memorial Grove Trail. Erosion of the trail occurs toward Douglas Drive.

SPECIAL-STATUS SPECIES

For the purposes of this Plan, special-status species are defined as follows:

- Species that are listed, formally proposed, or designated as candidates for listing as threatened or endangered under the federal Endangered Species Act (FESA);

- Species that are listed, or designated as candidates for listing, as rare, threatened, or endangered under the California Endangered Species Act (CESA);

- Plant species that are on the California Rare Plant Rank (CRPR) Lists 1A, 1B, and 2;

- Animal species designated as Species of Special Concern or Fully Protected by the California Department of Fish and Wildlife (CDFW); or

- Species that meet the definition of rare, threatened, or endangered under Section 15380 of the CEQA Guidelines.

Plants

Special-status plant species for which extant or non-historic California Natural Diversity Database (CNDDB) (CDFW 2023) records exist in the vicinity consist of the following species:

- Bent-flowered fiddleneck (*Amsinckia lunaris*; CRPR List 1B)

- Pallid manzanita (*Arctostaphylos pallida*; Federal Threatened, State Endangered, CRPR List 1B)

- Franciscan thistle (*Cirsium andrewsii*; CRPR List 1B)

- Western leatherwood (*Dirca occidentalis*; CRPR List 1B)

- Fragrant fritillary (*Fritillaria liliacea*; CRPR List 1B)

- Diablo helianthela (*Helianthella castanea*; CRPR List 1B)

- Loma Prieta hoita (*Hoita strobilina*; CRPR List 1B)
- Santa Cruz tarplant (*Holocarpha macradenia*; Federal Threatened, State Endangered, CRPR List 1B).
- San Francisco owl's-clover (*Triphysaria floribunda*) CRPR List 1B

Several other special-status plants are also known to occur in the region (Diablo Fire Safe Council 2017). None of these or other special-status species, however, are likely to occur within the majority of project site due to: (1) prior disturbance in the project area; (2) the introduction of non-native plant species; and (3) the absence of suitable habitat and substrates such as wetlands and serpentine substrates. Less disturbed areas on the project site, such as the oak woodland, riparian woodland, scrub, and native grasslands, may provide suitable habitat for special-status plant species and locally rare plant species. Therefore, protocol-level plant surveys are recommended to be conducted where suitable habitat is present.

Sensitive Natural Communities

The CDFW has ranked California natural communities by their rarity and threat using the best and most recent scientific information available. Natural communities with ranks of S1–S3 are considered sensitive natural communities. While sensitive natural communities have not been mapped at the HNA, several potential sensitive vegetation communities, especially perennial grasslands and riparian habitats, may exist. Thus, before implementation of vegetation treatment activities, it is recommended that a qualified biologist identify and map the extent of sensitive natural communities in the treatment area pursuant to relevant protocols. Protocol-level surveys for sensitive natural communities should be timed to coincide with protocol-level special-status plant surveys whenever possible.

Wildlife

Special-status animal species that are known to occur in the vicinity of the project site and for which suitable habitat is present include the following:

- Monarch butterfly (*Danaus plexippus*; Federal Candidate)
- Crotch bumble bee (*Bombus crotchii*; State Candidate Endangered)
- Western bumble bee (*Bombus occidentalis*; State Candidate Endangered)
- Alameda whipsnake (*Masticophis lateralis*; Federal and State Threatened)
- California red-legged frog (*Rana draytonii*; Federal Threatened, California Species of Special Concern)
- Western pond turtle (*Emys marmorata*; Federal Threatened, California Species of Special Concern)
- White-tailed kite (*Elanus leucurus*; California Fully Protected)

- Northern harrier (*Circus hudsonius*; California Species of Special Concern)
- Golden eagle (*Aquila chrysaetos*; California Fully Protected)
- Bald eagle (*Haliaeetus leucocephalus*; State Endangered, California Fully Protected)
- American peregrine falcon (*Falco peregrinus anatum*; California Fully Protected)
- Loggerhead shrike (*Lanius ludovicianus*; California Species of Special Concern)
- Vaux's swift (*Chaetura vauxi*; California Species of Special Concern)
- Olive-sided flycatcher (*Contopus cooperi*; California Species of Special Concern)
- Purple martin (*Progne subis*; California Species of Special Concern)
- Grasshopper sparrow (*Ammodramus savannarum*; California Species of Special Concern)
- Tricolored blackbird (*Agelaius tricolor*; State Threatened, California Species of Special Concern)
- Yellow warbler (*Dendroica petechia*; California Species of Special Concern)
- Townsend's western big-eared bat (*Corynorhinus townsendii*; California Species of Special Concern)
- Pallid bat (*Antrozous pallidus*; California Species of Special Concern)
- Western red bat (*Lasiurus frantzii*; California Species of Special Concern)
- San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*; California Species of Special Concern)
- American badger (*Taxidea taxus*; California Species of Special Concern)

However, it should be noted that based on the habitat requirements and connectivity to occupied habitat, not all species are likely to occur at the HNA. Special status wildlife species that are either verified to be present or have a high likelihood of occurring at HNA are as follows:

- **Monarch Butterfly**. The monarch butterfly is a federal candidate listed species that could breed within the project site. Monarch butterflies breed from June to September and require their obligate larval host plant, milkweed (*Asclepias* spp.), for laying eggs, larval development, and metamorphosis. This species utilizes other flowering species for nectaring during the breeding season. No milkweed was observed during LSA's reconnaissance-level field surveys, and milkweed is not listed in the plant list (Appendix E); furthermore, milkweed has not been recorded at the HNA by the Western Monarch Milkweed Mapper (Xerces et al. 2023). However, individual monarch butterflies are frequently observed flying through the project site (LSA, unpublished data). Trees provide suitable overwintering roosting habitat for monarch butterflies. The project site is situated approximately 1.5 miles from the San Francisco Bay shoreline, which falls within

the distance in which monarchs overwintering roosts are known to occur (Leong et al. 2004). According to a monarch study completed for the project site in 1993 (ESA 1994), the project site may be situated at too high an elevation to allow monarchs to use the project site as an overwintering roost site. No CNDDB occurrences for monarch butterfly have been recorded at the project site, while the closest CNDDB occurrence for an overwinter roost is in Richmond, approximately 1.2 miles from the site. The project site is not listed as a location for Xerces Society's Thanksgiving Count for monarch butterflies.[9] Surveys for existing overwintering roosts are recommended prior to removal of large eucalyptus trees, especially in lower elevations that are sheltered from prevailing cold winds. Measures to avoid and minimize impacts to monarch butterfly larval and adult foraging habitat will be required as part of the regulatory process.

- **Crotch and Western Bumble Bee**. The crotch and western bumble bees are Candidate State Endangered listed species. These species are known to occur in grassland and scrub habitat where suitable native nectar plants are present. These species historically occurred in the region but are now considered rare. Due to the presence of suitable flowering plant species, these species, although unlikely due to their rarity, could be present. Measures to avoid and minimize impacts to bumble bee species and their foraging habitat will be required as part of the regulatory process.

- **Alameda Whipsnake**. Alameda whipsnake is a federal and State listed threatened species that occurs in chaparral and rock outcrops and adjacent habitats, such as riparian woodland, oak woodland, and grasslands. Although very little high-quality chaparral habitat is present, the project site provides suitable habitat for this species. Focused habitat field surveys for Alameda whipsnake at the project site in 1993 (ESA 1994) determined that the site provides suitable habitat for this species. No Alameda whipsnakes have been recorded at the project site. The closest non-historic CNDDB occurrence was recorded near the San Pablo Dam, approximately 2.7 miles from the project site. The likelihood that Alameda whipsnake occurs at the project site is low. Measures to avoid and minimize impacts to Alameda whipsnake and its foraging habitat will be required as part of the regulatory process.

- **Special-Status Birds and Other Nesting Bird Species**. Several special-status bird species are known to occur at or near the project site (Appendix A). These bird species could nest, winter, and/or migrate through the project site. Some of these bird species, such as the American peregrine falcon, could forage on the project site but are unlikely to nest at or adjacent to the site due to the lack of suitable nesting habitat. Special-status birds observed at the project site include white-tailed kite, olive-sided flycatcher, and Vaux's swift, among others (eBird 2023). Several other special-status birds have been recorded in the project vicinity (CDFW 2023, eBird 2023). Active nests of special-status and other native bird species are protected by the Migratory Bird Treaty Act and/or California Fish and Game Code. Measures to avoid and minimize impacts to nesting birds will be required as part of the regulatory process.

- **Special-Status Bats and Other Bat Species**. Several bat species, including special-status bat species, could roost and/or forage at the project site. All roosts of native bats, regardless of their status, are protected by California Fish and Game Code. Townsend's western big-eared bat

[9] https://westernmonarchcount.org/.

(California Species of Special Concern) may briefly forage over the project site but would not roost on the project site due to the lack of suitable roosting habitat. Suitable habitat for pallid bat and western red bat (both of which are California Species of Special Concern) and other bat species exists; these species could roost in the on-site trees. Pallid bats may roost in tree cavities and in structures, while western red bats roost in trees. Western red bats typically roost in riparian habitats but could roost in the larger on-site trees. This species does not breed in the area but does occur in the spring and fall during migration. The western red bat has been observed approximately 1.5 miles from the project site near Jewell Lake (LSA pers. obs.). Surveys for bat roosts are recommended prior to the removal of large eucalyptus trees. Measures to avoid and minimize impacts to bat roosting and foraging habitat will be required as part of the regulatory process.

- **San Francisco Dusky-Footed Woodrat**. The San Francisco dusky-footed woodrat is a California Species of Special Concern. This species occurs in riparian woodland, woodland/forests, and scrub habitat and has been observed at the project site. LSA observed woodrat houses in the northern portion of the site, but this species could occur throughout the project site where suitable habitat is present. Measures to avoid and minimize impacts to woodrat houses and foraging habitat will be required as part of the regulatory process.

RISKS AND THREATS

Wildfire in the Hillside Natural Area

Fire is a natural phenomenon that poses inherent hazards to the neighboring communities in the HNA due to the topography, proximity to vegetation that can burn, and prevailing wind patterns. The role and characteristics of fire in the HNA have been altered due to changes in vegetative succession, human uses, invasive species, and recreational demands. Climate change has changed the severity and length of fire seasons, increasing the risk of loss of residential and other structures. Secondary fire impacts, such as smoke exposure, visual blight, and loss of recreation opportunities affect a wide range of communities, not just those adjacent to the HNA. The HNA is surrounded by homes and businesses with several major roads leading away from its boundary (Moeser Lane, Arlington Boulevard, and Potrero Avenue). Many homes are located on long, winding roads and in cul-de-sacs with little access to quick evacuation in the event of a fire. Homes surrounding the HNA are at risk from fire for a number of reasons. Structures are generally older, dating to before the requirement for ignition-resistant construction. Most roofs are less flammable; however, wood siding, decks, and unprotected vents that are part of most homes can make buildings prone to ignition.

Fuels and Fire History

The East Bay hills' combination of warm and dry summers, conducive topography, flammable vegetation, dense urban development, limited firefighting access, and Diablo winds present significant risks to the public, dwelling structures, and property located along the wildland-urban interface. The HNA has been the location of many fires over the last 20 years. Historic fire ignitions in the East Bay hills have not been well documented but are almost all directly related to human activity.

On July 4, 2010, a fire started adjacent to the wildlands at the eastern end of Tamalpais Avenue and Fair View Drive and on April 18, 2012, a human-caused fire started at the entrance to the Recycling

Center. In 2020, a lightning strike started a fire south of Moeser Lane. The size or acreage impacted by fire has been relatively small. All fires have been contained to 2 acres or less but had the potential to burn into the HNA. Aggressive initial attack and strong mutual aid cooperation are paramount in these instances.

Fire history was compiled from newspaper articles, old fire planning studies, and recent fire perimeters collected by fire departments. The UC Berkeley Wildland Vegetative Management Plan indicates the fire history of the East Bay hills from 1905 to 2017. Of these fires, 11 fires that burned under Diablo wind conditions burned 9,840 acres of the East Bay hills between 1923 and 1998. Most of these losses occurred from two fires: the 1923 Berkeley Fire and the 1991 Oakland Tunnel Fire, which destroyed 2,843 single-family dwellings and 437 apartment and condominium units and killing 25 people, with financial losses of more than $2 billion in current dollars. During the same period, three large west-wind fires burned 1,230 acres of grass, brush, and trees, as well as four homes in the East Bay hills. Additional smaller fires have also ignited near the Plan area, including, most recently, the 2017 Grizzly Fire.

Most of the burns have originated along the periphery of the HNA in flatter locations dominated by grasses. These areas are most easily accessed and most heavily traveled. Grass fuels are also easily ignited. The central portion of the HNA has experienced relatively few fires. This is probably due to denser woody vegetation and steeper slopes, both of which limit access. The brushland and woodland areas cannot be traveled through as easily as the grassland areas.

The triangular parcel north of Moeser Lane and the adjacent PG&E property have experienced fires more frequently than any other parcel within the HNA. Approximately nine fires have occurred in this area over the past 20 years. This area is gently sloping grassland with numerous trails leading to and from the residences to the south and east and the school district site to the west. It is also adjacent to Moeser Lane, which is a major thoroughfare.

The area west of Ken Smith Grove and east of the residences on Navellier Street has had at least four fires over the last 20 years. This area is adjacent to one of the main access points of the HNA. The steeper areas south of the former EBMUD water storage tank located off Ganges Street at the north border of the HNA has experienced at least six fires in the past 20 years. This area is easily accessed by the former EBMUD facility roads from Snowdon Avenue, and from the fire road south of Julian Court at Potrero Avenue. The area northeast of the EBMUD water storage tank off Potrero Avenue has had at least four fires in the past 20 years, the most recent of which occurred on November 2, 2023.

Flammability

Flammability is defined as the capacity of plant biomass to burn. It includes four components: ignitability (the ability of a material to ignite); sustainability (the ability of a material to sustain combustion and produce energy); combustibility (the rate at which a substance burns into flame); and consumability (the proportion of biomass consumed during combustion) (White and Zipperer 2010). Relationships between plant traits and flammability of tree species are an important aspect of fire risk. Studies show that three main types of plant traits are associated with different components of flammability:

- Moisture content;
- Structural and morphological features of leaves, litter, bark, and wood; and
- Chemical composition, and volatile and nonvolatile compounds.

Blue gum is highly flammable and resilient, resulting in a dangerous contribution to an already fire-prone landscape. Guerrero et al. (2022) studied the fire hazard of several exotic forest species (including blue gum and Monterey pine) in Chile. Although all of the studied species were highly flammable, blue gum was extremely flammable, as its leaves contain high concentrations of essential oils, monoterpenes, and sesquiterpenes, which can generate a flammable atmosphere. Moreover, the heat of combustion of *E. globulus* was positively correlated with its high essential oil contents. Studies of eucalyptus' crude fat content find that it ranges from about 10 to 20 percent of its dry weight (whereas tropical leaves typically have about 3 percent). Mutch (1970) noted "a high crude fat content ...sets the state potentially for a more intense fire with greater flame heights." Agee et al. (1973) measured the highest percentage of oil in gum trees among all plant species measured. Eucalyptus is predisposed to ignite in the presence of a heat source, releasing high amounts of energy during combustion, which contributes to the risk of the formation and spread of canopy fires among these tree formations.

The distribution in space of burnable biomass is an important factor in determining the fire hazard of any vegetation type. Eucalyptus branches, leaves, and bark slough off in large pieces that end up draped on one another, creating a near-optimum mixture of oxygen and fuel. This fluffy arrangement provides a "goldilocks situation"—not too dense and not too airy, but one that provides close enough contact for the fire to burn and transfer heat easily to the next particle. Management of fuels makes a crucial impact on both volume and structure. Removing surface fuels and shorter trees and pruning lower branches aids in preventing crown fires.

Once fuel ignites, another important factor in fire behavior is the volume of the fuel. Greater fuel volume results in fires that are hotter and harder to contain. Eucalypts are big plants that produce a lot of fuel. Wildfire burns small material most readily and almost disregards material larger than 3 inches in diameter. Beyond the trunks and larger branches, there is still a lot of volume in the tree's foliage, bark, and debris. Agee et al. (1973) measured approximately 29 tons/acre of fuel in Sibley Regional Park in Oakland, with roughly half consisting of a thick layer of decomposing leaf and organic material (duff). More recently, the National Park Service measured fuel loading (volume) in the Golden Gate National Recreation Area (north of San Francisco, California) totaling approximately 31 tons/acre (not including duff but including larger-diameter branches).

Fire Behavior

A fine-scale analysis of potential fire behavior across the HNA is useful to determine the possible effects of wildfire, and the potential for spread and containment of a wildland fire. For this purpose, a worst-case scenario was used to reflect conditions during an event of high impact. Several fire behavior prediction software applications have been developed by the United States Forest Service. These include a wide variety of applications designed to specifically meet firefighting or fire prevention needs. For this analysis, we used the application FlamMap (version 6.1), a fire behavior mapping and analysis program that computes potential fire behavior characteristics (Finney 2006). The model describes potential fire behavior for constant environmental conditions (weather and

fuel moisture) at the pixel level (30 x 30 meters) within the landscape dataset. Potential fire behavior calculations include surface fire spread, flame length, crown fire activity type, crown fire initiation, and crown fire spread. Dead fuel moisture and conditioning of dead fuels in each pixel are based on slope, shading, elevation, aspect, and weather.

The compiled weather data from a nearby Remote Automatic Weather Station (RAWS) station (in Berkeley off Grizzly Peak Boulevard near Marlborough Terrace) reflects a fairly dry fuel moisture regime, a "worst-case" scenario, although not necessarily the most extreme case. These are conditions that occur in 90th and 97th percentiles of a 10-year dataset (January 1995 to May 2021). Due to climate change and other factors, a worst-case scenario that reflects the most extreme conditions has proven to be unpredictable. Two scenarios were developed: one with winds blowing from the northeast (under Diablo wind conditions) and another with winds from the northwest. The wind speeds are the same in both scenarios. The inputs into the FlamMap model scenarios (FlamMap n.d.), both the south/southwest and east/northeast (Diablo) scenarios, are presented in detail in Appendix B.

Topography, fuel, and weather are the factors that drive fire behavior. Because of the steep slopes and abundant fuel, along with warm, dry temperatures and occasional strong winds, the risk of fire in and around the HNA is high. Long flame lengths and tree torching are expected for most of the area in the HNA; these pose threats to the hillside residences and the community. Fortunately, the moderate fire spread rates expected in the HNA may assist fire containment when fire suppression efforts are not thwarted by long flames.

Flame Length

Flame length is often correlated to the ability to control a fire. A flame length of 4 feet is the limit of what can be attacked with hand crews, and 8 feet is usually treated as a cut-off point for strategic firefighting decisions on whether to attack the fire directly or instead attempt control through indirect methods (Andrews and Rothermel 1981). Indirect attack is a method of suppression in which the control line is located some considerable distance away from the fire's active edge. Flame lengths in both scenarios are expected to be high (over 12 feet and, in some places, over 20 feet) in some areas of each of the three sections of the HNA due to heavy fuels, especially in the mixed forest and scrub/shrub lands. Where a well-developed understory is present under the oak canopies, fires are expected to burn with high intensity. Fires can be expected to burn fast when they are propelled by dry grass and scrub.

When comparing the impact of northeast winds and northwest winds on the fire behavior of the HNA, it is clear that in the northwest wind scenario, larger areas of the HNA have very high and extremely high flame lengths. The highest flame lengths predicted with the northwest wind are in the southeastern portion of HNA South, the northeastern quadrant of HNA North, and a section of the western part of the Madera property, as well as areas outside of all three sections of the HNA along boundaries with the surrounding community (Figure 11). These areas will be focal points of vegetation treatments.

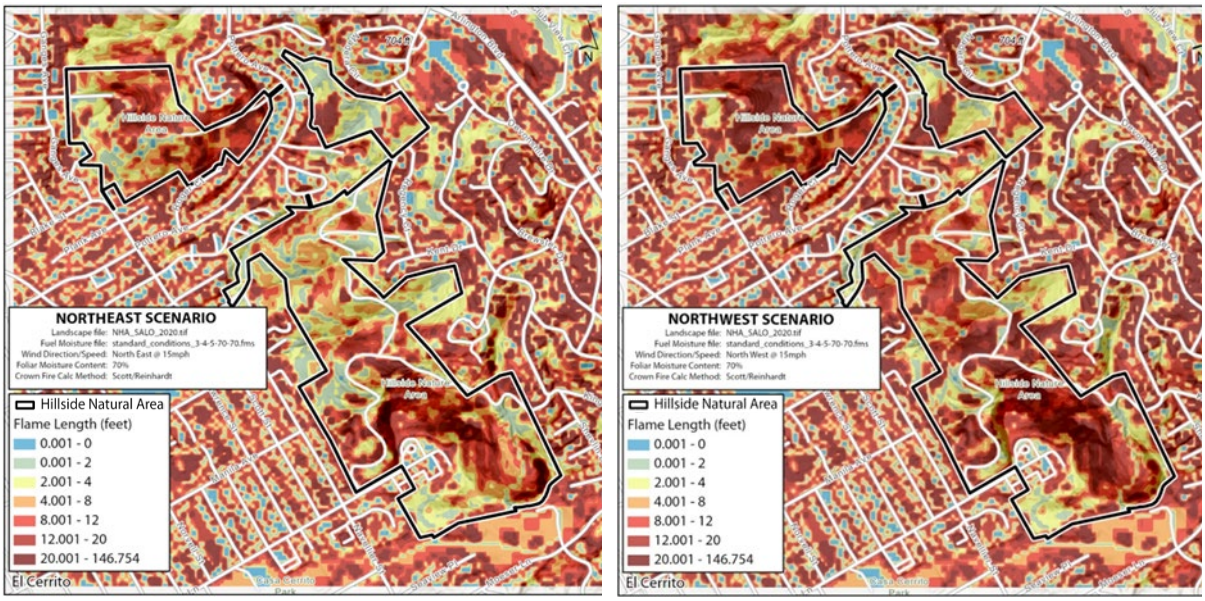

Figure 11: Flame Length Map Comparison

Rate of Spread

Rate of spread measures how quickly a fire moves across a landscape. Rate of spread is dependent on surface fuel types, moisture, wind, and slope. Fine fuels in flat, dry, windy areas will burn at a much faster rate than areas with thicker surface fuels, more rugged topography, more moisture, and less wind. The rate of spread is of concern when considering fire containment, response times, and evacuation. A slow-moving fire (for example, slower than 1/8 mile per hour, or 11 feet/minute) might be easily contained, whereas fast-moving fire (a fire moving faster than 1 mile per hour, or 88 feet/minute) challenges containment and has the potential to move into high-value, sensitive areas before containment can occur. While a fast rate of spread does not necessarily result in a problematic fire, a fast-moving fire coupled with high flame lengths cannot be suppressed with a hand crew. Rate of spread predictions in both a northeast wind scenario and a northwest wind scenario are presented below (Figure 12). The comparison between the wind scenarios for the rate of spread follows the same pattern as the comparison of the two wind scenarios for flame length. There are more areas of high rate of spread increase with a northeast wind. The greatest differences appear in the Madera property area, where more of the area burns faster. Rates of fire spread are also quite fast on HNA North, and the highest rates of spread appear on HNA South, above the Recycling Center. These areas will be focal points of vegetation treatments. Areas outside the HNA are predicted to burn with the same rates of spread with both wind directions, with the exception that the eastern neighborhood is expected to burn faster under a northeast wind scenario.

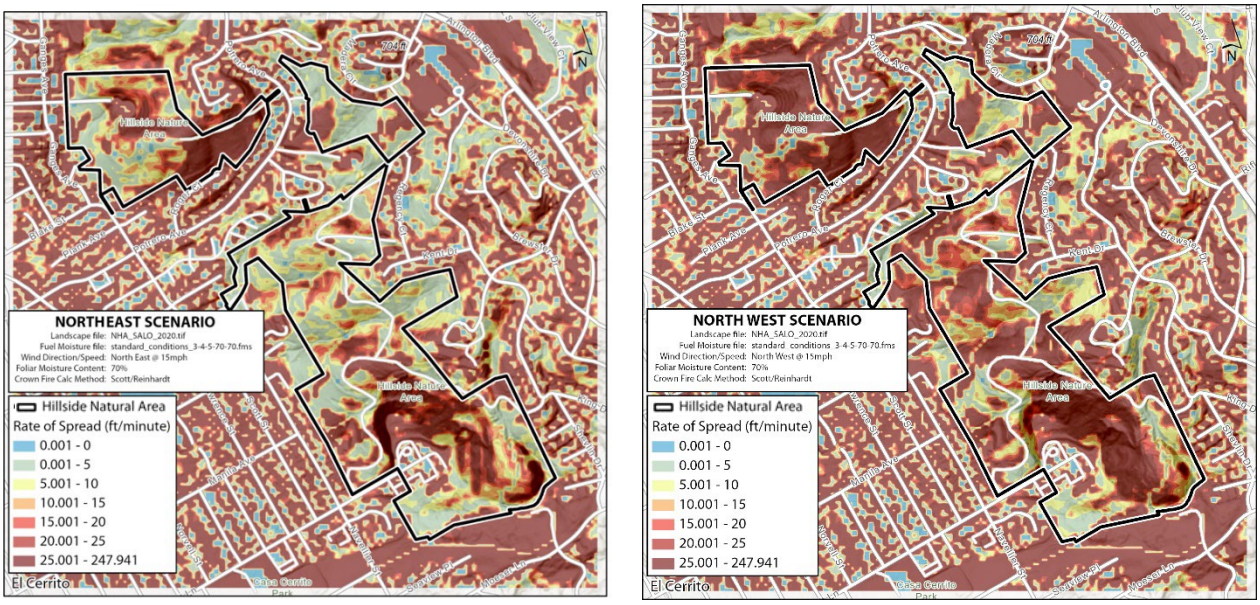

Figure 12: Rate of Spread Map Comparison

Predicted Crown Fire Activity

Crown fire activity includes four possible model outputs: surface fire, torching fire, crown fire, or no predicted fire. Surface fires are limited to fire burning in grass, short shrubs, and the understory of a treed environment, or locations with tall shrubs. The transition from a surface fire to the crowns of trees is known as torching, or "passive crown fire." Trees are said to "torch" when a surface fire intermittently ignites the crowns of trees or shrubs as it advances and the foliage ignites and flares up, usually from bottom to top. Crown fire indicates locations where fire is expected to spread into and possibly consume the canopy of trees or shrubs (Figure 13). Fire spread from tree crown to tree crown is considered "active crown fire" and is based on the rate of fire spread, the density of the tree crown, and wind speed. It is important to keep in mind that crown fires and torching can occur only where there are trees and tall shrubs. Short shrub stands can burn intensely and still not torch.

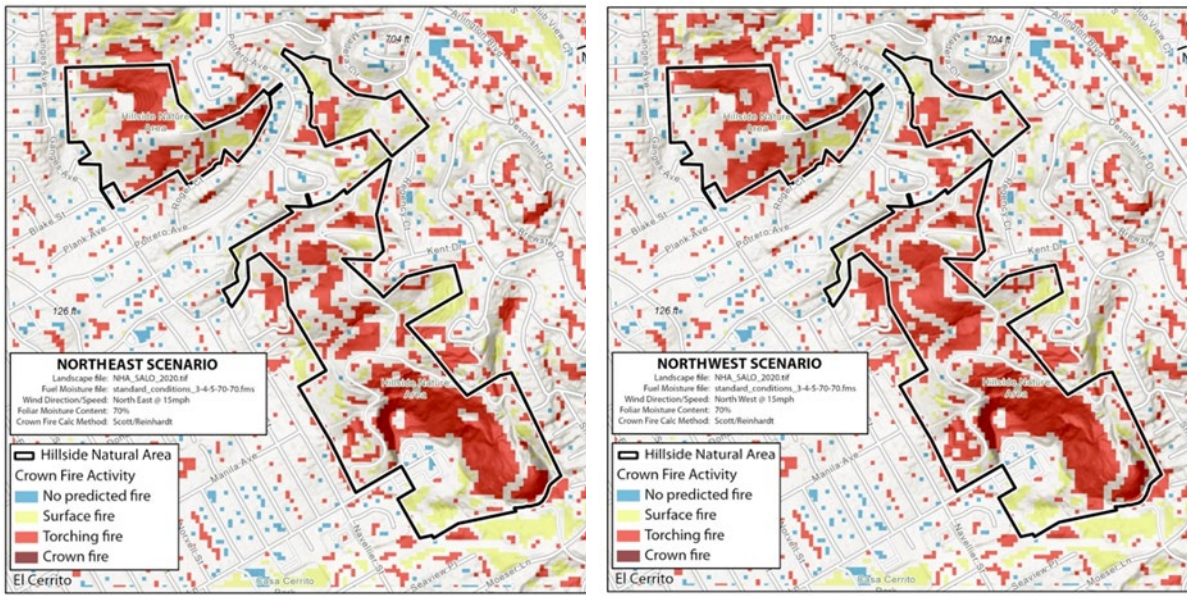

Figure 13: Crown Fire Activity Map Comparison

When a fire burns through trees or tall shrub crowns, countless embers are produced and are distributed, sometimes at long distances. These embers can start new fires called “spot fires,” which can each grow and confound the finest fire suppression forces. “Spotting potential” or “crowning potential” describes the propensity of vegetation to create and disperse embers that have the potential to start new fires well in advance of the main fire. In terms of ecological effects, prediction of torching or crown fire is highly correlated with fire severity and greater environmental impact. While the coniferous, eucalyptus stands, and oak forests can torch, oak forests are less likely to have fire reach to the tree crowns unless vegetation is burning underneath.

Most of the HNA is predicted to burn with torching fire. In the HNA, torching fire is predicted to be concentrated in the wooded and shrub areas of each of the three sections of the HNA, especially where a well-developed understory is present. Crown fire predictions in both a northeast wind scenario and a northwest wind scenario are presented in Figure 13. When comparing the impact of northeast winds and northwest winds on the crown fire activity of the HNA, we see that in the scenario of northwest winds, the presence of torching fire increases slightly. Crown fire, while remaining relatively low, is present in the northwest wind scenario in small patches in HNA South and HNA North, where it was not present at all in the northeast wind scenario. These patches of high torching probability associated with dense eucalyptus stands will be focal points of vegetation treatments.

Maximum Spot Distance

The maximum spot distance (Figure 14) is created from an extended set of outputs from FlamMap software. The distance embers can spread to start new fires is determined by the height of the tree, its position on the slope, and roughly, the shape and size of the particle. Spotting is simulated only from torching trees for passive and active crown fire. Maximum spot distances of embers are

calculated for each pixel that is predicted to torch. This metric is not intended to simulate the numbers of embers, exact locations where embers would land, or locations of resulting spot fires. The predicted spot distance is relatively high; however, only a small portion of the area is predicted to produce spot fires where tall, dense trees (eucalyptus) occur higher on the slope and where understory fuels are present. Eucalyptus is a tall tree species and is often located high on the slope, promoting long ember cast. The leaves, bark, or other particles are thin enough to be lifted but large or long enough to still be burning when they land. With a northeast wind, a smaller proportion of the HNA is expected to cast embers. With a northwest wind, a greater proportion of the HNA is expected to create spot fires; however, the average spot fire distance is shorter.

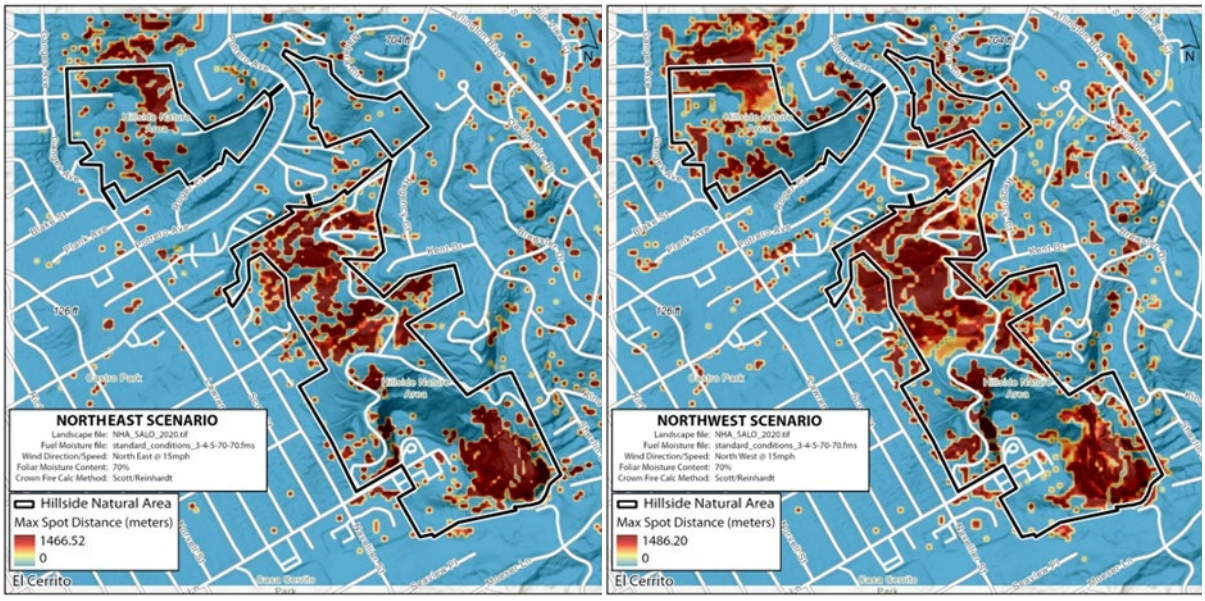

Figure 14: Maximum Spotting Distance Comparison

Forest Diseases and Pathogens

Much of the natural vegetation communities of the Bay Area have undergone substantial changes in their disturbance regimes, such as fire, drought, and disease. New pests and infectious plant diseases can be distributed by human transport and affect the vulnerability of plant communities to fire. Diseases that cause landscape-scale tree mortality may affect the regional fire risk. Recent studies have shown that fire history has contributed to patchy patterns of disease-related forest declines in California and that human caused changes in fire regimes may be an important factor in structuring infectious disease dynamics, contributing to future outbreaks and driving disease infection regimes (Simler-Williamsson et al. 2021).

Sudden Oak Death

SOD, caused by the non-native invasive pathogen *Phytophthora ramorum*, has killed tens of thousands of trees in coastal California (Rizzo and Garbelotto 2003). *Phytophthora* pathogens are known as the cause of significant forest disease in Europe (Braiser and Jung 2003). In California, SOD was first observed in 1995 in Mill Valley (Marin County, California) and originally appeared to affect

primarily tanoak (*Notholithocarpus densiflorus*). By May 1997, not only tanoaks, but also coast live oaks were dying in the Marin Municipal Water District lands and in China Camp State Park on San Francisco Bay (Svihra 2001). Other hosts for *P. ramorum* include California bay laurel and coastal redwood. The pathogen was also found in many nurseries[10] in California, Oregon, Washington, and British Columbia. The distribution of *P. ramorum* as an introduced, nonnative species includes wildlands (only Oregon and California) and nurseries in North America, as well as several European countries (nurseries and limited outbreaks in parks and gardens/woodlands). In Coastal California, the organism infects many different species and nearly all woody plants can serve as hosts for *P. ramorum* (Rizzo et al. 2002a).[11] Typically, coast live oak-bay laurel forests indicate increased mortality of coast live oak. The HNA has approximately 29 acres of coast live oak-bay laurel forests that are at risk of SOD, which has been confirmed to occur at the HNA. Bay laurel is the largest producer of *P. ramorum* inoculum, while Oregon white oak (*Quercus garryana*) appears largely resistant to the disease. Elevated coast live oak mortality may lead to cascading effects in SOD-impacted ecosystems due to the oak's importance as a mast-producing species (i.e., providing acorn crops as forage for a variety of mammals and birds) and as nesting habitat (Apigian and Allen Diaz 2006; Apigian et al. 2006).

Oak Borers

The Goldspotted oak borer (GSOB; *Agrilus auroguttatus*) is an invasive pest that is native to Arizona and may be progressing northward in California due to climatic changes and increasing drought stress to native oaks. The GSOB currently causes severe live oak tree mortality in San Diego, Riverside, and Orange counties. GSOB attacks drought-stricken trees with lowered immunity. The pest is rapidly expanding its range northward and is expected to affect Northern California as the climate warms. GSOB poses a major threat to susceptible oak species throughout California and southern Oregon. Currently, there are no effective tools for saving trees once a major infestation occurs, although management and damage mitigation is possible in low-level infestations. The Mediterranean oak borer (MOB; *Xyleborus monographus*) is an introduced ambrosia beetle that was found infesting several valley oak (*Quercus lobata*) trees in Napa County in 2019. The insect was likely introduced on imported wood products. To date, it has also been detected in Lake, Sonoma, and Sacramento counties. MOB has been found in several of the oaks in the white oak group, including valley oak, blue oak (*Q. douglasii*), and Oregon white oak. The beetle also vectors the fungus *Raffaelea montetyi*, which has pathogenic properties. There are no known cases of either species occurring in the HNA as of this writing.

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[10] Since 2005, a federal order (USDA APHIS 2007a) requires that all nurseries in California, Oregon, and Washington that shipped host plant nursery stock interstate be inspected and certified free of evidence of *P. ramorum*. This Plan does not advocate outplanting of nursery stock. If, however, nursery-grown plant stock is to be used, it should originate from an accredited nursery that has adopted BMPs for the prevention of introducing *Phytophthora* species.

[11] The California Oak Mortality Task Force (COMTF) website (www. suddenoakdeath.org) contains the most up-to-date information available on regulated hosts, associated plants, and experimental hosts. See http://nature.berkeley.edu/comtf/html/host_plant_lists.html#AssociatedHosts for lists of regulated and associated hosts.

PART 2: VALUES, VISIONS, GOALS, AND OBJECTIVES

COMMUNITY VALUES

To gauge the community's interest, involvement, and values regarding the HNA and its management, the City and consultant team held meetings with an SAG and the broader public, conducted a public survey, and collected written comments by email. The consultant team measured the demographics of survey respondents to understand the representativeness of responses compared to the broader El Cerrito community. The results indicate that, in general, the respondents were representative of the community. Respondents were mostly from within El Cerrito City limits (89 percent), followed by outside El Cerrito but within Contra Costa County (6 percent) and then outside El Cerrito but within Alameda County (4 percent). The respondents were 49 percent women, 42 percent men, and 1 percent other genders, while 8 percent preferred not to say. Respondents born from 1950 to 1959 made up 23 percent of respondents, while 21 percent of respondents were born from 1970 to 1979. Another 17 percent were born from 1960 to 1969. Respondents were 70 percent White or Caucasian, 8 percent Asian or Asian American, and 5 percent Latino, Latina, or Latinx. Another 4 percent were multiracial, while both Black or African and Arab Americans were both 0.3 percent of respondents, respectively. Another 10 percent of respondents preferred not to say and 2 percent specified their ethnicity. Half of respondents (52 percent) had advanced degrees while more than a third (35 percent) had a 4-year degree. Another 6 percent of respondents had some college/2-year degree, and 5 percent preferred not to say. Other respondents said they had some high school or had a high school education. Compared with United States Census data from 2021, respondents were more frequently White and had a higher educational attainment than the average citizen of El Cerrito (United States Census Bureau 2021).

Overview of Community Priorities

The themes described below, regarding participants' favorite things about the HNA and key areas of support and concern with respect for the Plan, arose across engagement touchpoints.

Community's Favorite Aspects of the HNA

During the public workshop, attendees were asked, "What are your favorite things about the HNA?" Their answers, grouped into themes, follow.

- **Natural Beauty and Views:** Stunning views of the Bay and surrounding landscapes.
- **Open Space and Access to Nature:** Valuable natural open space within an urban area for various outdoor activities like hiking in the hills.
- **Wildlife and Habitat Conservation:** Habitat for wildlife, including owls, and diverse ecosystems.
- **Community Connection:** A shared space for community bonding and enjoyment.
- **Fire Danger Awareness:** Recognition of fire danger, emphasizing the need for caution and prevention.
- **Peace and Calm in Daily Life:** Peace, calm, and a haven for daily tranquility.

- **Climate Mitigation:** The HNA plays a role in climate mitigation.
- **Local Pride and Identity:** The HNA is considered one of El Cerrito's crown jewels, making living there worthwhile.

Key Areas of Support for the Plan

Across engagement touchpoints, the following key areas of support for the Plan emerged from the community:

- Reducing fire risk in the areas of the HNA where the risk of fire is traditionally and consistently the highest.
- Use of sustainable and cost-effective methods in tree removal and vegetation management. Minimized use of herbicides for health and climate-related reasons.
- Allocation of annual funds to maintain/treat vegetation in the Very High Fire Hazard Severity Zone in the HNA.
- Preserved native oak woodlands and restore native plant and tree communities. Balanced short-term urgency with long-term health of the ecosystem.
- Improved roads and trails for better emergency response access and coordinated new foot trail development.
- Fire-resistant buildings, fuel breaks, and community education on fire prevention measures.
- A need for expertise in selecting and protecting native species, conducting controlled burns, and managing vegetation on steep slopes. Involvement of experts and collaboration with organizations for effective conservation practices.
- Strong support for community involvement, including youth engagement and a volunteer program.

Key Areas of Concern for the Plan

Across engagement touchpoints, the community expressed these key areas of concern with regard to the Plan:

- Up-front costs for native plant maintenance and fire-hardening measures.
- Challenges in effectively managing invasive species, particularly eucalyptus, and resprout growth.
- Spread of SOD and the potential necessity of removing bay trees.
- Identification of gaps in public education on fire protection, buffer zones, defensible spaces, and vegetation maintenance.

Community Priorities by Topic Area

At each community engagement touchpoint, participants were asked for their feedback within four categories of potential actions for the Plan: removing fire-hazardous and invasive trees, restoring native plant and tree communities, conserving native oak woodland, and fire protection. Key themes from community input within each category are detailed below (Table D), alongside any specific feedback that arose and a description of where the feedback was heard.

Table D: Key Community Concerns

Theme	Feedback	Where We Heard It
Removing Fire-Hazardous and Invasive Trees		
Areas of Support		
Funding	● Support for allocation of annual funds to manage vegetation to reduce fire risk in the HNA. ● Specify how the City will fund and carry out shaded fuel breaks	SAG meeting, public workshop
Prioritization of Brush Removal and Eucalyptus Thinning	● Support for brush removal and thinning of eucalyptus trees for enhanced fire safety. ● Support for urgent removal of tall, highly flammable trees from groves that could spread fire rapidly over large areas.	SAG meetings, public workshop, survey, written SAG comments
Adoption of Affordable Removal Methods	● Support for adopting cost-effective removal methods, with a focus on targeted removal of invasive weeds and eucalyptus. ● Some support for sheep and goat grazing with care, since this method can be imprecise. ● Participants highlighted that preservation of native understory may be cheaper and more likely to succeed than restoration. ● Plan should reference a management standard and best management practices to protect species and protocols for formal notice before mowing.	SAG meeting, public workshop, written SAG comments
Consideration of Chemical Treatment and Alternative Options	● Some support for chemical treatment, burial under plastic or chips, and using brush herbicides with dye as potential options for managing resprouting stumps. Non-chemical approaches are preferred.	Public workshop, online survey
Community Involvement	● Support for involving the community as volunteers and community scientists in the long-term maintenance of the HNA. ● Support for involving youth as interns. ● Participants encourage partnerships and projects with neighboring schools and other projects that would engage youth in learning about nature, caring for the earth, and experiencing the joys of outdoor work and the safe and effective use of tools. ● The desirable native species and native grasslands to be retained in the fuel break should be accurately mapped and marked with flagging by expert volunteers.	SAG meeting, public workshop, survey, written SAG comments
Areas for Improvement		
Use of Herbicides	● Minimize or avoid using chemical herbicides for health and climate-related reasons.	SAG meeting, public workshop
Other Considerations		
Integration with Existing Plans	● Participants emphasized the importance of incorporating elements of California's Wildfire and Forest Resilience Action Plan in developing El Cerrito's HFR Plan, El Cerrito Kensington Wildfire Action Plan (2017), and 1994 HNA Fire Hazard Reduction Plan.	SAG meeting, written SAG comments

Table D: Key Community Concerns

Theme	Feedback	Where We Heard It
Restoring Native Plant and Tree Communities		
Areas of Support		
Partnerships	• Support for building partnerships to rehabilitate plants, specifically recommending collaboration with organizations like the CNPS, youth groups, and local volunteer activities focused on native plants.	SAG meeting, public workshop
Guidelines and Grants	• Support for leveraging guidelines to transition to perennial and native bunch grasses, coupled with a call for pursuing grants to facilitate the process and make it more financially viable. Include monitoring when obtaining grants.	SAG meeting
Education	• Support for more comprehensive education for community members, emphasizing connections between conservation activities and climate change, communicating long-term benefits, providing actionable guidelines, specifying mowing seasons, and understanding appropriate native plant communities.	SAG meeting, public workshop
Coordination and Defined Roles for Volunteers	• Support for involving the community, with a specific emphasis on defining clear guidelines and meaningful roles for volunteers in conservation activities. • Support for the City to take on volunteer coordination. Monitoring of invasives that have been removed is important and can be done by expert community scientists and reference groups (e.g., Friends of Five Creeks, Trail Trekkers, EQC, UC Berkeley scientists, CNPS, and Golden Gate Bird Alliance)	SAG meeting, public workshop, written SAG comments
Areas for Improvement		
High Costs	• Participants highlighted concerns about the up-front planting costs and ongoing expenses associated with monitoring and managing native species. Want forbs and more grasses included in restoration and to make sure we are choosing natives that require less work.	SAG meeting, public workshop
Weed and Competing Plant Management	• Participants raised concerns about the challenges in managing weeds and competing plants, with a specific focus on curbing non-native grasses and protecting native grasses from tree encroachment. • Participants suggested scheduling mowing activities with flexibility based on existing vegetation and climate conditions to avoid disrupting native plant growth.	SAG meeting, public workshop, written SAG comments
Conserving Native Oak Woodland		
Areas of Support		
Community Education	• Support for educating people about the purpose of conservation activities and public education on oaks, including varieties, fire-resilient pruning, and SOD. • Suggestion to collaborate with homeowners. • Decision on what to do with diseases (i.e., SOD) should be based on studies, consultation with other agencies, and public education.	SAG meeting, public workshop
Expertise to Select and Protect Oaks	• Participants voiced a need for expertise to choose the correct (climate-resilient) oak varieties, introduce controlled burns, and reference protocols regarding bay tree thinning. Want living document so if SOD management changes, it can be adapted.	SAG meeting, public workshop

Table D: Key Community Concerns

Theme	Feedback	Where We Heard It
Define "Native Oak Woodland"	• Participants voiced a preference to balance healthy oak woodlands with open native grasslands and understand what an Indigenous-stewarded landscape looked like before non-native people arrived.	SAG meeting
Fire Protection		
Areas of Support		
Additional Funding	• Participants noted that funding (including grants and an annual budget) will help homeowners fire-harden their houses/properties; a budget is also needed to maintain vegetation. • Participants suggested the Plan should budget for long-term costs of removing, replacing, and maintaining fuel and fire breaks, considering the likelihood the City will maintain them.	SAG meeting, public workshop, written SAG comments
Community Education on Fire Protection	• Support for education about buffer zones, fire hardening, defensible spaces, vegetation maintenance, and controlled burning.	SAG meeting, public workshop
Implement Fire Breaks and Support Fire-Resistant Buildings	• Participants supported fire-resistant buildings, infrastructure, fire breaks, buffer zones, and enforcement of the vegetation code. • Support for shaded fuel breaks, managed vegetation and defensible space around the perimeter of the HNA and fire breaks around all fire roads/emergency access roads. Highest priority is annual maintenance of defensible space within 100 feet of property lines	SAG meeting, public workshop, survey
Implement Controlled Burns in High-Priority Areas	• Participants supported controlled burns in the highest risk areas, and that communities need to be engaged. • Support for safe controlled burns and other Indigenous stewardship practices.	SAG meeting, public workshop, survey, written SAG comments
Areas of Improvement		
Timeline Considerations	• Participants emphasized a need to act quickly to address fire risk. • Interest in a system of prioritizing actions based on speed, cost, effectiveness, and long-term implications.	SAG meeting, public workshop
Improve Fire Road Access	• Participants emphasized the need to improve access to the blind "arm" between Kent and Regency for maintenance and emergencies.	Written SAG comments

City = City of El Cerrito
CNPS = California Native Plant Society
EQC = Environmental Quality Committee (City of El Cerrito)
HFR = High Fire Risk
HNA = Hillside Natural Area
SAG = Stakeholder Advisory Group
SOD = Sudden Oak Death

Vision

Based on stakeholder feedback provided at the community workshops and through the public survey, the following vision for the HNA was developed.

El Cerrito's HNA is:

- A **premier recreational open space** offering multiple benefits of outdoor recreation to be enjoyed by residents and visitors.
- A **fire-resilient, healthy natural landscape**, where the risk of fire can be managed due to a lack of high fuels and effective, strategic shaded fuel breaks that enhance mitigation efforts in the event of a wildland fire situation.
- A **natural, native-dominated plant community** where non-native and invasive species are managed and natural ecosystem function is high, supporting a variety of native, endemic, and rare species.
- Embedded into **neighborhoods that are acutely aware of and responsive to risks of wildland fire** and who embrace defensive space and home hardening to make buildings and infrastructure more fire-resistant.
- **Maintained by joint efforts of the City and its community members** and supported by outside funding from local, State, federal, and private partnerships.
- **Managed adaptively to respond to changing conservation priorities and ecological conditions (due to climate change)**. This management supports the natural development of a climate- and fire-resilient natural landscape that provides crucial ecosystem services for the El Cerrito community.

Goals

Goal 1: Protect Residential Areas Surrounding the HNA From Wildfire

The HNA is surrounded by residential neighborhoods. Because of the steep slopes and abundant fuel, along with occasional strong winds during warm and dry conditions driving a potential fire uphill, threats to hillside residences are similar to Berkeley, Oakland, and other west-facing hillsides in the East Bay.

Objective 1.1: Establish Defensible Space on the HNA within 100 Feet of Residential Dwelling Structures[12]

Rationale: Numerous studies (Cohen 2000, Gibbons et al. 2012, Schmidt 2020, Knapp et al. 2021, Syphard et al. 2021) have confirmed that vegetation treatments near residential structures have the greatest effect on reducing the risk to dwelling structure ignition and damage. Treating vegetation adjacent to structures, including outbuildings and fences, reduces ignitability, and fire condition factors such as rate of spread and intensity would be minimized. California has established three

[12] This objective pertains only to the portion of HNA land that is within a 100-foot perimeter of an existing dwelling structure. Where the 100-foot perimeter around the structure is fully contained within privately owned parcels, the establishment and maintenance of defensible space is the responsibility of the homeowner as legally mandated.

zones of defensible space. AB 3074, passed into law in 2020, requires a new ember-resistant zone (Zone 0) within 0 to 5 feet of the home. This regulation is currently in process with the Board of Forestry and Fire Protection. The intensity of fuel management varies within the 100-foot perimeter of the home, with more intense fuel reduction occurring closer to the home in Zone 1 (0–30 feet). Zones 1 and 2 currently make up the 100-foot of defensible space required by law.

Objective 1.2: Establish Fuel Breaks

Rationale: Managing vegetation can constrain fire spread or reduce fire intensity by reducing flame lengths and the likelihood of torching or canopy fire. This may enhance fire suppression efforts and limit the extent of carbon losses during fire. By forcing a fire "to the ground," flame lengths are dramatically shortened and the rate of speed slows down to where wildland firefighting crews can better protect residential structures and contain the fire. Near dwellings, firefighters are focused on keeping the structures from burning. This may be done by keeping fire from the residential structure at the wildland's edge. Within a fuel break, vegetation is managed in a strip at least 100 feet wide that separates forest and other flammable vegetation from the adjacent properties or neighboring dwelling structures. It is, in essence, an extension of the defensible space on the residential property. Establishment and maintenance of this extended defensible space includes the removal of medium (light brush and small trees) and heavy (dense brush) fuels, leaving a vegetative ground cover of grass, forbs and small shrubs, with a possible overstory of widely spaced trees intact (shaded fuel break).

Objective 1.3: Reduce Abundance of High-Risk Invasive Trees

Rationale: As discussed above, eucalyptus trees and non-native pines are often extremely large, highly flammable, fast-growing and resilient to injury and cutting. This creates a challenging situation for forest thinning and ground fuels removal on Motorcycle Hill, Quarry Hill, the Wildwood and Ken Smith groves, and other patches of non-native flammable trees. Eucalyptus species and non-native conifers largely form monocultural groves, which can become densely stocked at 400 to 900 trees per acre and with tree heights exceeding 120 feet. These species have a tendency to dramatically explode when on fire, due to the high concentration of volatile oils in their bark, leaves, and wood. Eucalyptus and Monterey pines can produce up to 50 tons of flammable ground fuel per acre, compared to 1 to 5 tons of fuel per acre in grasslands or native live oak forest. Eucalyptus litter contains up to three times the energy of cellulose, so they burn hotter and faster. Blue gum eucalyptus leaves release volatile chemical gases at relatively low temperatures and ignite easily, earning them the Australian name "gasoline tree." When wind-driven fire reaches eucalyptus tree crowns, it can spur flames that reach over 150 feet into the air, with burning embers blowing downwind beyond 0.5 mile. Eucalyptus embers stay lit longer than embers from other vegetation. Removing all non-native eucalyptus and pine trees from the HNA is the long-term goal to significantly reduce the risk of a fire.

Objective 1.4: Develop a Fire Roads and Trails Network

Rationale: Historically, access to the HNA has been challenging due to the steep terrain and the dense residential development surrounding the HNA, leaving little room for implementing fire roads or other vehicular access. Currently, access is limited to few access points, the majority of which are accessible by foot or small all-terrain vehicles (ATVs) only (see Figure 10). In addition, trails, fire roads (where they exist), and accessible open areas (grasslands) are in various conditions. Several

are unpassable by vehicles due to width and grade, vegetation overgrowth, washouts, or other unsafe surface conditions. In order to implement vegetation treatment projects (i.e., fuel reduction projects, eucalyptus removals) and to provide firefighting equipment and personnel access to various parts of the HNA, additional fire road improvements are needed. Thus, part of each vegetation treatment prescription will include access road maintenance and repair to ensure that vehicles can access the proposed treatment site safely. Improvements of existing roads to enhance emergency equipment response include widening, spaced turnouts, turnarounds, and road base application that supports a 75,000 GVWR (gross vehicle weight-rated) fire apparatus.

Goal 2: Increase Forest Health

Aside from wildfire resilience, an additional goal of this Plan is to improve the ecological health of the HNA. While ecosystem health can have multiple definitions, for the purposes of this Plan, a healthy HNA include woodlands, grasslands, shrublands, and related vegetation types that yield both ecological and community benefits. Healthy vegetation improves climate resilience, reduces the risk of fire, safeguards water and air quality, protects fish and wildlife habitat, enhances biodiversity, sequesters carbon, improves recreational opportunities, and avoids economic losses.

Objective 2.1: Actively Manage Threats to Native Oak Species

Rationale: The primary threat to native oaks at the HNA are stand-replacing fires and plant pathogens. This Plan aims to reduce the threat to oak woodlands by fire and to (1) create healthy stands of native oak woodlands that are self-sustaining by exhibiting sufficient seedling survival to replace adult tree mortalities, and (2) create a structure of an open, multi-aged forest stand or woodland that provides various habitats for other species. Such healthy stands will be more diverse, and, as a result, more resistant to fire and diseases or pathogens. The current spread and distribution of plant pathogens are a major management concern. This Plan outlines effective strategies to restrict and control the primary forest diseases at the HNA, wood boring insects (e.g., GSOB and MOB) and SOD.

Objective 2.2: Remove Invasive Species

Rationale: Invasive species are capable of causing extinctions of native plants and animals, reducing biodiversity, competing with native organisms for limited resources, and altering habitats. Managing and controlling invasive plants are important actions in managing resilient forests. The HNA has several invasive species, including eucalyptus and pine trees, a variety of shrubs (e.g., French broom, pittosporum) and herbaceous plants (fennel, pampas grass, artichoke and other thistles, and ivy). All invasive species compete with native species for water and space, and most can increase rapidly when allowed to proliferate unchecked. Managing invasive plants in ecologically and/or culturally significant places is often challenging due to the diverse public and their values. Focusing limited staff and volunteer time and fiscal resources where they can be most effective is key to successfully tackling the invasives problem at the HNA. The local nonprofit groups Friends of Five Creeks and Trail Trekkers have used volunteers to control invasive, fire-prone species in the HNA for over a decade. This Plan aims to address the following objectives when managing invasive species at the HNA:

- Prevent the spread of and strategically remove invasive plants throughout the HNA. Early detected, new infestations are targeted first, followed by spot treatments and follow-up maintenance projects.

- Develop and apply best practices to prevent the spread of invasive plants, including from vegetation treatment activities.
- Remove invasive plants mostly by hand. Mechanical treatments (grinding, shredding, chipping, mulching, or mowing) of understory shrubs or small trees may be used in some places.
- Prioritize invasive plant species removal in healthy native plant communities, fuel breaks, and recently cleared eucalyptus areas.
- Achieve wildland fuel reduction, ecosystem function, and recreational land management objectives.
- Prevent reinvasion of the targeted weed or invasion of other noxious species by intermittent weed monitoring and mapping and by implementing biosafety protocols (e.g., inspect and clean equipment and tools, prohibit transportation of firewood).
- In areas where sensitive native species or communities occur, breeding/flowering seasons and other vulnerable times must be avoided and other general or specific minimization or mitigation measures must be implemented.

Objective 2.3: Restore and Re-Establish Native Species

Rationale: Secondary to removing the extreme fire risk associated with flammable non-native trees, this Plan promotes healthy native ecosystems and biodiversity. Native plants and the site-adapted communities they form support a greater diversity of insects, birds, amphibians and reptiles, mammals, fungi, and other life forms. Restoration of native vegetation may also provide greater suitable habitat for special-status species, such as the Alameda whipsnake, San Francisco dusky-footed woodrat, and monarch butterfly. The Plan provides for specific activities and prescriptions to protect and enhance stands of native grasses and wildflowers. In particular, areas cleared of invasive trees and shrubs will be used to reestablish native plants, such as perennial grasses, wildflowers, and common native shrubs that support a wide variety of wildlife. Together with local stakeholders, the City will develop a native plant palette to be used when reestablishing native vegetation in cleared areas.

Goal 3: Measure Progress

Objective 3.1: Measure Progress Toward Vegetation Management Goals

Rationale: It is recommended that the City continues to engage in inventory and monitoring programs within the limits imposed by available funds and resources. Monitoring results will be used to understand the status of and trends within the natural communities within the HNA. Data gathered from these efforts are key inputs into understanding of the past, present, and future of forested and unforested vegetation communities, fire, and a changing climate in El Cerrito. The goal of monitoring is to gather the necessary data to understand what is happening, why it is happening, and how specific management adjustments will change the outcome. Regular, periodic monitoring can reveal new issues that were not addressed in the Plan (e.g., new invasive species), changed

circumstances that need to be addressed, and a potential necessary adaptive shift in vegetation treatments, methods, and locations.

Objective 3.2: Review the Plan Every 5 Years

Rationale: Actions and plans will need to be adjusted over time. By monitoring the HNA, information can be gathered to make these adjustments. This iterative process is called adaptive management. Adaptive management is a systematic, practical approach that includes a structured process for learning which actions best meet management objectives. It therefore reduces resource management uncertainty. Adaptive management further enables flexible decisions, which can be adjusted in the face of uncertainties. If monitoring reveals significant departures from the baseline of the management Plan, new management goals or objectives may be needed. Regular evaluation and revision of the Plan as part of the ongoing management process identifies when changes are needed before a crisis develops.

Objective 3.3: Maintain Community Engagement and Stakeholder Involvement

Rationale: Public engagement and community participation are crucial determinants of success of the HNA restoration. The Plan's successful implementation partly depends on a functioning community engagement and feedback process that allows the community and stakeholders to support the City's management. It is recommended that the City implement intermittent public information campaigns on relevant issues concerning the HNA and that the City support local groups in conducting educational events and volunteer workdays.

PART 3: ACTION PLAN

This section of the Plan presents a prioritized list of actions to reduce the risks and impacts of increasingly severe fire events in the HNA (Table E). All actions are directly linked to the goals and objectives of this Plan. Management actions decrease damage from fire by creating shaded fuel breaks, expanding defensible space into the HNA, altering forest structure or species composition, and removing highly flammable invasive species. The recommended actions are designed to minimize fire threats and vulnerabilities while at the same time protecting the recreational and ecological values the HNA offers. The recommended actions are based on current fire management standards and best practices to protect and improve ecosystem function, minimize soil erosion, and enhance recreational possibilities. The success of these actions will be enhanced with ongoing maintenance activities after each project is completed. In order to adequately plan for maintenance funding, it is recommended that the City develop a maintenance program that includes the relative costs of each action (e.g., cost per acre to maintain a fuel break).

While the Plan has considered the surrounding area as it relates to threat and vulnerability, recommendations of this Action Plan only pertain to City-owned parcels within the HNA, and its recommendations pertain solely to responsibilities of the various departments of the City of El Cerrito. Homeowners, volunteers, citizen scientists, and other local experts will have the opportunity to interact and engage with the City through the public relations, partnerships, and education component of this Plan.

Table E: Summary of Management Actions, Priorities, Locations, Prescriptions and Implementation Cost Categories

Action	Priority	Location	Prescription	Lead Department	Cost Category[13]
1: Create Defensible Space (Objective 1.1)	Highest	Within 100 feet of dwelling structures immediately adjacent to the HNA.	Where dwelling structures are closer than 100 feet from the HNA, the City will manage portions of the HNA within this distance to create a defensible space by maintaining vegetation. The City will promote Contra Costa County Measure X as a funding source for private property owners to manage the portions of their properties within this distance.	El Cerrito Fire Department	$$ one-time $ ongoing
2: Establish Shaded Fuel Breaks (Objective 1.2)	High	A 100 feet wide shaded fuel break along the entire perimeter of the HNA, beginning at the property boundary (where feasible i.e. the presence of a drainage or other topographic features may prohibit full 100 feet.)	Establish and maintain a shaded fuel break by removing or pruning trees, shrubs, brush, and other vegetative growth. A canopy of large native trees will be maintained where possible. All work will be accomplished by use of hand crews or mechanical equipment; supported by chippers and/or burning as determined appropriate on a case-by-case basis, while conserving native vegetation.	El Cerrito Fire Department El Cerrito Public Works Department	$$$ one-time $ ongoing
3: Remove Eucalyptus And Non-Native Conifers (Objective 1.3)	**High-medium, depending on location and cost**	1. The eucalyptus stand at Motorcycle Hill 2. The extensive eucalyptus stand at Quarry Hill	Stand removal involves the felling of all standing trees and prevention of resprouting from the stump. Landings are typically needed to sort, store, and chip cut trees into mulch and spread or remove the material.	El Cerrito Public Works Department El Cerrito Fire Department	$$$$ one-time $ ongoing

[13] Costs are expected to vary substantially. The categories represented here indicate a relative scale of costs from Low ($, in the $1,000s), to High ($$$$, exceeding $100,000). Costs also depend on the size and slope of the treatment area, the size of trees to be removed, and additional considerations (equipment access) and slash treatments (including chipping and or burning). Individualized projects will be designed by the City based on input from contractors and other experts, and cost estimates will be available prior to contracting and implementation).

Table E: Summary of Management Actions, Priorities, Locations, Prescriptions and Implementation Cost Categories

Action	Priority	Location	Prescription	Lead Department	Cost Category[13]
		3. Eucalyptus and other non-native trees between Kent Court and Buckingham Drive 4. Non-native invasive trees in the Madera property 5. The Ken Smith eucalyptus grove and potentially along riparian corridors (likely requires permit from CDFW)	Stump treatments may include herbicides and tarping. Small logs and branches may be burned or chipped. Include follow-up treatments for latent seedling and weed management.		
4: Manage A Sustainable System Of Fire Roads & Trails (Objective 1.4)	**High-medium, depending on location**	Improvements to the fire road access at Potrero Avenue and King Court, addition of service access to Motorcycle Hill, conversion of Ken Smith trail into a fire road with turnaround, and improvement of existing roads to enhance emergency equipment response.	Improved fire roads and trails are needed to facilitate implementation of vegetation treatment projects and provide firefighting equipment and personnel access to various parts of the HNA. Existing unimproved surface fire trails will be widened and recontoured where necessary to provide vehicle access to treatment areas as well as for emergency vehicle and maintenance access while preserving native vegetation and preventing weed spread where practicable.	El Cerrito Public Works Department El Cerrito Fire Department	$$$ one-time $ ongoing
5: Actively Manage Threats To Native Oak Species (Objective 2.1)	**High-Medium**	Throughout the existing oak woodlands at the HNA.	SOD is present in the HNA but has not reached a high level of infection. Disease monitoring and selective removals is a critical component of this Plan. Conduct complete inventory of all mature oak and bay laurel trees for monitoring the progression of SOD within the HNA. Best management practices include limiting the movement of host material or infested soil.	El Cerrito Public Works Department	$$ ongoing

Table E: Summary of Management Actions, Priorities, Locations, Prescriptions and Implementation Cost Categories

Action	Priority	Location	Prescription	Lead Department	Cost Category[13]
6: Remove Invasives (Objective 2.2)	**Medium**	Throughout the HNA, wherever they are found. Single infestations are targeted first, followed by spot treatments and follow-up maintenance projects.	Remove invasive plants mostly by hand and prevent re-invasion where practicable. Mechanical treatments (grinding, shredding, chipping, mulching, or mowing) of understory shrubs or small trees in some places. Prioritize invasive species removal in healthy native plant communities	El Cerrito Public Works Department	$$ ongoing
7: Restore And Re-Establish Native Species (Objective 2.3)	**Medium**	Prioritize areas where invasive species removals are complete. This includes the removal of eucalyptus and conifer stands at Motorcycle Hill and Quarry Hill, but also shrub and grassland patches throughout the HNA where invasive species have been removed.	Promote passive restoration of plants from the existing native seedbank wherever possible. In some cases, active restoration of native plants is necessary following invasive plant control. Active restoration includes the initial reintroduction of the native, site-adapted species (grasses and shrubs). Conserving native grasslands and other Sensitive Natural Communities, enhancing, and expanding them is an important part of achieving this goal.	El Cerrito Public Works Department	$-$$$ one-time $ ongoing
8: Monitor Key Performance Indicators (Objectives 3.1 – 3.3)	**Medium**	Monitoring at the HNA will include the key indicators resiliency, recreation, plan review, and public relations.	Use monitoring to adapt management practices for each of these key indicators: ● Fire Behavior: Inspect fuel breaks at the HNA annually. Inspections of defensible space is another metric of the neighborhood's resilience. ● Biodiversity: Regularly monitor the HNA for the abundance and presence of key special status species, including monarch butterfly, and monitor native	El Cerrito Public Works Department El Cerrito Fire Department	$ ongoing

Table E: Summary of Management Actions, Priorities, Locations, Prescriptions and Implementation Cost Categories

Action	Priority	Location	Prescription	Lead Department	Cost Category[13]
			plant communities, weed cover, and wildlife populations as funding allows. ● Fire-Adapted Communities: Conduct FlamMap (or equivalent) analysis of fire risk and behavior every 5–10 years as a means to pinpoint areas of deficiencies and target vegetation treatments. ● Trail Monitoring: Inspect all trails at least once per year to evaluate surface conditions. ● Plan Review: Provide a review and, if necessary, update to the Plan every 5 years. ● Public Relations: Provide multiple avenues for a community engagement and feedback process that allows the community and stakeholders to support and be informed of the City's management of the HNA.		

CDFW = California Department of Fish and Wildlife
City = City of El Cerrito
HNA = Hillside Natural Area
SOD = Sudden Oak Death

ACTION 1: CREATE DEFENSIBLE SPACE WITHIN 100 FEET OF RESIDENTIAL DWELLING STRUCTURES IMMEDIATELY ADJACENT TO THE HILLSIDE NATURAL AREA

Defensible space is a term used to describe the careful selection, location, and maintenance of vegetation and other combustible materials on the property. The purposes of a defensible space are to minimize fire pathways to the house and reduce potential heat exposures to structure components.

Where residential dwelling structures are closer to the HNA than the required 100 feet, the City will collaborate with homeowners to implement defensible space clearing on the HNA to the legal standards (Senate Bill 63[14]). These include the maintenance of defensible space of 100 feet, with more intense fuel reductions used between 5 and 30 feet around the structure (Figure 15).

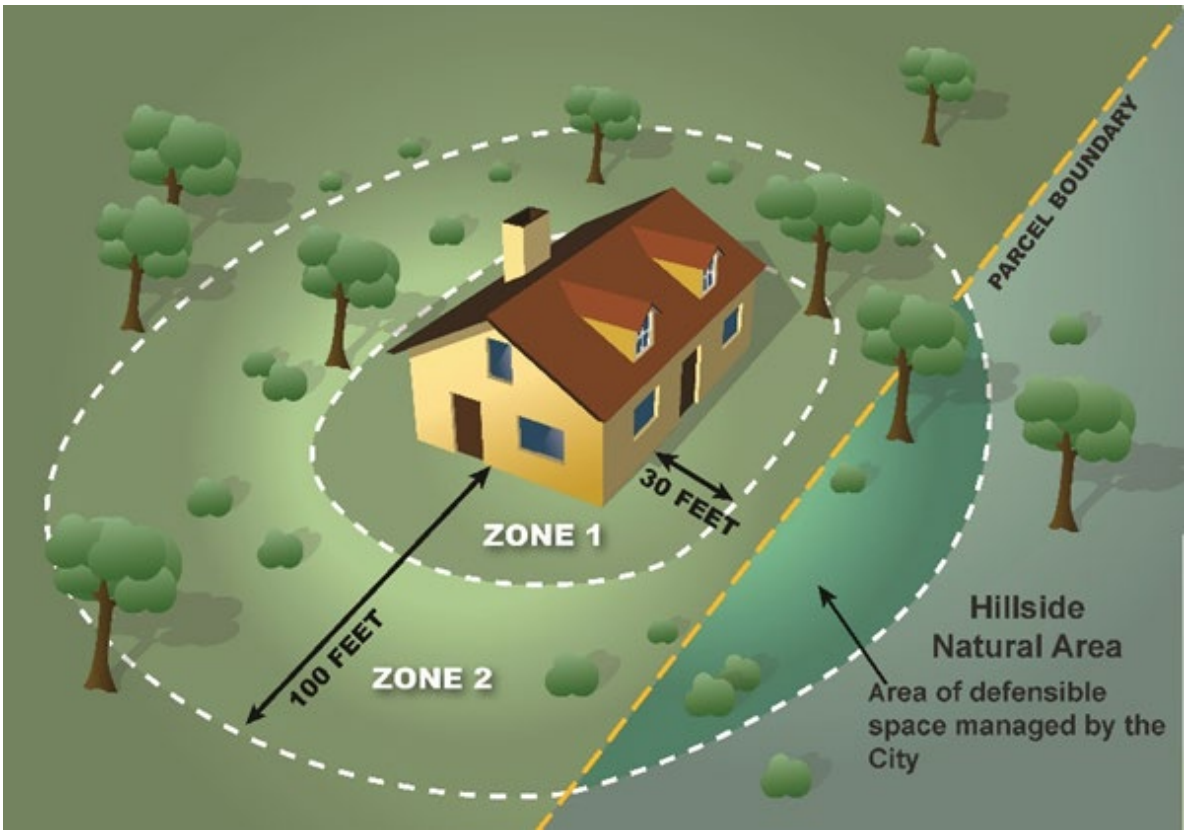

Figure 15: Defensible Space Diagram

Several private property owners adjacent to the HNA have requested funding through Measure X, a Contra Costa County fund that is intended to increase wildfire resiliency.[15] Residents are offered the opportunity to identify and apply for projects that will reduce overall exposure to wildfire risk

[14] https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220SB63.
[15] https://www.cccfpd.org/wildfire-mitigation-program/.

countywide. Several landowners have implemented work in the HNA along the borders of their properties. These are located on the eastern side of the HNA, between King Court and Duke Court.

Implementation of this Action is led by the El Cerrito Fire Department. Anticipated costs are estimated to be medium.

Priority

Highest

Location

The highest flame lengths predicted with the northwest wind are in the southeastern portion of HNA South, the northeastern quadrant of HNA North, and a section of the western part of the Madera property, as well as areas outside all three sections of the HNA along boundaries with the surrounding community. Portions of the HNA where residential structures are closer than 100 feet from the HNA boundary will be the main target for creating extended defensible space (e.g., Kent Court, Douglas Drive, Wildwood Place, Navellier Street, and Park Vista).

Prescription

The City will manage defensible space clearing and vegetation management in those portions of the HNA that are 100 feet or less from a dwelling structure on an adjacent lot and will seek other funding opportunities where Measure X funds are not applicable. Work to be conducted includes (1) the removal of all dead plants and dry vegetation exceeding 4 inches in height,[16] not including San Francisco dusky-footed woodrat nests; (2) removal of high-fuel-volume trees that are at risk of falling on buildings[17]; and (3) pruning of "legacy trees" that are structurally sound to a height of 8–10 feet above ground. All work will be confined to the City-owned HNA lands. In addition, the City will support and assist homeowners in applying for and implementing vegetation management on their parcels within 100 feet of residential structures. The City will promote Contra Costa County Measure X as a funding source for private property owners to manage the portion of their properties, including the replacement of combustible wooden fences with non-combustible material.

Appendix G details the types of work that should be accomplished to create defensible space within the HNA (and on privately owned parcels adjacent to the HNA).

ACTION 2: ESTABLISH SHADED FUEL BREAKS

Fuel breaks are a strip or block of land on which vegetation, debris, and detritus have been reduced and/or modified to control or diminish the risk of the spread of fire crossing the strip or block of

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16 Excessive complete removal of ground-level vegetation could expose large areas of mineral soil, which are prone to invasion of undesired weeds. Nest structures of San Francisco dusky-footed woodrats will be flagged by the biologist in pre-activity surveys and shall not be removed.

17 Snags that do not pose a risk of falling on fences or structures may be retained as habitat for woodpeckers, bats, and cavity-nesting birds.

land. Fuel breaks provide opportunities for fire suppression resources to slow fire spread or halt the progression of a fire and are therefore an essential element in creating defensible space zones between homes and open space areas. Fuel breaks provide opportunities for firefighting success under less extreme fire weather conditions by providing areas of lower fire line intensities, improved firefighter access, and enhanced fire line production rate. Establishment of shaded fuel breaks along the entire perimeter of the HNA is the responsibility of the City. Where defensible space clearance (Action 1) extends from private property into the HNA, defensible space creation has priority over shaded fuel break establishment, as it requires vegetation management at a higher fire safety standard.

Priority

High

Location

Most of the HNA is predicted to burn with torching fire, especially where tall trees and a well-developed understory are present. Reducing the risk of torching and active crown fires through implementation of fuel breaks also reduces the ember cast. Fuel breaks are strips of managed vegetation that are most effective when they are located in places where the fire naturally slows down (e.g., along streams and ridgetops) or where vehicular access can increase the effectiveness of fire crews. Fuel breaks extend defensible space. They will be established around the entire perimeter of the HNA, beginning at the property line and extending inward, with priority given to areas where high fuel loads occur in close proximity to neighboring parcels. These include ridgetops at Motorcycle Hill, the Madera property, and HNA South within the wildland-urban interface. See Figure 16 for locations of potential fuel breaks.

Shaded Fuel Breaks and Managed Vegetation Areas

Shaded fuel breaks create defensible space to be used by fire suppression resources to reduce the hazard of wildland fires. Typically, shaded fuel breaks are coupled with access trails and roads to allow firefighters immediate vehicular access. In areas where there are no roads or fire trails due to steep terrain or other constraints, managed vegetation areas extend defensible space and can serve similar functions in slowing the progression of fire to residential structures. Whether there are fuel breaks or vegetation management areas, the intent of fuel treatment is to reduce the intensity of a fire as it burns into the managed area. The *Best Management Practices Guidebook for Hazardous Fuel Treatments in Contra Costa County* (Diablo Firesafe Council 2009) is an excellent resource for developing site-specific prescriptions for shaded fuel breaks and other vegetation management actions.

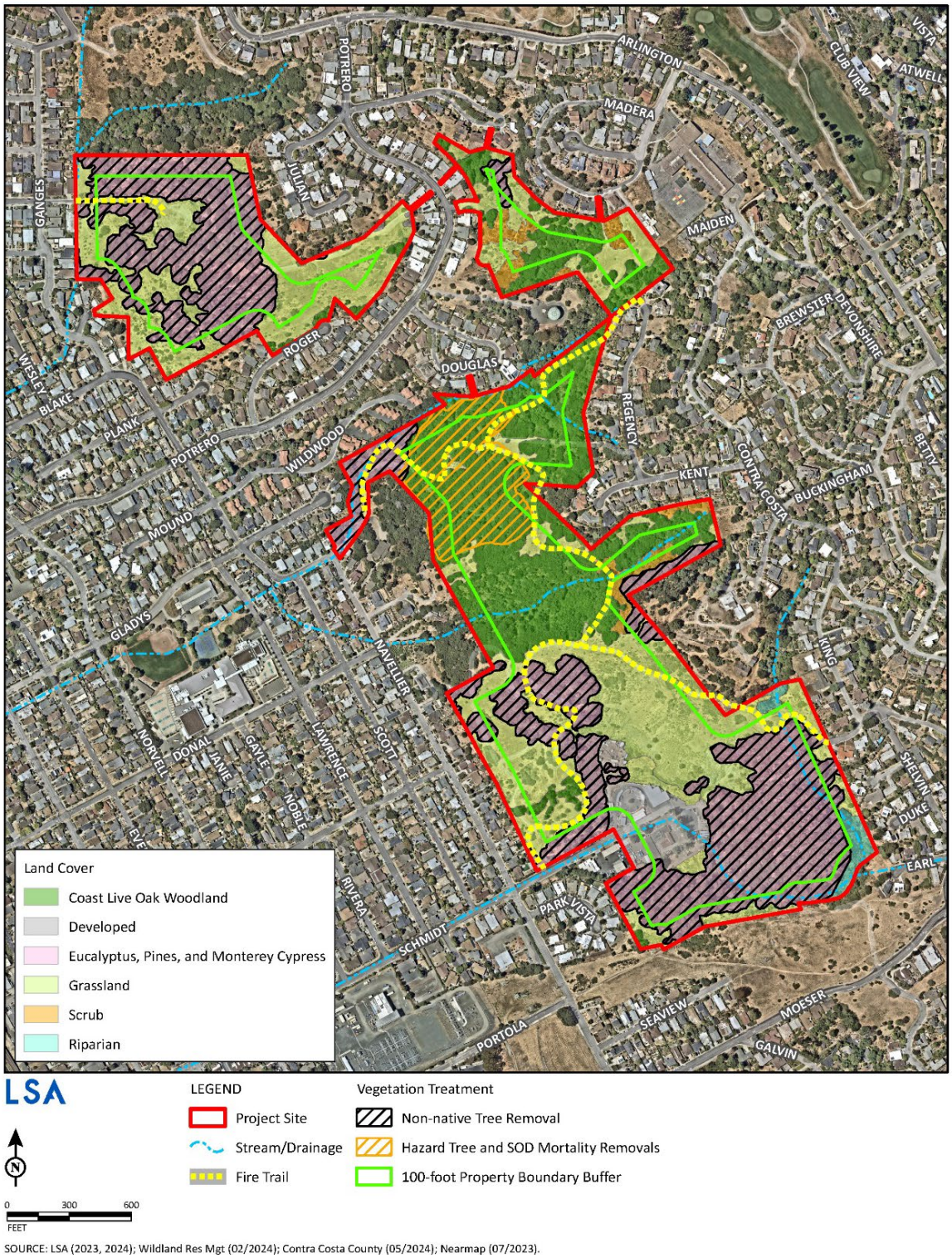

Figure 16: Vegetation Treatment Areas of the HNA

The desired fire behavior is a surface fire, burning low vegetation and leaf duff. To create this fire behavior, only trees with a diameter at breast height (DBH) of 6 inches or more are retained, ladder fuels (fuels that enable a fire to climb to an overstory tree or canopy) are removed, and tree or brush canopies are pruned or trimmed so that the contiguous fuels arrangement is interrupted. A shaded fuel break does not remove all vegetation in the treatment area. Instead, it retains a portion of the canopy of native tree species. Fuels that provide vertical continuity, thereby allowing a fire to spread from the ground to the canopy, are called "ladder fuels." Shaded fuel break treatments remove ladder fuels and invasive species, such as eucalyptus. "Fuel breaks typical have well-spaced, large sized "dominate" trees; a low number of trees per acre (e.g. 50 trees/acre - < 100 sq. feet. of basal area); few understory smaller trees; high "height to live crown" distance; less than 10 percent cover of brush arranged in isolated groups; and low levels of snags and down logs"(NRCS 2020). [18] The target horizontal distance between residual trees ranges from 20 feet between trunks up to 8–15 feet between tree crown drip lines. Larger overstory trees (> 6 inches DBH) count as residual trees. To reduce ladder fuels, low-growing native vegetation will be retained and kept to a height of 5 feet or less, provided there is horizontal separation between plants of three to five times the height of the residual plants and the residual plants are not within the drip lines of an overstory tree. It is recommended that the majority of the HNA have a 100 feet wide shaded fuel break from property lines, but widths will vary depending on the steepness of the terrain, the presence of a drainage, or other topographic features that may prohibit a full width of 100 feet. Especially on the steep, west-facing section along the boundary, shaded fuel breaks may reach up to 300 feet to account for potential extreme fire behavior on these steep slopes.

Prescription

Implementation consists of removing or pruning trees, shrubs, brush, and other vegetative growth as prescribed. All work will be accomplished by the use of hand crews and/or mechanical equipment, supported by chippers and/or burning as determined appropriate on a case-by-case basis. It is recommended that the work be done using contracted services. The preferred width of a shaded fuel break along a ridge top or adjacent to one is approximately 100 feet from property lines where vehicular access is available. Where eucalyptus trees of any size are located within a shaded fuel break, these will be removed by felling and subsequent stump treatments to prevent resprouting. Eucalyptus trees will be removed from the site to be burned, chipped, or used as logs elsewhere. All slash (small logs and branches) and cut material larger than 6 inches should be removed from the site.

Slash may be chipped or piled and burned during periods of low fire danger. Larger native overstory trees (> 6 inches DBH) count as residual trees and, in order to reduce ladder fuels, shall have vegetation within their drip lines removed. However, larger hazardous snags or heavily damaged trees may also be removed if their vitality is low. Trees up to the 6-inch DBH class can be removed under this prescription, although individual trees under 6 inches DBH may be retained for diversity if they do not endanger project objectives. It is advantageous to have an arborist decide which trees

[18] Snags that do not pose a risk of falling on fences or structures may be retained as habitat for woodpeckers, bats, and cavity-nesting birds.

are to be removed; trees will be marked accordingly prior to the start of operations. Access to shaded fuel breaks will be on foot and by ATV where trails, slope, and soil conditions allow.

Shaded fuel break treatments allow managers to retain a high species diversity of individual younger, middle-aged, and older plants, which allows the opportunity for an unevenly aged vegetative type without compromising project objectives. For example, young saplings of individual oaks may be retained because, despite their smaller diameter, these trees do not contribute to undesired fire behavior effects. Understory fuels over 1 foot in height are to be removed, creating vertical separation and low horizontal continuity of fuels. However, grass need not be mowed in a fuel break. If mowed annually, native perennial grasses would not survive. Mowing heights for grasslands should not be lower than 4 inches to prevent "scalping" of native perennial bunchgrasses and desirable forbs. Mowing heights may need to be adjusted on a site-specific basis. Generally, they should range from 4 to 6 inches above ground level to favor native plants. Spot treatment (mowing of especially dense and tall patches of annual grasses) may be adequate to produce the desired fire behavior. Mowing can also reduce the seed drop of annuals if achieved prior to seed maturity and carried out over several years.

Individual specimens of rare or desirable native species (e.g., flowering/nectar sources, such as shrubs) may be retained within a shaded fuel break provided there is a horizontal separation between plants of three to five times the height of the residual plants and the residual plants are not within the drip lines of an overstory tree. Additionally, it may be necessary to cull individual stems over the desired diameter in order to improve forest health, especially where heavy leaf litter fall and dense canopies create risk of undesired fire behavior. Typically, managing vegetation in this manner also provides greater opportunities for pollinators through creation and maintenance of an open woodland with a variety of flowering vegetation.

Site-specific prescriptions may be developed for individual sections of the HNA. In non-forested areas (i.e., coastal scrub), it is desirable to remove as much brush as possible within the fuel break area (see the standards for expanded defensible space in Appendix G). However, if individual plants are desired to be left, the plants should be left with the following characteristics: young plants less than 5 feet tall and individual or pairs of plants that are no more than 5 feet wide. The distance between residual plants shall be three to five times the height of the residual plants: three times the height distance for slopes less than 30 percent, and five times for slopes equal to or greater than 30 percent. The width of the fuel break shall be 100–300 feet, where feasible. All grasses are to be maintained no lower than 4 inches in height near the access points, trails, and public recreation spots (picnic sites, benches, etc.). However, sites revegetated with native perennials or those containing native perennial grasses (e.g., needlegrasses) should not be mowed frequently. Shaded fuel breaks should be maintained to the above standards based on regular monitoring and inspection. It is anticipated that some shrub and sapling removal will be needed every 3–5 years. In addition, overstory trees may require pruning or removal based on hazard assessments.

Prior to implementing a shaded fuel break project, appropriately timed surveys for special-status species and important native plants shall be conducted. Fuel break projects shall not be implemented where:

- Nesting birds or bats may be using tree or shrub canopies;
- Monarch butterflies are potentially breeding or overwintering; and
- Threatened and endangered plant species may be adversely affected.

Mitigation measures for the timing of pre-activity surveys, BMPs, worker training, and activity implementation windows must be developed as part of the CEQA compliance document (IS/MND) and strictly enforced.

Where feasible and acceptable by stakeholders, prescribed broadcast burning can be an excellent tool in maintaining fuel breaks that have been established. Prescribed burns produce low-intensity surface fires that are intended to control vegetation in shaded fuel breaks by reducing fuel loads and/or maintaining a targeted vegetation community. The City has no intention of implementing prescribed burning at this time. However, it may provide an effective way of maintaining fuel breaks in the future. In a prescribed burn, the fire burns along the surface without significant movement into overstory vegetation, with short flame lengths. Typically, prescribed broadcast burning uses existing roads and trails as fire containment lines; otherwise, fire containment lines are constructed using manual or mechanical treatments. In some cases, vegetation may be trimmed, thinned, or removed manually by prescribed herbivory, hand crews, or mechanical equipment in advance of burning. Prescribed broadcast burning may be used where other activities are not feasible because of rocky soils, steep slopes, or irregular terrain. This activity is used only during conditions under which the risk of losing control of the burn is extremely low and when air quality conditions permit. However, given the amount of work and effort required to acquire a smoke permit and set up fire engines, a larger area should be burned, with the fuel break serving as the top line. The management of the fuel break itself is likely to be done with hand crews, grazers, or machinery since it will need to be done more often.

Required fire suppression equipment (e.g., fire engine[s] and a water tender) would be on site during a prescribed broadcast burn both to bolster already-existing control lines and quickly extinguish any fire that deviated from the burn prescription. The City currently has no plans to implement prescribed burning on a large scale but may consider it in the future. Prescribed burns in the HNA would require the approval of the El Cerrito Fire Department and the preparation of a Burn Plan that includes a Smoke Management Plan (SMP) approved by the Bay Area Air Quality Management District (BAAQMD). BAAQMD Regulation 5 requires all burn activity to only occur with written approval of an SMP by BAAQMD and to only be conducted on permissive burn days.

Slash and fuel load disposal can be challenging. Due to the risk of spreading forest diseases, wood from oak trees should not be removed from the HNA (eucalyptus logs and firewood may be hauled off site). GSOB larvae remain in cut oak logs and firewood from GSOB-killed trees or green-infested trees, and are a continual threat of further infestation. Transporting infested firewood is likely the most significant pathway for introducing SOD and forest pests into non-infested areas. For possible ways to manage slash and removed fuel loads by chipping or burning, see Action 3.[19]

[19] Biomass accumulated as a result of vegetation treatment may be considered to be the treatment contractor's property. The City can require the contractor to propose how each type of material is disposed of and to verify that the oak wood is incinerated (e.g., in an air curtain burner or mobile pyrolysis unit).

Maintenance of grassy or brushy areas can also be accomplished with targeted herbivory. This entails the thoughtful use of livestock to remove foliage and grass to reduce fuel volumes. The type of livestock (usually goats), numbers, timing, and locations of livestock are specified, as is the amount of foliage and grass to be left upon completion. Protection against the spread of invasive species is provided with controlled diet prior to access to the site. Grazing by goats can often achieve significant biomass reduction on steep slopes. When managed well, targeted herbivory is an excellent tool for fuel reduction in areas where no sensitive species or communities exist. In concert with other methods, targeted herbivory is often the only way to effectively manage fine fuels in large areas.

ACTION 3: REMOVE EUCALYPTUS AND NON-NATIVE CONIFERS

It is recommended that the City remove all invasive, flammable tree species from the HNA, with special emphasis and priority on eucalyptus and Monterey pine.

Priority

High-Medium

Location

The areas of highest priority for eucalyptus and pine removal are in locations with the greatest flame lengths and torching risk (see Figures 11–14). As a guidance, the results of the Fire Risk Assessment (Appendix B) suggest that the highest risk emanates from the Quarry Hill and Motorcycle Hill eucalyptus groves (see Figures 11–13).

All existing eucalyptus groves at the HNA should be prioritized for removal as soon as practicable. These priorities include:

1. The eucalyptus stand at Motorcycle Hill;
2. The extensive eucalyptus stand at the southeast rim of the quarry (Quarry Hill grove),
3. Eucalyptus and other non-native trees between Kent Court and Buckingham Drive;
4. Non-native invasive trees on the Madera property; and
5. The Ken Smith eucalyptus grove.

Eucalyptus trees at the Ken Smith Grove are of a lower priority, due to their small stand size and relatively isolated location within the HNA. Planting of small patches of oak saplings under the current canopy of eucalyptus could provide a head start toward stand conversion if saplings can be protected during eucalyptus removal operations. See Figure 17 for the locations and extent of the removal locations. It is recommended to remove eucalyptus trees within 50 feet of watercourses (e.g., along Wildwood Creek) pursuant to a Lake and Streambed Alteration Agreement or a Routine Maintenance Agreement to be authorized by CDFW.

It is suggested to implement the first eucalyptus removal at Motorcycle Hill because it is easier to plan a selective cutting (leave oaks) while felling trees to the road. Placing an air curtain burner or pyrolysis unit at the former reservoir site could be advantageous in disposing of slash, bark, and midsized trees. Once the area has been cleared, removal of the remaining invasive trees at Motorcycle Hill (the south hillslope) is easier to accomplish. Trees could be skidded or winched

SOURCE: LSA (2023, 2024); Wildland Res Mgt (02/2024); Contra Costa County (05/2024); Nearmap (07/2023).

Figure 17: Non-native Trees and Landings/Processing Sites

downhill, or some logs could remain on the slope. Slash could be burned on site or removed via air curtain burner or pyrolysis unit. In addition, all saplings or stump resprouts of any eucalyptus or pine species should be removed at any time.

In a second phase, all eucalyptus and pine trees at the quarry should be removed. Stands south and east of the Recycling Center at Quarry Hill are of the second-highest priority, as they are in steep terrain exposed to westerly winds. Starting from the existing fuel break and the grassland near the powerline, a selective cut (leaving all native trees) would progress uphill. Logs and slash could be skidded or winched downhill and removed/burned.

No removal of oaks or other native trees is anticipated unless they pose a hazard to logging crews or recreationists.

Prescription

The primary goal of eucalyptus and non-native conifer removal from the HNA is to reduce the extreme fire risk associated with these highly flammable species and to achieve a comprehensive site restoration toward native-dominated natural, vegetation communities. Eucalyptus groves and stands at the HNA consist of trees of many different ages. Removal strategies are complex, as they involve felling very tall, dense trees onto a forest floor littered with strips of bark, leaf debris, and often a field of stumps. Stand removal involves the removal of all standing trees and preventing resprouting from the stump. For each stand removal project, a detailed prescription will be required as part of the contract bid solicitation. It is recommended to consult with qualified logging and vegetation management operators prior to developing bid packets to ensure that prescriptions are cost-effective, feasible, and attractive to potential bidders. At a minimum, prescriptions shall entail the following considerations:

- **Equipment Staging and Landings:** Equipment would be staged, fueled, and maintained at landings or fire roads while contractors are mobilized (Figure 17). Additional landings may be created when the distance from a tree patch to an existing landing exceeds 1,000 feet. However, all material stockpiling and staging areas would be located in existing rights-of-way or at designated disturbed/developed areas. Landings are typically needed to sort, store, and chip cut trees into mulch and spread or remove the material. A flat landing area is typically used for yarding operations, temporary stacking, loading, and trucking logs or brush off the treated site. When possible, landings and skid trails will be located in areas that already provide vehicular access, along pre-existing grades or in areas that have been disturbed. As previously described, limited areas suitable for landings and skid roads exist in the HNA, possibly requiring new landings or access roads to be created. Minor grading and clearing would be required to establish the landings. It is anticipated that at least one landing each is needed at Motorcycle Hill and at Quarry Hill. As conditions permit, removals would be conducted throughout the year, taking into consideration specific avoidance, minimization, and mitigation measures (e.g., nesting season, bat roosts). In steep areas (Motorcycle Hill and Quarry Hill) heavy wire cables powered by diesel-driven winches or a skyline high-lead system may be used to transport felled logs to a central landing site without the use of rubber-tired or tracked skidders. Alternatively, felled trees up to approximately 24 inches DBH would be hauled by rubber-tired or tracked skidders along paths/skid trails to landings in the project area.

- **Fell and Remove Standing Trees:** Felling different-sized trees requires specialized skills and equipment. Trees may need to be removed in stages. Smaller trees may be cut first to make room for felling the larger ones. The native understory would be protected by flagging or high-visibility fencing to indicate where a felling path should be avoided. While some limited damage to native understory is unavoidable, treatment contractors must ensure that roots of native shrub and grass species will remain in place to regrow.

  The largest eucalyptus trees are 72" (6 feet) or more in diameter. Tree cutting will be achieved with chainsaws, using a directional dropping technique. Once trees are felled, they will be limbed (branches cut flush with the stem) to prevent projections hindering the skidding process. Felled trees would be either: (1) chipped or lopped and scattered on fire roads, and logs retained as a component of sediment/erosion control measures and to contribute to wildlife habitat and long-term soil productivity; (2) removed from the site to prevent contribution to excessive fuel buildup and future difficulty of control; or (3) combinations of these, as appropriate. Large trees may be cut into 6–12 feet sections when designated to remain on site or to facilitate ease of handling by smaller skidders. Some logs would be placed so that they help control sediment and erosion or support wildlife habitat. The branches would be lopped and scattered after felling. This method would also be used when it is impractical to skid a tree to the chipper. In these cases, the downed tree would be cut by chainsaws such that all portions of the tree would come into contact with the ground or within 24 inches of it.

  Where some adult eucalyptus or non-native conifers are located too close to existing dwelling structures to be felled, and where sectional removal is not feasible, select individual eucalyptus may be retained as part of a shaded fuel break in rare occasions. In that case, stand thinning and extensive pruning of lower branches will be needed to accomplish the fuel reduction objectives. An example of such treatments exists at the end of King Court. By selectively removing smaller-diameter trees, the remaining large trees are widely spaced. All ladder fuels will be removed. Additional pruning of large retained trees may be required to provide the necessary ground clearance. Maintaining a shaded fuel break under mature trees requires frequent maintenance and removal of surface fuels, including shed bark and leaf litter.

  Costs associated with maintaining fuel breaks where mature eucalyptus trees are present are anticipated to be higher due to the accumulation of leaf and bark litter and the frequent resprouting of eucalyptus seedlings. Thus, this plan recommends removal of all eucalyptus where possible to reduce recurring maintenance costs and intervals.

- **Erosion Control**: Trees within 50 feet of watercourses (e.g., along Wildwood Creek) would not be removed as part of this action. If control of non-native or hazard trees within the riparian buffer is required later, these will be accomplished pursuant to a Lake and Streambed Alteration Agreement or a Routine Maintenance Agreement to be authorized by CDFW. Erosion control BMPs, identified by the San Francisco Bay RWQCB,[20] would be implemented to control erosion during and after vegetation removal. Riparian areas shall be separated and protected from the

[20] See https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/planningtmdls/basinplan/web/bp_ch4c.html#4.19.

work area through silt fencing, amphibian/reptile-friendly fiber rolls (i.e., no monofilament mesh), or other appropriate erosion control material. Materials staging and all other project-related activity shall be located as far as possible from riparian areas, with no off-road driving or parking of vehicles or equipment within the drip line of a riparian tree.

- **Native Understory and Sensitive Natural Communities Protection:** Although native plants are typically sparse in the understory of eucalyptus, there are some native shrubs and herbaceous plants present within all eucalyptus stands at the HNA. Native vegetation shall not be removed, although some may be unavoidably damaged or destroyed in the tree removal process. The roots of native understory vegetation may serve as a binder to hold the soil in place after the removal of the overstory. A qualified biologist or arborist shall flag rare or otherwise important shrubs and herbaceous plants prior to tree removal activities and ensure the flagging remains throughout the duration of the project. These plants shall be avoided if feasible. To minimize disturbance to riparian habitat occurring adjacent to treatment areas, riparian areas shall be clearly delineated by a qualified biologist. If feasible, the proposed fuel treatments shall avoid/minimize impacts to the purple needlegrass grasslands and other sensitive natural communities.

- **Stump Treatments:** The initial cut is usually at 1 to 2 feet off the ground. All stumps are later "flush cut" as close to the ground as possible. To prevent resprouting, stumps will be ground to the tree root collar where accessible, to minimize the use of herbicides. Where inaccessible, a qualified licensed pest control applicator will apply an herbicide solution to the cambium layer of the freshly cut tree stump within a few minutes of felling. The herbicide mixture will likely consist of a combination of Garlon 4 Ultra (triclopyr), Stalker (imazapyr), and/or RoundUp (glyphosate[21]) in a solution of methylated seed oil, water, or other product as indicated and acceptable by the product label, and marking dye (e.g., Hi-Light). All chemical applications will be conducted per the California Department of Pesticide Regulation (CDPR) pesticide guidance. All cut tree stumps would receive semiannual follow-up treatment of herbicides. Semiannual follow-up treatments would involve strictly controlled low-volume foliar spray mix applied to any resprouted foliage after the resprout reaches 3 feet in height but before it reaches 6 feet in height. In this maintenance phase, cut stubble or foliar application (by hand sprayer) would be made to resprouted stumps.

  Where herbicide application is not recommended (e.g., riparian areas, near seeps or rare plants), tarping of stumps may be applicable. Tarping uses light deprivation and a physical barrier to prevent resprouting. This involves stapling heavy black plastic over the stump and burying it with duff, wood chips, and mulch on site. Any emergent sprouts must be cut by hand as soon as possible (at least every year) to deprive the stump of nutrients and prevent regrowth of the tree.

- **Slash and Log Chipping:** Where feasible, eucalyptus and pine logs will be removed from the treatment area, but it is possible that in some situations logs larger than 6 inches in diameter may be left on the ground to deteriorate naturally. Trees 24 inches in diameter or smaller can be chipped. Chipping involves grinding vegetation debris into small pieces that can be transported

[21] Note that the City of El Cerrito has currently a moratorium on the use of glyphosate. Thus, any glyphosate use will require City approval under special circumstances.

off site for other uses such as composting or burning to produce electricity. At the landings, trees would be chipped using a grapple-fed chipper or a tracked chipper. The largest chippers can easily process 24-inch-diameter trees. Trees would be fed into the chippers whole and pulled through the masticating blades by means of a conveyor belt and feed wheel. Alternatively, the tracked chipper may be driven to downed trees on moderate slopes, rather than having the trees first moved to a landing area. Trees with diameters larger than 24 inches comprise the material that would be hauled.

The wood chips from the chippers are expected to be 1 to 4 inches in size. Retained chips may be scattered on the site to protect fragile soils during the operation. Chips may be spread with an average depth ranging from 4 to 24 inches, depending on site slope, proximity to watercourses, and viability of deposition from the chute of the chipper. The areal coverage of wood chips is not expected to exceed 20 percent of the project site (if a tracked chipper is used) and would be less than 15 percent if chipping is confined to roadways and landings. Chips spread over uneven terrain (such as in natural depressions or around stumps) may also have a greater depth when the finished surface is raked to follow the general contour of the slope.

However, CAL FIRE is typically opposed to deep chips in vegetation treatment areas and fuel breaks because once they ignite, they are hard to extinguish. However, chips could be used to advantage along hauling routes, fire trails and recreation spots at greater depths, where native grass and shrub restoration is not desired. Mulching on site often may also provide weed or erosion control by covering loose, recently disturbed soil. Chips generated by the vegetation treatments could also be used to create skid roads in lieu of cutting into the soil because the mechanical skidders can travel atop the level chip bed, thus avoiding excavation and soil disturbance in many locations. When the chips decompose (at an estimated rate of 4 to 7 inches per year), the contour of the slope is expected to reappear as it existed prior to logging, with less evidence of skid road creation and a more natural-appearing landscape. An alternative to chipping is the use of an air-curtain burner that reduces smoke and pollution during the burn process or a mobile pyrolysis unit that creates biochar, an effective fertilizer.

- **Repurposing of Logs:** Especially larger-diameter logs could be repurposed for outdoor, residential, or commercial uses. Repurposing is a sustainable urban forestry practice for felled trees to be managed for their whole of lifecycle to maximize the environmental, social, and economic returns. Tree repurposing enables the use of logs for habitat or milling them into lengths of timber for furniture making or mulching them to return nutrients to the soil and create habitat. Existing benches have been crafted from felled eucalyptus at the HNA in the past. There is a vibrant repurposing of eucalyptus wood currently ongoing in the Bay Area. For example, at the Tam Valley Community Services District between Mill Valley and Sausalito, a grove of 22 eucalyptus trees were removed for fire safety reasons and repurposed as hardwood flooring material, art pieces, and landscape timbers. A wood repurposing program by the City of Mill Valley used eucalyptus logs for the Dipsea Stairway replacement program. The Albany Hill Eucalyptus Project involves finding ways to reuse and repurpose eucalyptus removed from Albany Hill. In 2022, the City of Albany also contracted with a local Bay Area lumber operator to mill three large trees into over 2,000 linear feet of lumber, which was then used by the Urban Tilth Watershed Stewardship Field Crew to build retaining walls and railings along the oak

woodland trail. Even fallen branches were used to address erosion and trail maintenance. The project lowers greenhouse gas emissions and costs from transporting the logs and branches to waste collection centers.

- **Pyrolysis:** An alternative to chipping logs is the use of air curtain burners or mobile pyrolysis units that produce biochar. Biochar is a stable solid rich in carbon that is made from organic waste material or biomass that is partially combusted in the presence of limited oxygen. Designed as a pollution control device for open burning, these machines reduce smoke particles as they are trapped and reburned, reducing them to an acceptable limit per United States Environmental Protection Agency (EPA) guidelines. The greatest benefit of the air curtain burning is the removal of large logs, but slash can be included too.

- **Prescribed Burning:** Prescribed burning is the intentional application of fire in a pre-defined, specific location under prescriptive conditions of fuels, weather, and other variables. Prescribed burning includes broadcast burning of vegetation and pile burning. In pile burning, cut brush, tree branches, and tops are piled and burned under prescribed and permitted conditions. This is a very cost-effective way of removing slash. In situations where the mulch generated by chipping cannot be used on the site, pile burning is the preferred treatment of removing slash. Slash can also be loaded into an air curtain burner along with the boles of larger trees. Prescribed burning requires careful planning and controlled conditions. Smoke from controlled burns can be a nuisance to residents and businesses, and it can adversely impact community health by contributing to existing pollution. Controlling where the smoke will go is an important part of every prescribed burn. If not carefully managed, smoke may exceed air quality standards. California's smoke management program is based on the Smoke Management Guidelines adopted by the California Air Resources Board. In addition, BAAQMD[22] requires the submission of an SMP through the Prescribed Fire Information Reporting System (PFIRS; https://ssl.arb.ca.gov/pfirs) at least 30 days prior to burning. If the SMP is approved, an approval letter will be uploaded to PFIRS and the land manager will receive an automatic notification email indicating that the SMP is approved. The SMP must be approved by BAAQMD prior to burning. In addition, a burn permit must be provided by the local fire agency and/or CAL FIRE prior to conducting a prescribed burn.

- **Seedlings:** Non-native tree seedlings emerging from the latent seed stock in the project area would be managed over time to prevent recolonization of these invasive species (see Action 6).

ACTION 4: MANAGE A SUSTAINABLE SYSTEM OF FIRE ROADS AND TRAILS

Paved public access roads to the HNA include several residential streets and courts surrounding the HNA (Figure 10). These provide the primary access routes used by vegetation treatment personnel for maintenance and emergency vehicle access during a fire or other public emergency. It is recommended to increase the City's capacity for emergency access and to effectively maintain firebreaks, manage fuel loads, and to enhance environmental benefits by maintaining a network of

[22] More information regarding prescribed burning can be found on the BAAQMD website, https://www.baaqmd.gov/permits/open-burn, or by calling the Open Burn Line at (415) 749-4600.

vehicle-accessible fire roads. Having sufficient access for fire suppression equipment (e.g., fire engine[s] and a water tender) would be required prior to implementing prescribed broadcast burns. Many fire road improvements can be planned in parallel with implementing fuel treatments (and funded through implementation grants). While the primary goal is to provide service and emergency access, it is recommended that improvements also include enhancements of existing trails that are accessible to a broad audience, including some Americans with Disabilities Act-compliant sections and trails that may provide opportunities for education and interpretation.

Priority

High-Medium

Location

The current fire road and trail conditions report (Appendix 4) defines the quality and location of all trails in the system. The existing fire road and trail system have been captured on a base map that identifies access points, existing trail alignment, and proposed new fire roads and trails (Figure 10).

Prescription

- **Fire Access Needs and Priorities**: Existing fire roads should be widened and recontoured where necessary to provide vehicle access to treatment areas, as well as for emergency vehicle and maintenance access. Improved fire roads will be designed pursuant to applicable standards for wildland fire apparatus access roads (e.g., 75,000 lbs. Gross Vehicular Weight Rating [GVWR]). Dead-end roads are to be avoided, but turnarounds are necessary in a few locations. It is recommended that all fire access roads be gated and closed to public vehicular use, except for wheelchairs (where applicable) and bicycles. An access point shall be provided from a road or driveway and consist of transition by means of a curb cut. Details of each fire access road segment may also be developed in parallel with designing fuels treatments and eucalyptus removal activities. The main emphasis of fire road improvements are:
    - Improve/widen fire road access at the Potrero Avenue Motorcycle Hill entrance and the King Court HNA South entrance (Ridge Trail Fire Road).
    - Add vehicular access along the Lower Snowden (Castro) Trail alignment and provide a turnaround.
    - Convert the Ken Smith trail into a fire road with a turnaround.
    - Improve existing roads to enhance emergency equipment response, including widening, spaced turnouts, turnarounds, and road base application that supports a 75,000 lb apparatus (GVWR).
- **Recreational Trails**. It is recommended that the City work with different user groups (e.g., hikers, bikers, trail runners, wheelchair users) to ensure that trails serve the widest possible user spectrum (i.e., multi-use trails). Designation of the road and trail system and

subsequent management actions will occur through transparent and collaborative decision-making processes. Trail improvements will consider the following key elements:

- **Trail Classification**: The placement of trails into classes is determined with specific criteria that can be used to evaluate trails individually as well as comparatively. Classifying a trail system requires input from staff and the public that are knowledgeable about the facilities, transportation routes, circulation patterns, and trail usage. Trails may be categorized by the type of use allowed. In addition to "accessible" or "non-accessible," trails are assigned a use designation as pedestrian, bicycle, multi-use and wheelchair-accessible. Design specifications for bike trails are used as the standard for construction and maintenance.

- **Segmentation**: Prior to assigning trail attributes (e.g., road or trail, use type, classification), trails on the base map are divided into segments based on trailheads, intersections, and trail ends. Segmenting the trail enables trail program managers to break the trail into manageable pieces and efficiently identify the unique characteristics of that portion of trail.

- **Trail Standards:** Trail construction and maintenance standards may vary with trail classification and use characterization. Visitor safety, resource protection, and trail investment concerns are primary considerations. The City may also designate wheelchair-accessible trail segments where slope and surface conditions permit. In general, all fire roads will have slopes not exceeding 10 percent. Stream crossings will be minimized and will require additional permitting. Recreational trail structures such as bridges and steps will require a minimum design standard and maintenance schedules, while trail beds along a steep slope or hazardous area should be wider to provide greater safety for users. Trail and road improvements will adhere to the following standards:

  - Impacts to the natural environment from the road and trail system will be avoided, minimized, or mitigated to acceptable conditions under CEQA and other applicable local, State, and federal environmental laws and regulations.

  - Trails will be situated at adequate distances from streams to protect riparian and aquatic habitat and wildlife corridors. New roads and road fill slopes will be outside riparian areas except at stream crossings. Spoil from road construction will be deposited outside riparian areas, and special care will be taken to stabilize soil surfaces.

  - Where possible, trails will use existing trail alignments to reach vista points and other scenic attractions of the HNA. Roads and trails will be designed so that their surfaces, grades, cross gradients, sight distances, width, curves, vegetation clearance, and other specifications are consistent with anticipated uses. The City will strive to provide multiple points of entry to the HNA, to maximize available parking capacity, and to avoid concentrating access.

  - Construction, maintenance, and enforcement responsibilities related to the road and trail system will be financially feasible.

- Management actions will include notifications for private property and adjacent property owners and land uses.

- **Recreation Infrastructure:** Recreation infrastructure, such as resting spots, benches, bicycle parking, and signage, facilitates both visitor enjoyment and management of public access. Consistency with the El Cerrito Trails Signage Plan (2016) should be maintained. Planned recreation infrastructure should be thoroughly discussed with local stakeholders. An adoption program for trails and infrastructure elements may provide additional community engagement and maintenance support.

- **Sustainability and Maintenance Needs:** Due to their location on the landform, some trails can be difficult to maintain or sustain in the future. These trails may be classified as temporary trails. Trail closures for certain uses and seasons should also be considered to reduce maintenance and public risk. Landings, skid trails, and other temporary access trails needed for removal of eucalyptus could be revegetated after the tree removal is complete and no further mechanized access is needed.[23] Trails required to provide continued access for vegetation maintenance, firefighting, and emergency vehicles are permanent trails. New permanent trails (and fire roads) should be designed and constructed so they do not adversely affect natural and cultural resources. Trails also should not disrupt or alter the natural hydraulic flow patterns of the landform. Finally, trails are designed and constructed to withstand the impacts of the intended uses and the natural elements (e.g., the impact of 25- to 50-year storms) while receiving only routine cyclical maintenance. Eroded segments occur on the Live Oak Trail, and the Forest Brown Fire Road, Navellier Fire Road, and Ridge Trail Fire Road require maintenance to ensure continued vehicular use.

- **Avoidance of Sensitive Resources**. Purple needlegrass, soap root, and other herbaceous and ephemeral species have been observed along the Motorcycle Hill Trail, Ridge Fire Road, Live Oak Trail, Lower Trail, and Madera-Julian Trail and will need to be avoided. San Francisco dusky-footed woodrat houses were observed to the north of the end of Snowden Avenue and just north of Regency Court. Drainages and creeks are regulated under RWQCB jurisdiction, and riparian areas are regulated under CDFW jurisdiction. Riparian trees such as alders and cottonwoods can be found along the Ridge Fire Road adjacent to the Forest Brown Fire Road. Riparian willows were observed nearby the 3 feet V-ditch at the Ridge Fire Road and at the southern edge of the HNA tree line, southwest of Earl Court. Riparian eucalyptus trees can be found north of the intersection between the Navellier Fire Road and the Wildwood Creek Trail.

[23] Temporary trails could be created entirely of wood chips (see Action 3).

ACTION 5: ACTIVELY MANAGE THREATS TO NATIVE OAK SPECIES

Priority

High-Medium

Location

Throughout the existing oak woodlands at HNA.

Prescription

Best Management Practices. There is currently no effective way to control SOD or eliminate it from an affected woodland. SOD is present at the HNA but has not reached a level of high infestation to date. However, with increasing climate stress, SOD could become an existential threat to the oak woodlands of the HNA. Implementing BMPs has been proven to effectively prevent or reduce the adverse effects of *P. ramorum*. BMPs in wildlands and urban-interface zones include limiting movement of host material or infested soil.[24] Possible treatments include manipulating forest stands by pruning, host removal, thinning, and other actions to reduce the incidence and impact of *P. ramorum*. California bay laurel removal (sporulating hosts of *P. ramorum*), in combination with pile and broadcast burning, has been suggested as a viable management practice (Valachovic et al. 2008). California bay laurel removals and burning of infected wood on site are proactive and precautionary measures intended to help reduce the spread of the pathogen by reducing inoculum. In infested areas, it is recommended to leave infested material on site, chipping the small material for use as ground cover and using larger pieces for firewood. Removing plant debris from the site is not recommended. Individual California bay laurel and coast live oak trees display differential levels of resistance to *P. ramorum* (Hüberli et al. 2002). Therefore, the complete removal of all bay laurel trees within the HNA is not recommended. As a precaution against spreading the pathogen, cleaning and disinfecting of all tools, boots, gloves, and vehicles after use on confirmed or suspected infested trees or in known infested areas is highly recommended.

Tree Inventory. Depending on the funding available, the complete inventory of all mature oak and bay laurel trees is an advantageous first step in monitoring the progression of SOD within the HNA. A tree inventory is conducted by a trained biologist, arborist, or forester and includes a record of the location and characteristics of each individual tree. At a minimum, attributes should include tree location, species, size, health condition, tree risk rating, and maintenance needs. All inventoried trees are permanently marked and numbered to facilitate individualized recording of infection and localization of diseased trees. Therefore, the inventory should be linked to a geographic information system (GIS) and updated regularly. If funding is limiting, a tree inventory can be completed over multiple years.

[24] The COMTF, at www.suddenoakdeath.org, has compiled BMPs for a number of activities and user groups on wildlands and in urban-interface zones.

ACTION 6: REMOVE INVASIVE SHRUBS AND HERBACEOUS SPECIES

The California Invasive Plant Council (Cal-IPC) defines invasive, non-native plant species as non-native to wildland ecosystems but able to spread into them and displace or hybridize with native species, alter biological communities, and alter ecosystem processes. The primary objective of this action is to eradicate or control invasive and/or noxious weeds in treatment areas. Common invasive species at the HNA include acacia, cape ivy, cardoon, cotoneaster, Crofton weed, fennel, French broom, *Hedera* species, thistle, pampas grass, pittosporum, and mayten, eucalyptus, and Monterey pine trees.

Physical control of weeds at the HNA is desirable and achievable. Physical methods of weed control generally are labor intensive and often are used for small populations or where other control methods are inappropriate, such as near sensitive water supplies or habitats. Physical methods can be highly selective, targeting only invasive species, but they can also disturb the soil or damage nearby vegetation, thereby promoting germination and establishment of weedy species. Physical control methods may also produce large amounts of debris, disposal of which is sometimes difficult.

Priority

Medium

Location

Invasive species are found throughout the HNA. It is recommended to design a multi-year process whereby single infestations are targeted first, followed by spot treatments and follow-up maintenance projects. The preferred approach is to work on a small set of species and obtain control on those species before targeting a different set. Prioritization of individual invasive species is dependent on location and therefore should be considered prior to each control action. Typically, prioritization of species will shift over time as site characteristics change, especially after stand removals. Prioritization of species must be carefully considered and should be periodically reevaluated.

Prescription

The most effective weed control matches treatment timing and type with the growth stage of the plant to maximize treatment efficiency. All control should be implemented before seed drop or regeneration happens. An understanding of the biology and ecology of the target species is necessary for long-term management. Invasive species management at the HNA will be implemented using a variety of methods as follows:

- **Hand Labor Treatment:** Hand labor treatment includes methods such as pulling, digging, scraping, cutting, girdling, frilling, or drilling the cambium layer of woody species or mowing grassy species with a string mower. Hand treatment is appropriate for small weed infestations or highly localized infestations. The local stakeholder group Friends of Five Creeks has used volunteer efforts incorporating hand labor treatment with considerable effectiveness, especially for French broom. However, for agencies relying on hired crews or agency staff labor, maintaining these efforts at the landscape scale and for a sustained duration has proven difficult.

The "Bradley Method" (Fuller and Barbe 1985) is a proven methodology for weed management. It works best when the area under control expands at a rate that allows previously treated areas to be monitored and kept in satisfactory condition. It also advocates minimizing damage to native plants and disturbance to the soil so that the natives can thrive and defend against reinvasion. Generally, weed control activities are initiated in stands of native vegetation with the least extent of weed infestation, and progress to stands with the worst weed infestation. Although this work would likely be contracted to a vegetation management firm, some limited supplemental hand work by volunteers is suited for the HNA. The City will continue to work with volunteer organizations interested in participating in weed control at the HNA.

- **Mechanical Treatment:** Mechanical treatments use mechanized equipment to remove above ground vegetation and include mowing and brush cutting, as well as the use of chainsaws, grinders, backhoes, or bulldozers. Mastication is the grinding, shredding, chipping, mulching, or mowing of understory shrubs or small trees, using a front- or boom-mounted rotary head attached to a wheeled or tracked vehicle. These methods are often non-selective in that all vegetation on a treated site is affected. Mechanical treatments are highly effective for controlling clumps of woody or shrubby vegetation on gentle topography with few obstacles such as rocks, stumps, or logs. Most mechanical equipment is not safe to operate on slopes over 30 percent. It is also of limited use where soils are highly susceptible to compaction or erosion or where excessive soil moisture is present. Mowing can prevent fuel buildup (thatch) and seed formation on tall annual and perennial weeds and deplete food reserves of these weeds, but it can also favor low-growing weeds or damage desirable native species. Timing of mowing must be carefully planned to ensure that weeds are mowed prior to seed maturity. Contractors must clean vehicles of contaminated soil, invasive plant seeds, or plant parts before entering the HNA, whenever moving equipment between areas within the HNA, and before leaving the HNA. Vehicle-cleaning areas will be established for this purpose.

- **Prescribed Burning:** Prescribed burning, as described earlier, includes broadcast burns to cover large areas or pile burns to remove cut debris. Cal-IPC has published a manual on the use of fire as a tool for controlling invasive plants.[25] The principle of burning to remove invasives is to reduce the seed production of invasives and kill seeds in the soil.

- **Chemical Control:** Herbicides are chemicals that kill or inhibit plant growth; they can be extremely effective tools when used to control certain species. However, the effectiveness of herbicides can vary among sites, species, and climatic conditions. Environmental risks posed by herbicide use include drift, volatilization, persistence in the environment, groundwater contamination, and harmful effects on insects and other animals. In order to minimize these environmental risks, the application of herbicides at the HNA is limited to direct application on eucalyptus tree stumps or other woody invasive species stumps and resprouts (i.e., brushed or injected into the inner bark, cut stems, and stumps [cut stumps]). Herbicide application for widely occurring herbaceous weeds is not recommended without specific cause and City-approved prescription. Application of herbicides in the HNA must be made under direct

[25] https://www.cal-ipc.org/docs/ip/management/UseofFire.pdf.

supervision and control of a Licensed Applicator pursuant to the CDPR regulations, site-specific methods, and pre-approved by the City Integrate Pest Management Coordinator.

- **Prioritization:** The Cal-IPC CalWeedMapper[26] was used to examine which invasive plants are present at the HNA that are a designated management priority by Cal-IPC for the San Pablo Watershed region. Statewide invasive species management priorities include eradication targets (plants that are rare in the region), containment targets (plants that are more widespread), and surveillance targets (plants not in the region but found nearby). Twenty-six invasive plants occurring at the HNA are listed in the Cal-IPC invasive plant priority database. Since all are widespread, they were identified as a containment priority. The highest priority according to Cal-IPC is the containment of jubata grass (*Cortaderia jubata*), pampas grass, and French broom. Only one species is on the watch list (Cootamundra or Bailey's wattle); all others are either of Moderate (n=15) or Limited priority (n=7). When addressing weed management at the HNA, it is recommended to prioritize species with a High to Moderate rating first. Also, it is recommended to prioritize invasive species removal in healthy native plant communities. Table F shows the occurring invasive species and their associated Cal-IPC Rating.

[26] https://weedmap.cal-ipc.org/weedmapper/.

Table F: Invasive Species Containment Prioritization

Species Name	Common Name	Cal-IPC Rating			
		High	Moderate	Limited	Watch
Acacia baileyana	Cootamundra wattle				1
Acacia dealbata	silver wattle		1		
Acacia melanoxylon	black acacia			1	
Bellardia trixago	bellardia			1	
Bromus diandrus	ripgut brome		1		
Conium maculatum	poison-hemlock		1		
Cortaderia jubata	jubata grass	1			
Cortaderia selloana	pampas grass	1			
Cotoneaster franchetii	orange cotoneaster		1		
Cotoneaster pannosus	silverleaf cotoneaster		1		
Cynara cardunculus	artichoke thistle		1		
Ehrharta erecta	erect veldtgrass		1		
Erodium cicutarium	redstem filaree			1	
Eucalyptus globulus	Tasmanian blue gum		1		
Festuca arundinacea	tall fescue		1		
Foeniculum vulgare	fennel		1		
Genista monspessulana	French broom	1			
Hirschfeldia incana	shortpod mustard		1		
Hypochaeris radicata	rough catsear		1		
Lythrum hyssopifolium	hyssop loosestrife			1	
Oxalis pes-caprae	Bermuda buttercup		1		
Plantago lanceolata	English plantain			1	
Polypogon monspeliensis	rabbitfoot polypogon			1	
Ricinus communis	castor bean			1	
Torilis arvensis	hedge parsley		1		
Vinca major	big periwinkle		1		
Grand Total		**3**	**15**	**7**	**1**

Cal-IPC Rating

High: This notation indicates that a plant is included in the CCR Section 4500 list of California State Noxious Weeds. These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.
Moderate: These species have substantial and apparent-but generally not severe-ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.
Limited: These species are invasive, but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.
Alert: An alert is listed on species with high or moderate impacts that have limited distribution in California but may have the potential to spread much further.
Watch: These species have been assessed as posing a high risk of becoming invasive in the future in California.
Source: Cal-IPC weed mapper application. Website: https://weedmap.cal-ipc.org/weedmapper/.
Cal-IPC = California Invasive Plant Council CCR = California Code of Regulations

ACTION 7: RESTORE AND RE-ESTABLISH NATIVE SPECIES

Native plant species are best suited in ecological restoration because they are adapted to local climate and soil conditions, require less management during establishment, and support a broad variety of local animals, microorganisms, and other plants.

Priority

Medium

Location

Native vegetation restoration will be focused in areas where initial invasive species removals are complete and where the existing oak woodland canopy has been opened due to tree death. This includes areas where eucalyptus and conifers were removed, but also shrub and grassland patches throughout the HNA where invasive species and diseased or dead trees have been removed. It is crucial to first remove and control invasive species before attempting to reestablish native species, as broad application of weed control methods may be more difficult once native species have been established.

Prescription

This Plan promotes passive restoration[27] of vegetation communities from the existing native seedbank wherever possible. In some cases (e.g., after eucalyptus removals), active restoration of native plants is necessary following invasive plant control. Active restoration includes the initial reintroduction of the native, site-adapted species (grasses and shrubs). Costs of native vegetation community restoration can be high, depending on site characteristics and technical approaches. A list of native plants verified to occur at the HNA can be found in Appendix E. Prioritization of species to restore should be determined after the eucalyptus removal and weed control activities have been completed. Ease of establishment (e.g., seeding), site tolerance, availability of seeds or plugs, susceptibility to herbivory, and other factors may affect the prioritization of native species considered for restoration.

Potential restoration sites can be prioritized according to existing plant resources, site quality, project benefits, and long-term sustainability. These criteria take into account the relationship of the restored area to the landscape in which it exists, and how it will influence or be influenced by existing communities in the HNA.[28] The following criteria may be used in deciding restoration priorities:

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27 Passive restoration is allowing natural succession to progress in the absence of the previous environmental stressors, such as invasive weeds, eucalyptus overstory, etc. Passive restoration is generally less costly than active restoration.

28 For a detailed plant list by natural community, see the San Francisco Bay Conservation and Development Commission (2007) publication *Shoreline Plants - A Landscape Guide for The San Francisco Bay* (March 2007), available online at https://bcdc.ca.gov/wp-content/uploads/sites/354/2023/09/SPLG.pdf (accessed July 3, 2024). Also refer to *Fire Resistant Plants for Bayside Areas in Alameda and Contra Costa Counties, California,* available online at https://www.bringingbackthenatives.net/wp-content/uploads/2024/07/Fire-Resistant-Plants-for-Bayside-Areas-in-Alameda-and-Contra-Costa-Counties-California-Sheet1.pdf.

- **Oak Woodland Canopy Structure:** The existing oak woodland east of the Hillside Community Church parcel is a relatively uniform, even-aged stand with a dense interlocking canopy. The prescription for this stand includes removing individual oaks that are rated as hazardous trees or are affected by SOD. Where the canopy has been opened to allow light to reach the soil, underplanting with native bunchgrasses and small flowering shrubs can provide pollinator habitat and reduce the risk that taller, fire-prone invasive species (e.g., acacia, fennel, French broom) will invade and provide ladder fuels. Annual maintenance of these gaps will require hand labor to ensure that bunch grasses are prioritized for retention and expansion. Over time, selective removal of individual oaks may create patches resembling an open-canopy savannah, where individual oaks are interspersed within a native grass/shrubland rich in wildflowers and scattered low-stature shrubs that provide nesting habitat and nectar for pollinators. Invasive species control will be the primary challenge in this restoration.

- **Acorn Sources:** Existing oak woodlands in and near restoration sites are a likely source of locally adapted acorns, as well as a potential reservoir of other organisms endemic to oak woodlands. The passive movement of native nonvascular plants, lichens, fungi, actinomycetes, and bacteria into the restoration site is also favored if oak woodlands adjoin or surround the restoration site. Therefore, any existing oak tree within eucalyptus removal areas should be retained. Reestablishing oak woodlands is a long-term investment and therefore requires long-term planning and funding, which is best reserved for the sites with the highest suitability and restoration potential.

- **Site Quality:** The reestablishment of deep rooting grass and shrubs is important to conserve soil moisture and shading of the soil surface. Thus, in drier locales or on shallow, steep soils, patches of coastal scrub and grassland habitat should be maintained instead of attempting to establish oak woodlands. When vegetation communities are reestablished or created in areas previously occupied by eucalyptus or conifers, prescribed burns may be necessary to remove the existing duff layer and prepare the seedbed. Even when competing species are absent, native grasses may not readily establish. Especially in dry areas on hilltops where soils are shallow, oaks may not be easy to establish. These sites should be managed as native grasslands with a scattered shrub component.

- **Pioneer Species and Seral Dynamics:** On degraded sites, the use of pioneer (early seral stage) plant species may be necessary to recolonize disturbed sites previously occupied by eucalyptus and conifers. Suitable species to serve as a pioneer species are those that establish quickly and create favorable soil and microclimate conditions for the desired late-seral community to take hold. Coastal scrub is often the climax community in drier sites but can also be seral to oak woodlands or oak-dominated grassland savannah, especially when fire has been absent for long periods. Most coastal scrub species do not need fire to reproduce but sprout vigorously after fire. Thus, prescribed fire can be used to enhance coastal scrub communities. Coyote brush is normally not killed by fire and is able to sprout from the root crown post-fire. Fire return intervals of less than 5 years will cause scrub communities to revert to grasslands. A list of suitable pioneer species includes the following species (note that all species, but especially forbs and herbs, will need to be selected based on soil characteristics and sun exposure):

- Coast live oak (*Quercus agrifolia*)
- Coyote brush (*Baccharis pilularis*)
- California buckeye (*Aesculus californica*)
- Blueblossom ceanothus (*Ceanothus thyrsiflorus*)
- Toyon (*Heteromeles arbutifolia*)
- Silver lupine (*Lupinus albifrons*)
- California sage (*Artemisia californica*)
- Coffeeberry (*Rhamnus californica*)
- Poison oak (*Toxicodendron diversilobum*)
- Bush monkey flower (*Mimulus aurantiacus*)

- **Grassland Restoration:** Native grassland restoration in California is expensive, mainly due to the cost of seeds and the variability in success. Innovative restoration method, such as strip seeding (Shaw et al. 2023), can provide a less-expensive method for grassland restoration. Strip seeding includes strategically planting native perennial grasses in strips, resulting in alternating seeded and unseeded areas to target efforts and reduce costs while achieving ecological outcomes similar to conventional methods of seeding entire sites. Seeded strips generally do not provide invasion resistance compared to unseeded strips, so management of weeds is still necessary. Preserving, enhancing, and expanding existing grasslands sites is an important part of achieving this goal. Annual seed collection and distribution on newly disturbed sites, such as burn piles or other bare soils, is a proven alternative method. Early, heavy grazing (removing approximately 60 percent of the standing crop of annual grasses during February and March) by goats while perennial grasses have not yet bolted may be advantageous to reduce the overall seed drop by annuals and control competition with native perennials. This type of targeted herbivory requires careful planning and acute observation of the plants' developmental stage.

- **Site-Specific Benefits:** Ecological, societal, and economic benefits provided by native vegetation restoration can vary greatly between sites. Depending on soil type and topography, benefits such as erosion protection and soil stabilization may be significant or not. Since the HNA is heavily influenced by the urban context and public uses, recreation, modification of urban climate, and hydrologic effects may need to be considered. Aesthetic considerations (preserving or enhancing vistas) are often important in hilltop settings. Resistance to trespassing and off-trail travel may be important in certain areas to limit disturbances. Informal trails created by illegal users, trails with poor erosion-prone designs, or trails that threaten sensitive resources should generally be closed and rehabilitated with plant species that provide natural barriers to discourage users from off-trail wandering. Poison oak and coyote brush are suited as natural barriers.

- **Likelihood of Long-Term Sustainability.** Restored native vegetation communities that require little or no maintenance after the original establishment are likely to provide maximum benefits for minimum cost. Overall, prospects for sustainability result from a combination of site qualities (e.g., existing populations of understory plants), management (e.g., weeding, thinning, burning, and grazing), and the frequency and severity of disturbance. It is anticipated that most native species will readily reestablish themselves when competition of non-native species is reduced or eliminated. Therefore, follow-up management of restoration sites (hand weeding or hand

mowing) around reestablished native species will likely be necessary. When planting shrubs and trees, trunk protection from rodents may be necessary. Deer browsing may also jeopardize the re-establishment of native species. Tree tubes, fencing, and caging are proven methods to protect native trees and shrubs from deer browsing. Goat grazing should not be implemented in areas where native species are in the process of reestablishing but can assist in restoration site preparation.

ACTION 8: MONITOR KEY PERFORMANCE INDICATORS

Tracking the effectiveness of ecosystem restoration and fire resilience projects is important to inform ongoing management, make adaptive decisions, and document progress toward individual restoration project goals. It is recommended that monitoring at the HNA includes the key indicators resiliency, recreation, review, and public relations.

Priority

Medium

Resiliency

The California Wildfire Task Force has adopted "The Pillars of Landscape Resilience" (Figure 18) to describe desired landscape outcomes that encompass the suite of social and ecological benefits provided by resilient systems across fire-prone landscapes. Each pillar has a core metric that measures its performance. Of particular interest in the context of the HNA fire resilience and forest conservation are the pillars of fire dynamics, biodiversity conservation, forest resilience, and fire-adapted communities.

Fire Dynamics

Desired Outcome: In a resilient HNA, prescribed fires would be allowed to burn across the landscape periodically at low to moderate severity in a mosaic pattern that provides substantial ecological benefits. Even in case of a fire, the HNA will burn in an ecologically beneficial and socially acceptable way that perpetuates landscape heterogeneity and that does not threaten human safety or infrastructure.

Monitoring: The HNA should be inspected annually for the following conditions: (1) ladder fuels are removed and tree or brush canopies will not sustain fire, and (2) the contiguous fuels arrangement is interrupted (i.e., no large fallen trees or other fuel accumulations). This is done by comparing the conditions on the site with the Vegetation Management Standards in Appendix F. This work is typically conducted either by fire professionals or vegetation management contractors.

The City will annually monitor eucalyptus regrowth as resources permit. Areas that have not been managed should be inspected every 5 years as part of the Plan update. Surface fuel models and canopy characteristics may be mapped using remotely sensed data and confirmed with field visits by a wildland fire specialist. Fuel loads can be quite variable; thus, application of surface fuel models is the best approach. LiDAR imagery is the best option for measuring canopy characteristics.

Figure 18: Pillars of Landscape Resilience

Biodiversity

Desired Outcome: The network of native species and ecological communities is sufficiently abundant and distributed across the landscape to support and sustain their full suite of ecological and cultural roles.

Monitoring: It is recommended that the City contract with a qualified biologist to periodically monitor the abundance and presence of key special-status species, including monarch butterfly and San Francisco dusky-footed woodrat. Every 10 years, the vegetation communities of the HNA should be mapped according to the CalVeg system standards (0.25-acre minimum mapping unit), identifying and verifying the presence and location of locally rare plants, special-status plant and animal species, and sensitive natural communities. In addition, general biodiversity surveys, such as

Christmas bird counts, plant lists, and bio-blitzes, are encouraged to monitor the biological diversity of the HNA.

Fire-Adapted Communities

Desired outcome: Neighborhoods surrounding the HNA have adapted to live safely near the HNA by embracing defensible space and home hardening. These communities are knowledgeable and engaged by taking action to reduce their vulnerability to fire. They are a valuable partner of the City in its effort to provide a low-fire-risk environment.

Monitoring: If funding and resources are available, the City will contract with a wildland fire specialist to conduct a FlamMap or similar analysis of fire risk and behavior every 10 years as a means to pinpoint areas of deficiencies, target vegetation treatments, and document its progress in making the HNA fire resilient. Inspections of defensible space are another metric of the neighborhood resilience. A summary of the percentage of inspections that are compliant with the City's regulations should be presented every year.

Recognition of the neighborhood as a National Fire Protection Association Firewise Community also indicates a level of resilience. The neighborhoods in this program commit to actions regarding structure retrofitting for ignition resistance, fuel management evacuation preparedness, and education and outreach. The number of residents nearby in this program is an appropriate additional metric about fire-adapted communities.

Forest Resilience

Disease Monitoring and Selective Removals. To detect and remove affected trees before they spread the disease, it is essential to know the distribution and incidence of the pathogen. Monitoring to detect *P. ramorum* presence is a critical component of the United States Department of Agriculture (USDA) national management strategy (Federal Regulations, 7 CFR 301.92–301.92-12). Thus, if funding is available, SOD monitoring should be conducted frequently (at least annually) to rapidly and accurately determine where the pathogen and disease are located within the HNA. One proven method of monitoring is the training of public employees and citizen scientists to look for the disease. Garbelotto et al (2020) conducted yearly surveys led by citizen scientists designed to map the distribution of *P. ramorum*. Monitored symptoms included branch cankers and associated canopy mortality and affected multiple individuals per species. Volunteer citizen scientists require recurrent training to ensure adequate standards of data collection.

Recreation

Trail Monitoring

Desired Outcome: The HNA has a network of functional, aesthetic trails that provide diverse recreation opportunities for the community members and visitors of El Cerrito. Most trails are multiuse trails, and safety issues are adequately addressed in the design, use restrictions, and maintenance schedules for each trail. Trail maintenance is timely, erosion is negligible, and hazards are identified early and removed.

Monitoring: The City will coordinate with stakeholder groups to conduct a trail inventory at least once per year, preferably toward the end of the rainy season, to address any erosion issues or fallen trees. This should involve taking detailed measurements and pictures of trail facilities (benches, kiosks, signs, etc.) and record maintenance defect locations with a Global Positioning System (GPS) device.

Review

Desired Outcome: The HNA Plan is an adaptive Plan that provides flexible management responses to a changing landscape. Monitoring may reveal significant departures from the desired outcome; therefore, new management goals or objectives may be needed. Thus, the Plan is subject to regular evaluation and revision as part of the ongoing management process, and required changes to the Plan are identified before a crisis develops.

Monitoring: It is recommended that the City review the Plan every 5 years and evaluate the need for an update. Given available funding and resources, this review shall be conducted by City staff in consultation with experts in the field and stakeholders.

Public Relations, Partnerships, and Education

Desired Outcome: The community is informed about the HNA Plan implementation and any review efforts, provides feedback about HNA Plan implementation, participates in maintenance activities within the HNA as possible, and contributes to reviews and any updates of the HNA Plan so that it continues to reflect community priorities.

Monitoring: Public engagement and community participation are crucial determinants of success of the HNA management. It is recommended that, given funding and resources, the City maintain a webpage related to the HNA Plan that includes updates on management activities and educational or recreational events organized by the City. In addition, it is recommended that the City Council and the Park and Recreation Commission (or other advisory body designated by the City Council) receive an update at least every 2 years on Plan implementation challenges, successes, and overall progress. The City will continue to consult stakeholders from local community organizations and City committees in order to monitor and adjust community engagement approaches, particularly in advance of the HNA Plan 5-year review . As the City develops and implements any new community engagement strategies, such as educational initiatives, volunteer opportunities, and/or partnerships related to management of the HNA, the City will develop appropriate monitoring approaches and metrics accordingly.

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APPENDIX A

BIOLOGICAL RESOURCES ASSESSMENT

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BIOLOGICAL RESOURCES ASSESSMENT

HILLSIDE NATURAL AREA FIRE RESILIENCE AND FOREST CONSERVATION MANAGEMENT PLAN

EL CERRITO, CALIFORNIA

LSA

December 2024

BIOLOGICAL RESOURCES ASSESSMENT

HILLSIDE NATURAL AREA FIRE RESILIENCE AND FOREST CONSERVATION MANAGEMENT PLAN

EL CERRITO, CALIFORNIA

Submitted to:

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December 2024

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EXECUTIVE SUMMARY

PURPOSE AND BACKGROUND

The City of El Cerrito (City) proposes to develop and adopt a comprehensive fire hazard reduction and vegetation management plan for the City's Hillside Natural Area (HNA). The purpose of the Hillside Natural Area Fire Resilience and Forest Conservation Management Plan (Plan) is to:

- Identify and protect critical resource areas;
- Guide the City's fire fuel reduction, native forest conservation, and maintenance activities; and
- Evaluate fire road and trail network conditions.

This Biological Resources Report provides a California Environmental Quality Act (CEQA) compliant identification of special-status species and their habitats, wetlands and other regulated waters, and other potential biological resource constraints to the Plan's development. The report also provides recommended mitigation measures to address the requirements of CEQA.

PROJECT SITE DESCRIPTION

Site Characteristics

The project site is located within El Cerrito, California (Figure 1). The HNA is approximately 107.18 acres and is divided into three sections: Hillside Natural Area North ("Motorcycle Hill;" 24.22 acres), Madera Property (9.53 acres) and Hillside Natural Area South (73.43 acres). Elevations range from approximately 150 to 650 feet (ft) above sea level. The project site is characterized by steep hillslopes with predominantly western and southern exposures (Figure 2). There are six major vegetation cover types within the HNA (Figure 3). Soils on the project site consist of mostly rock outcrop-Xerorthents association with cut and fill land-Millsholm complex mapped along the western boundary and quarry mapped near the southern boundary of the project site (USDA 2023; Figure 4).

Vegetation Communities

The project site supports ruderal/non-native grassland, native grassland, coast live oak woodland, scrub, riparian woodland, and drainages (Figure 3).

- **Ruderal/Non-Native Grassland.** The ruderal/non-native grassland (33.47 acres) supports primarily non-native annual grassland species, with patches of perennial grassland and ruderal plant species. Non-native grasses are also abundant throughout the understory within all habitat types at the project site.

- **Native Grasslands.** Native grasslands (Figure 3) observed on the project site consist of small, localized patches of purple needlegrass (*Stipa pulchra*), foothill needlegrass (*Stipa lepida*), bent grass (*Agrostis pallens*), and creeping wild rye (*Elymus triticoides*).

- **North Franciscan Coastal Scrub.** The scrub habitat within the project site comprises 2.6 acres and is dominated by coyote brush (*Baccharis pilularis*) and French broom (*Genista monspessulana*). Other dominant to co-dominant species include orange bush monkey flower

(*Diplacus aurantiacus*). Stands of northern Franciscan coastal scrub are found throughout the project site, but they mainly occupy the steeper portions of the south- and west-facing slopes along the eastern boundary.

- **Coast Live Oak Woodland.** The coast live oak woodland (28.7 acres) on the project site is dominated by coast live oak (*Quercus agrifolia*) with California bay (*Umbellularia californica*), California buckeye (*Aesculus californica*), and toyon *(Hetreomeles arbutifolia).*

- **Riparian Woodland.** Riparian woodland occupies approximately 1.15 acres on the HNA, but that estimate is probably too low and will need to be evaluated by field mapping. It occurs along the streams and drainages and contains trees and shrubs, such as arroyo willow (*Salix lasiolepis*), Pacific willow (*S. lasiandra*), cottonwood (*Populus* sp.), alder (*Alnus* sp.), California bay, California buckeye, and coast live oak. Riparian woodland is considered a sensitive plant community under CEQA.

- **Eucalyptus and Pine Groves.** Eucalyptus groves are present in several areas within the project site. They are the most prevalent vegetation community at the project site, totaling over 36.2 acres. Eucalyptus are the dominant tree species within the groves. Both blue gum (*Eucalyptus globulus*) and yellow gum (*E. viminalis*) are growing at the project site (LSA 1987).

- **Rock Outcrops.** Rock outcrops are present in small areas throughout the project site. Species observed at the outcrops include naked-stem buckwheat (*Eriogonum nudum*), California poppy (*Eschscholzia californica*), coyote mint (*Monardella villosa*), and various non-native plants.

- **Streams/Drainages.** Several intermittent and ephemeral streams/drainage channels are present in the project site (Figure 3). These streams/drainages appear to flow in the southwest direction and flow off the project site into culverts beneath the adjacent residential area to the southwest. Some of the drainages occur within concrete v-ditches and become natural stream channels further downstream within the project site. These streams/drainages are likely to be considered jurisdictional features by the United States Army Corps of Engineers (USACE) and Regional Water Quality Control Board (RWQCB) and subject to regulation under Section 404 and 401 of the Clean Water Act and/or the California Porter Cologne Water Quality Control Act (Porter-Cologne Act).

SPECIAL-STATUS SPECIES

For the purposes of this assessment, special-status species are defined as follows:

- Species that are listed, formally proposed, or designated as candidates for listing as threatened or endangered under the Federal Endangered Species Act (FESA);

- Species that are listed, or designated as candidates for listing, as rare, threatened, or endangered under the California Endangered Species Act (CESA);

- Plant species that are on the California Rare Plant Rank (CRPR) Lists 1A, 1B, and 2;

- Animal species designated as Species of Special Concern or Fully Protected by the California Department of Fish and Wildlife (CDFW); or

- Species that meet the definition of rare, threatened, or endangered under Section 15380 of the CEQA guidelines.

Several special-status species could occur on the project site or in the vicinity (Table A). No special-status species were observed during the field survey.

SPECIES FOR WHICH AVOIDANCE, MINIMIZATION AND MITIGATION MAY BE REQUIRED:

- **Special-Status Plants.** If fuel reduction treatments are proposed within the native grasslands, riparian woodland, drainage channels, or the less disturbed portions of the oak woodland and scrub habitat (such as areas where French broom is not present), focused plant surveys for special-status plants should be conducted according to CDFW's *Protocols for Surveying and Evaluating Impacts to Special Status Plant Populations and Natural Communities* (CDFW 2018).

- **Monarch Butterfly.** The monarch butterfly is a federal candidate listed species that could breed within the project site. No California Natural Diversity Database (CNDDB; CDFW 2023) occurrences for monarch butterfly have been recorded at the project site, but the species was observed during field work on October 10, 2023, at Motorcycle Hill.

- **Crotch and Western Bumble Bee.** The Crotch and western bumble bees are Candidate State Endangered listed species. These species are known to occur in grassland and scrub habitat where suitable native nectar plants are present. These species historically occurred in the region but are now considered rare. Due to the presence of suitable flowering plant species, these species, although unlikely due to their rarity, could be present.

- **Special-Status Birds and Other Nesting Bird Species.** Several special-status bird species are known to occur at or near the project site (Table A; see list above). These bird species could nest, winter, and/or migrate through the project site. Some of these bird species, such as the American peregrine falcon, could forage on the project site, but are unlikely to nest at or adjacent to the site due to the lack of suitable nesting habitat. Special-status birds observed at the project site include white-tailed kite, olive-sided flycatcher, and Vaux's swift, among others (eBird 2023). Active nests of special-status and other native bird species are protected by the Migratory Bird Treaty Act and/or California Fish and Game Code.

- **Special-Status Bats and Other Bat Species.** Several bat species, including special-status bat species, could roost and/or forage at the project site. All roosts of native bats, regardless of their status, are protected by California Fish and Game Code. Townsend's western big-eared bat (California Species of Special Concern) may briefly forage over the project site but would not roost on the project site due to the lack of suitable roosting habitat. Suitable habitat exists for pallid bat and western red bat, both of which are California Species of Special Concern, and other bat species could roost in the on-site trees.

- **San Francisco Dusky-Footed Woodrat.** The San Francisco dusky-footed woodrat is a California Species of Special Concern. This species occurs in riparian woodland, woodland/forests, and scrub habitat and has been observed at the project site. LSA observed woodrat houses in the northern portion of the site, but this species could occur throughout the project site where suitable habitat is present.

OTHER MITIGATION MEASURES

- **Waters of the United States/Waters of the State.** Potential impacts to potentially jurisdictional features, such as the on-site streams/drainages (and seasonal wetlands/seeps, if present), are subject to regulation by the USACE, RWQCB, and/or CDFW. These features will be avoided during the fuel reduction activities, where possible. If these features are impacted, the City would need to obtain the required permits from the relevant regulatory agencies, including the USACE, CDFW, and RWQCB.

- **Riparian Vegetation.** To minimize disturbance to riparian habitat occurring adjacent to the fuel reduction area, riparian areas shall be clearly delineated by a qualified biologist. Riparian areas shall be separated and protected from the work area through silt fencing, amphibian/reptile-friendly fiber rolls (i.e., no mono-filament), or other appropriate erosion control material. If impacts to riparian habitat within the project area cannot be avoided, a Habitat Mitigation and Monitoring Plan (HMMP) shall be prepared and implemented for all impacted riparian habitat.

- **Native Grasslands and Other Sensitive Natural Communities.** If feasible, the proposed fuel treatments shall avoid/minimize impacts to the purple needlegrass grasslands, other native grasslands, and other sensitive natural communities. The stands of native grasslands shall be avoided during fuel treatment activities. If the native grasslands cannot be avoided, the loss of native grasslands shall be mitigated by restoring an equivalent acreage of native grasslands on site. The City shall reseed temporarily disturbed areas of native grassland habitat that are disturbed by fuel reduction activities with an appropriate weed-free native seed mix that contains the particular native grass seed and/or plugs. Any restored native grassland areas shall be monitored and reported on an annual basis, as required by CDFW.

INTRODUCTION

BACKGROUND

The City of El Cerrito (City) proposes to implement the Hillside Natural Area Fire Resilience and Forest Conservation Management Plan (project) to establish and adopt a comprehensive fire hazard reduction and vegetation management plan for the City's HNA. The Plan will:

- Identify and protect critical resource areas;
- Guide the City's fire fuel reduction, native forest conservation, and maintenance activities; and
- Evaluate fire road and trail network access.

Over the last few years, community concerns regarding fire risk in the City's HNA and surrounding residential communities have significantly increased. The City has responded with ongoing and increased vegetation maintenance activities, completing work largely based on planning efforts that were completed many years ago, including the 1994 City of El Cerrito HNA Fire Hazard Reduction Plan. However, the need for more robust, comprehensive, and balanced vegetation management practices became increasingly evident and was identified in the City's 2015 Urban Greening Plan. Additionally, in 2019, the El Cerrito Parks and Recreation Facilities Master Plan specifically called for action to "support the El Cerrito-Kensington Wildfire Action Plan goals and policies by creating defensible spaces, increasing weed abatement, and managing dead or diseased trees and other vegetation, especially in the Hillside Natural Area." El Cerrito voters passed a measure (Measure H) to further fund park maintenance activities that same year and the City has since increased its fire fuel reduction and vegetation management activities, in part with these park maintenance funds. Given the ongoing and historic drought, rising global temperatures and community concerns regarding the risk of wildfire, an updated plan with the required environmental site analysis is needed now to guide the City in performing and budgeting for the most effective, sustainable, and cost-efficient fuel reduction and forest conservation activities.

This Plan was developed with support from a $166,750 State Coastal Conservancy grant in September 2022. The Coastal Conservancy is a California State agency established in 1976 to protect and improve natural lands and waterways, to help people get to and enjoy the outdoors, and to sustain local economies along California's coast. It acts with others to protect and restore, and increase public access to California's coast, ocean, coastal watersheds, and the San Francisco Bay Area. Its vision is of a beautiful, restored, and accessible coast for current and future generations of Californians.

PURPOSE

The purpose of the Biological Resources Report is to provide a CEQA-compliant identification of special-status species and their habitats, wetlands and other regulated waters, and other potential biological resource constraints to the Plan development. The report includes a description of the project; an explanation of the methods used to conduct the analysis; the results of field surveys, including documentation of plant and wildlife species observed; and a list of special-status species (plants and animals) that could potentially occur at the site (and the likelihood of occurrence). The

report also provides recommended mitigation measures to address the requirements of CEQA (50 Code of Federal Regulations [CFR] §402.12).

METHODS

LSA reviewed available background information/literature, such as the Friends of Five Creeks' *Native Plants of the El Cerrito Hillside Natural Area, and the El Cerrito Hillside Natural Area Vegetation Management Plan* (LSA 1987) and *Biological Resources Report for the Madera Property Fuel Reduction Project* (LSA 2014), and searched the records of the CDFW's CNDDB (CDFW 2023), the United States Fish and Wildlife Service's (USFWS; 2023) Information for Planning and Consultation online system, the California Native Plant Society's (CNPS) Inventory of Rare Plants (CNPS 2023), and eBird's online system (eBird 2023) for the occurrence of special-status plant and/or wildlife species on or near the project site.

An LSA senior biologist conducted a biological field survey at the project site on August 11, September 27, and October 3, 2023. The survey involved walking throughout the project site to search for biological resources, such as the presence of special-status plants, wildlife, and their habitats, and sensitive habitats, such as wetlands and drainage channels. The potential presence of special-status species was based on an evaluation of the habitat types present on the site, the CNDDB records, and other occurrence information from the vicinity of the site. During the field survey, the biologist also investigated the presence of waters of the United States/waters of the State (including wetlands and drainages).

The scientific and vernacular nomenclature for the plant and wildlife species used in this study are from the following standard sources:

- Plants (Baldwin et al. 2012) and updates listed on the Jepson Herbarium website (http://ucjeps.berkeley.edu/eflora/)
- Amphibians and Reptiles (Crother 2017)
- Birds (American Ornithologists' Union 1998) and supplements through 2023
- Mammals (Bradley et al. 2014)

PROJECT SITE DESCRIPTION

LOCATION AND SITE CHARACTERISTICS

The project site is located within El Cerrito, California (Figure 1). The HNA is approximately 107.18 acres and is divided into three sections: HNA North ("Motorcycle Hill"; 24.22 acres), the Madera Property (9.53 acres), and HNA South (73.43 acres). Elevations ranges from approximately 150 and 650 ft above sea level. The project site is characterized by steep hillslopes with predominantly western and southern exposures (Figure 2). There are six major vegetation cover types within the HNA (Figure 3). Soils on the project site consist of mostly rock outcrop-xerorthents association with cut and fill land-Millsholm complex mapped along the western boundary and quarry mapped near the southern boundary of the project site (USDA 2023; Figure 4).

VEGETATION

Vegetation in El Cerrito is characterized by native and non-native grassland, riparian scrub and woodland, oak woodland, salt marsh near the San Francisco Bay, and other scrub and "soft" chaparral, in addition to extensive introduced landscaping and naturalized nonnative species such as eucalyptus, pine, and French broom (*Genista monspessulana*). LSA inventoried over 150 plant species that commonly occur in the HNA. The majority of those are native (n=82), but most of the non-native species are considered invasive. In addition, Friends of Five Creeks (2014) produced a plant list containing 129 native species. The heavily vegetated, undeveloped San Pablo and Sobrante ridges occur northeast of El Cerrito. The project site supports ruderal/non-native grassland, native grassland, coast live oak woodland, scrub, riparian woodland, and drainages (Figure 3).

Ruderal/Non-Native Grassland

The ruderal/non-native grassland (33.47 acres) supports primarily non-native annual grassland species, with patches of perennial grassland and ruderal plant species. Dominant annual grass species include wild oats (*Avena fatua*) and ripgut brome (*Bromus diandrus*). The dominant grass in the perennial grassland is veldt grass (*Ehrharta erecta*). Associated species observed in the annual grassland include rattlesnake grass (*Briza minor*), wild mustard (*Hirschfeldia incana*), Italian thistle (*Carduus pycnocephalus*), bristly ox-tongue (*Helminthotheca echioides*), English plantain (*Plantago lanceolata*), field hedge parsley (*Torilis arvensis*), and willow leaf lettuce (*Lactuca saligna*). Non-native grasses are also abundant throughout the understory within all habitat types at the project site.

Native Grasslands

Native grasslands observed on the project site consist of patches of purple needlegrass (*Stipa pulchra*), foothill needlegrass (*Stipa lepida*), bent grass (*Agrostis pallens*), and creeping wild rye (*Elymus triticoides*). Native herbaceous species observed within the native grasslands include soap root (*Chlorogalum pomeridianum*), golden rod (*Solidago velutina*), hayfield tarweed (*Hemizonia congesta* subsp. *luzulifolia*), and bracken fern (*Pteridium aquilinum*). Several other native grassland plant species, such as blue-eyed grass (*Sisyrinchium bellum*), narrowleaf mule ears (*Wyethia angustifolia*), and arroyo lupine (*Lupinus succulentus*), have been observed at the project site (Friends of Five Creeks 2014).

North Franciscan Coastal Scrub

The scrub habitat within the project site comprises 2.6 acres and is dominated by coyote brush (*Baccharis pilularis*) and French broom. Other dominant to co-dominant species include orange bush monkey flower (*Diplacus aurantiacus*). California sagebrush (*Artemisia californica*), coffeeberry (*Frangula californica*), and poison oak (*Toxicodendron diversilobum*). Stands of northern Franciscan coastal scrub are found throughout the project site, but they mainly occupy the steeper portions of the south- and west-facing slopes along the eastern boundary.

Coast Live Oak Woodland

The coast live oak woodland on the project site (28.7 acres) is dominated by coast live oak (*Quercus agrifolia*) with California bay (*Umbellularia californica*) and California buckeye (*Aesculus californica*). This woodland supports an abundance of mature native shrubs, vines, and grasses, including toyon (*Heteromeles arbutifolia*), pink honeysuckle (*Lonicera hispidula*), California blackberry (*Rubus ursinus*), blue elderberry (*Sambucus mexicana*), California aster (*Aster chilensis*), Pacific pea (*Lathyrus vestitus*), California bee plant (*Scrophularia californica*), blue witch (*Solanum umbelliferum*), coyote brush, bush monkey flower, poison oak, and bent grass. Non-native species observed within the oak woodland included pittosporum (*Pittosporum* sp.), Bailey acacia (*Acacia baileyana*), blackwood acacia (*Acacia melanoxylon*), pampas grass (*Cortaderia selloana*), orange cotoneaster (*Cotoneaster franchetii*), Himalayan blackberry (*Rubus armeniacus*), English ivy (*Hedera canariensis*), plum (*Prunus* sp.), and non-native grasses. Understory species include beaked hazelnut (*Corylus cornuta*), wood fern (*Dryopteris arguta*), western sword fem (*Polystichum munitum*), soap root, pink honeysuckle (*Lonicera hispidula*), poison oak, California blackberry, coffeeberry, and coyote brush.

Riparian Woodland

Riparian woodland occurs along the streams and drainages. This community occupies approximately 1.15 acres on the HNA, but that estimate is probably too low and will need to be evaluated by field mapping. Tree species observed include arroyo willow (*Salix lasiolepis*), Pacific willow (*S. lasiandra*), cottonwood (*Populus* sp.), alder (*Alnus* sp.), California bay (*Umbellularia californica*), California buckeye, and coast live oak. Associated species observed include common lady fern (*Athyrium filix-femina* var. *cyclosorum*), western chain fern (*Woodwardia fimbriata*), California blackberry, Himalayan blackberry, blue elderberry, English ivy, and French broom.

Eucalyptus and Pine Groves

Eucalyptus groves are present in several areas within the project site. They are the most prevalent vegetation community at the project site, totaling over 36.2 acres. Eucalyptus are the dominant tree species within the groves. Blue gum (*Eucalyptus globulus*), red ironbark (*E. sideroxylon*), and yellow gum (*E. viminalis*) are growing at the project site (LSA 1987). Conifers, primarily Monterey pine (*Pinus radiata*) and coast live oaks, also occur within the groves. Dense shade created by the eucalyptus canopy, combined with volatile chemicals contained in the large amount of bark and leaf litter deposited by eucalyptus, create poor growing conditions for most herbaceous and woody understory species. Consequently, the understory of these woodlands is often devoid of vegetation and may consist of a thick layer of bark and leaves. Where openings in the canopy allow sufficient

light to penetrate to the grove floor, patches of poison oak, toyon, other shrubs and annual grasses can occur.

Rock Outcrops

Rock outcrops are present in small areas throughout the project site. Species observed at the outcrops include naked-stem buckwheat (*Eriogonum nudum*), California poppy (*Eschscholzia californica*), coyote mint (*Monardella villosa*), and various non-native plants.

Streams/Drainages

Several intermittent and ephemeral streams/drainage channels are present in the project site (Figure 3). These streams/drainages appear to flow in the southwest direction and flow off the project site into culverts beneath the adjacent residential area to the southwest. Some of the drainages occur within concrete v-ditches and become natural stream channels further downstream within the project site.

WILDLIFE

Several common wildlife species inhabit the project site. Most of the bird species observed were foraging in the oak woodland and scrub habitats. A few birds, such as turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*), American crow (*Corvus brachyrhynchos*), and common raven (*C. corax*), were observed flying over the project site. No active bird nests were identified during the reconnaissance-level field surveys, which were conducted in late summer and early fall 2023, but a few inactive stick nests were found in the on-site trees. Numerous resident birds were observed foraging at the project site, suggesting that they likely nested on or near the project site. Non-native fox squirrel (*Sciurus niger*) nests were also observed in the oak trees. Foraging black-tailed deer (*Odocoileus hemionus*) and Botta's pocket gopher (*Thomomys bottae*) burrows were observed in the non-native grasslands.

BIOLOGICAL RESOURCE ASSESSMENT

SPECIAL-STATUS SPECIES

For the purposes of this assessment, special-status species are defined as follows:

1. Species that are listed, formally proposed, or designated as candidates for listing as threatened or endangered under FESA;

2. Species that are listed, or designated as candidates for listing, as rare, threatened, or endangered under CESA;

3. Plant species that are on CRPR Lists 1A, 1B, and 2;

4. Animal species designated as Species of Special Concern or Fully Protected by the CDFW; or

5. Species that meet the definition of rare, threatened, or endangered under Section 15380 of the CEQA guidelines.

Several special-status species could occur on the project site or in the vicinity (Table A). No special-status species were observed during the field survey.

Special-Status Plants

Special-status plant species for which extant or non-historic CNDDB (CDFW 2023) records exist in the vicinity consist of the following species:

- Bent-flowered fiddleneck (*Amsinckia lunaris*; CRPR List 1B)
- Pallid manzanita (*Arctostaphylos pallida*; Federal Threatened, State Endangered, CRPR List 1B)
- Franciscan thistle (*Cirsium andrewsii*; CRPR List 1B)
- Western leatherwood (*Dirca occidentalis*; CRPR List 1B)
- Fragrant fritillary (*Fritillaria liliacea*; CRPR List 1B)
- Diablo helianthela (*Helianthella castanea*; CRPR List 1B)
- Loma Prieta hoita (*Hoita strobilina*; CRPR List 1B)
- Santa Cruz tarplant (*Holocarpha macradenia*; Federal Threatened, State Endangered, CRPR List 1B).

Several other special-status plants are also known to occur in the region (Diablo Fire Safe Council 2017). None of these or other special-status species, however, are likely to occur within the majority of project site due to: (1) prior disturbance in the project area; (2) the introduction of non-native plant species; and (3) the absence of suitable habitat and substrates such as wetlands and serpentine substrates. Less disturbed areas on the project site, such as the oak woodland, riparian woodland, scrub, and native grasslands, may provide suitable habitat for special-status plant species; therefore, protocol-level plant surveys are recommended to be conducted where suitable habitat is present (see Recommendations section).

Table A: Special-Status Species Evaluated for the Project

Species	Status (Federal/ State/CRPR)	Habitat	Potential for Occurrence
Plants			
Amsinckia lunaris Bent-flowered fiddleneck	1B	Occurs in coastal bluff scrub, cismontane woodland, valley and foothill grassland; openings. Elevation: 3-500 m. Blooms: March-June	Although suitable habitat is present, the potential for this species to occur is low due to the density of invasive plants. Nearest occurrence is near San Pablo Ridge approximately 2.4 miles from the project site.
Arctostaphylos pallida Pallid manzanita	FT/CE/1B	Broadleaved upland forest, close coned coniferous forest, cismontane woodland, coastal scrub, and chaparral. Grows on siliceous shale, sandy, or gravelly substrates in uplifted marine terraces. Elevation: 185-465 m. Blooms: December-March	Although woodland habitat is present, suitable substrates are absent. Nearest CNDDB occurrence is in Sobrante Ridge Regional Preserve approximately 3.0 miles from the project site.
Astragalus tener var. tener Alkali milk-vetch	1B	Playas and vernal-pools in freshwater wetlands, alkali sink, valley grassland, wetland-riparian. Elevation: 0-90 m. Blooms: March-June	No suitable habitat present. The closest CNDDB occurrence is a possibly extirpated 1900 record from an unknown location near the Stege Marsh in Richmond.
Cirsium andrewsii Franciscan thistle	1B	Northern coastal scrub, mixed evergreen forest, wetland-riparian. Elevation: 0-160 m. Blooms: March-July	Although woodland habitat is present, the potential for this species to occur is low due to the density of invasive plants. The closest CNDDB occurrence is near Tilden Regional Park approximately 3.3 miles from the project site.
Dirca occidentalis Western leatherwood	1B	Broad-leafed upland forest, chaparral, closed-cone coniferous forest, cismontane woodland, north coast coniferous forest, riparian forest, and riparian woodland on brushy slopes, mesic sites. Elevation: 30-395 m. Blooms: January-March	Suitable woodland habitat present. The closest CNDDB occurrence is from an unknown location in Wildcat Canyon Regional Park approximately 0.4 mile from the project site.
Fritillaria liliacea Fragrant fritillary	1B	Northern coastal scrub, coastal prairie, valley grassland, wetland-riparian. Elevation: 0-360 m. Blooms: February-April	Although woodland habitat is present, the potential for this species to occur is low due to the density of invasive plants. The closest CNDDB occurrence is a possibly extirpated 1938 record from an unknown location near the Mira Vista Country Club, near the north end of Wildcat Canyon Regional Park.

Table A: Special-Status Species Evaluated for the Project

Species	Status (Federal/ State/CRPR)	Habitat	Potential for Occurrence
Gilia millefoliata Dark-eyed gilia	1B	Coastal strand. Elevation: 0-30 m. Blooms: April-July	No suitable habitat present. The closest CNDDB occurrence is from an 1863 record at unknown location in Oakland estimated at approximately 3.6 miles from the project site.
Helianthella castanea Diablo helianthela	1B	Broadleaved upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill grassland, usually within rocky azonal soils. Elevation: 60–300 m. Blooms: April-June.	Suitable habitat present within the woodland and scrub habitat, but species likely not to occur due to prior disturbance and the introduction of invasive species. The closest CNDDB occurrence is from a presumed extant population near the San Pablo Reservoir approximately 2.2 miles from the project site.
Loma Prieta hoita *Hoita strobilina*	1B	Chaparral, cismontane woodland, and riparian woodland on mesic serpentine sites. Elevation: 30-860 m. Blooms: May- October	Although woodland is present, serpentine is absent from the project site. The closest CNDDB occurrence is from a presumed extant population in El Sobrante approximately 2.0 miles from the project site.
Santa Cruz tarplant *Holocarpa macradenia*	FT/CE/1B	Occurs in sandy-clay soil in coastal prairie, coastal scrub, and in valley and foothill grassland. Elevation: 10-220 m. Blooms: June-October	Although valley and foothill grassland is present, this species is known to occur on sandy soils, which are absent from the project site. All extant populations of this plant have been reintroduced. The closest CNDDB occurrences are northeast of the project site in Wildcat Canyon Regional Preserve approximately 0.7 mile from the project site.
Insects			
Monarch butterfly *Danaus plexippus*	FC/Sensitive Winter Roosting Sites	Winter roosts along the coast from northern Mendocino to Baja California, Mexico in wind-protected tree groves (eucalyptus, Monterey pine, cypress) with nectar and water sources nearby. Uses milkweed (*Asclepias* spp.) as host plants.	Suitable sheltered groves of trees present, but project site is likely located at too high of an elevation to provide suitable roost sites. Suitable breeding habitat present in on-site patches of milkweed; milkweed has been recorded on the project site (Xerces et al. 2023). Suitable nectar plants present. Individual monarch butterflies observed flying through project site during the October field survey. Closest CNDDB occurrence of

Table A: Special-Status Species Evaluated for the Project

Species	Status (Federal/ State/CRPR)	Habitat	Potential for Occurrence
			an overwintering roost is at the University of California Richmond Field Station, approximately 1.2 miles from the project site.
Crotch bumble bee *Bombus crotchii*	–/ Candidate CE	Open grassland and scrub habitats supporting flowering plants, such as *Asclepias* sp., *Chaenactis* sp., *Lupinus* sp., *Medicago* sp., *Phacelia* sp., and *Salvia* sp.	Suitable habitat present. Closest CNDDB occurrence is a 1933 and 2015 record from Berkeley, approximately 2.4 miles from the project site.
Western bumble bee *Bombus occidentalis*	–/ Candidate CE	Variety of habitat types, supporting native flowering plants. Species has declined precipitously perhaps from disease.	Suitable habitat present. Closest CNDDB occurrence is a 1992 record from Berkeley Richmond Field Station, in Richmond, approximately 1.2 mile from the site.
Fish			
Steelhead (central California coast Distinct Population Segment) *Oncorhynchus mykiss*	FT/CSC	Pacific Ocean, San Francisco estuary, Sacramento and San Joaquin Rivers and tributaries.	No suitable habitat present. On-site stream and drainages do not provide suitable habitat. No CNDDB occurrences within 5 miles of the project site.
Amphibians			
California tiger salamander *Ambystoma californiense*	FT/CT	Breeds in vernal pools, ponds, and stock ponds. Spends summer and early Fall in uplands surrounding breeding sites, taking refuge in small mammal burrows or other underground cover.	Although suitable upland habitat is present in grasslands, no suitable breeding habitat present at or near the site. No CNDDB occurrences within 5 miles of the project site.
California red-legged frog *Rana draytonii*	FT/CSC	Found in lowlands and foothills in or near permanent ponds and streams with dense, shrubby, or emergent riparian vegetation.	Suitable non-breeding aquatic, upland, and dispersal habitat present in on-site streams, but species not known to occur at or near the project site (CDFW 2023). The closest extant CNDDB occurrence is from near the San Pablo Dam approximately 2.2 miles from the project site. The CNDDB also includes a 1956 record approximately 1.5 miles from the project site at Jewell Lake in Tilden Regional Park in Berkeley, but due to the presence of introduced predators, such as bullfrogs and fish, this occurrence is likely extirpated.

Table A: Special-Status Species Evaluated for the Project

Species	Status (Federal/ State/CRPR)	Habitat	Potential for Occurrence
Foothill yellow-legged frog Central Coast Distinct Population Segment *Rana boylii*	FT/CE	Partly shaded, shallow streams and riffles with a rocky substrate.	No suitable habitat present. No extant CNDDB occurrences recorded within 5 miles of the project site.
Reptiles			
Northwestern pond turtle *Emys marmorata*	FC/CSC	Ponds, marshes, rivers, streams, and irrigation ditches with aquatic vegetation. Requires basking sites and adjacent grasslands or other open habitat for egg-laying.	Suitable aquatic habitat present in on-site streams, but lack of deep plunge pools and high quality basking sites likely precludes the species from occurring The closest CNDDB occurrence is from Jewell Lake in Tilden Regional Park approximately 1.5 miles from the project site.
Alameda whipsnake *Masticophis lateralis euryxanthusi*	FT/CT	Chaparral and rock outcrops. Also occurs in riparian woodland, forests, and grasslands where chaparral and rocky outcrops are present nearby.	Suitable habitat present. The closest CNDDB occurrence is approximately 1.6 miles from the project site.
Birds			
American white pelican *Pelecanus erythrorhynchos*	–/CSC	Occurs in shallow inland and coastal marine habitats, marshes, lakes, and rivers.	No suitable habitat present. Species does not breed in the project area but may fly over the project site. Species observed at the project site (eBird 2023). Species not tracked in the CNDDB.
Long-eared owl *Asio otus*	–/CSC	Woodlands and forests that are open or adjacent to grasslands, meadows, or shrublands.	Suitable nesting habitat present in trees on or adjacent to the site. No CNDDB occurrences within 5 miles of the site.
Short-eared owl *Asio flammeus*	–/CSC	Open grasslands, meadows, and marshes with few trees. Requires dense ground vegetation for both roosting and nesting.	Suitable habitat present. Wintering/migrating individuals observed in Point Pinole Regional Park (eBird 2023). No CNDDB occurrences within 5 miles of the site.
Burrowing owl *Athene cunicularia*	–/CSC	Nests in burrows in grasslands and woodlands; often associated with ground squirrels. Will also nest in artificial structures (culverts, concrete debris piles, etc.)	Suitable habitat present, but not known to nest in the project area. During the time of the field surveys, no ground squirrel burrows were observed and the grass within the grassland was too tall for burrowing owl burrows. Species is known to winter along the San Francisco Bay shoreline in Richmond, Albany, and Berkeley (eBird 2023). Closest CNDDB occurrences is in

Table A: Special-Status Species Evaluated for the Project

Species	Status (Federal/ State/CRPR)	Habitat	Potential for Occurrence
			Richmond, approximately 1.5 miles from the project site.
White-tailed kite *Elanus leucurus*	–/CFP	Nests in shrubs and trees in open areas and forages in adjacent grasslands and agricultural land.	May nest and forage on the project site. Species observed at the project site (eBird 2023). Closest CNDDB occurrences is approximately 3.2 miles from the project site.
Northern harrier *Circus hudsonius*	–/CSC	Nests and forages in meadows, grasslands, open rangeland, and fresh or saltwater marshes.	Suitable nesting and foraging habitat present. The closest CNDDB occurrence is from the Berkeley Meadow near the Berkeley Marina approximately 3.2 miles from the project site.
Golden eagle *Aquila chrysaetos*	–/CFP	Forages in rolling foothill or coast-range terrain, with open grassland and scattered large trees. Nests in large trees, on cliffs, and occasionally on power line poles.	Suitable nesting and foraging habitat present. No CNDDB occurrences recorded within 5 miles of the project site.
Bald eagle *Haliaeetus leucocephalus*	Delisted/CE; CFP	Winters at lakes, reservoirs, river systems, and some rangelands and coastal wetlands throughout most of California. Breeds in mountainous habitats near reservoirs, lakes and rivers, mainly in the northern two-thirds of the State, in the Central Coast Range, and on Santa Catalina Island. Nests generally built in the upper canopy of large trees.	No suitable habitat present, but species could fly over the project site. The closest CNDDB occurrence is approximately 3.2 miles from the project site.
American peregrine falcon *Falco peregrinus anatum*	Delisted/ Delisted/ CFP	Forages in open country, mountains, and seacoasts. Nests on high cliffs, bridges, and buildings.	No suitable nesting habitat present, but grasslands provide suitable foraging habitat.
Loggerhead shrike *Lanius ludovicianus*	–/CSC	Found in grasslands and open shrub or woodland communities. Nests in dense shrubs or trees and forages in scrub, open woodlands, grasslands, and croplands. Frequently uses fences, posts, and utility lines as hunting perches.	Suitable nesting and foraging habitat present, but species is rare in the project vicinity (eBird 2023). No CNDDB occurrences recorded within 5 miles of the project site.
Vaux's swift *Chaetura vauxi*	–/CSC	Grasslands and agricultural fields; nests in dense vegetation in large hollow trees near open water; forages in most habitats but prefers rivers and lakes.	Suitable nesting and foraging habitat present. Species observed at the project site (eBird 2023). Species not tracked in the CNDDB.

Table A: Special-Status Species Evaluated for the Project

Species	Status (Federal/ State/CRPR)	Habitat	Potential for Occurrence
Olive-sided flycatcher *Contopus cooperi*	–/CSC	Coniferous forests with open canopies.	Suitable nesting and foraging habitat present. Species observed at the project site (eBird 2023). Species not tracked in the CNDDB.
Purple martin *Progne subis*	–/CSC	Occurs in woodlands; nests in tree snags and abandoned woodpecker cavities and human-made structures.	Suitable nesting habitat present, but species is rare in the County (Glover 2009). No CNDDB occurrences within 5 miles of the project site.
Grasshopper sparrow *Ammodramus savannarum*	–/CSC	Occurs in grasslands with coyote brush and other shrubs.	Suitable nesting and foraging habitat present. Species not tracked in the CNDDB.
Tricolored blackbird *Agelaius tricolor*	–/CT, CSC	Nests in dense vegetation near open water, forages in grasslands and agricultural fields.	No suitable nesting habitat present, but site provides suitable foraging habitat. No CNDDB occurrences within 5 miles of the project site.
Yellow warbler *Dendroica petechia*	–/CSC	Nests in extensive willow riparian woodlands.	Suitable nesting and foraging habitat present, but species is a rare breeder in the County (Glover 2009). May forage on the site during migration. Species observed during migration at the project site (eBird 2023). No CNDDB occurrences within 5 miles.
Mammals			
Townsend's big-eared bat *Corynorhinus townsendii*	–/CSC	Found in wooded areas with caves or old buildings for roost sites.	No suitable roosting, hibernating habitat present, but could forage over the project site. The closest CNDDB occurrence is from Strawberry Canyon approximately 3.4 miles from the project site.
Pallid bat *Antrozous pallidus*	–/CSC	Occupies a wide variety of habitats at low elevations. Most commonly found in open, dry habitats with rocky areas for roosting.	Suitable roosting, hibernating, or foraging habitat present. The closest CNDDB occurrence is a 1943 record from an unknown location in El Cerrito.
Western red bat *Lasiurus blossevillii*	–/CSC	Often roosts and forages on or near riparian habitat. Roosts primarily in trees, 2-40 feet above ground, from sea level up through mixed conifer forests. Prefers habitat edges and mosaics with trees that are protected from above and open below with open areas for foraging.	Suitable roosting habitat present in trees and foraging habitat present. Species does not breed in the project area. No CNDDB occurrences recorded within 5 miles of the project site. Species observed near Jewell Lake in Tilden Regional Park in Berkeley (LSA pers. obs.).

Table A: Special-Status Species Evaluated for the Project

Species	Status (Federal/ State/CRPR)	Habitat	Potential for Occurrence
Big free-tailed bat *Nyctinomops macrotis*	–/CSC	Typically in deserts and arid grasslands where rocky outcrops, canyons, or cliffs occur for roosting. Occasionally roosts in buildings, caves, and tree cavities.	No suitable habitat present. The closest CNDDB occurrence is a 1916 record from an unknown location in Berkeley estimated at approximately 2.4 miles from the project site.
San Francisco dusky-footed woodrat *Neotoma fuscipes annectens*	–/CSC	Primarily along riparian areas within chaparral and woodlands. Feeds mainly on woody plants but also eats acorns, grasses, and fungi. Builds conspicuous stick houses in trees and on the ground.	Suitable habitat and species present within the riparian woodland, scrub, and trees on and adjacent to the site. Woodrat houses observed during the field surveys. The closest CNDDB occurrence is approximately 4.2 miles from the project site.
American badger *Taxidea taxus*	–/CSC	Grassland, scrub, and woodland with loose-textured soils.	Suitable grassland habitat present, but site's proximity to residential development and isolation from large open space area likely preclude this species. No CNDDB occurrences within 5 miles.

Source: LSA 2023 (CDFW 2023, eBird 2023, Glover 2009, Xerces et al. 2023)
Status Codes:
FT = Federal threatened.
FC = Federal candidate.
CE = California endangered.
CT = California threatened.
CFP = California fully protected.
CSC = California Species of Special Concern.
List 1B = California Rare Plant Rank (CRPR) List 1B: plant considered rare, threatened, or endangered in California and elsewhere.
– = No status
[a] Nearest records are based on CNDDB (CDFW 2023) occurrences unless otherwise noted.

Special-Status Wildlife

Special-status animal species that are known to occur in the vicinity of the project site and for which suitable habitat is present include the following:

- Monarch butterfly (*Danaus plexippus*; Federal Candidate)
- Crotch bumble bee (*Bombus crotchii*; State Candidate Endangered)
- Western bumble bee (*Bombus occidentalis*; State Candidate Endangered)
- Alameda whipsnake (*Masticophis lateralis*; Federal and State Threatened)
- California red-legged frog (*Rana draytonii*; Federal Threatened, California Species of Special Concern)
- Northwestern pond turtle (*Emys marmorata*; Federal Candidate, California Species of Special Concern)
- American white pelican (*Pelecanus erythrorhynchos*; California Species of Special Concern)
- Burrowing owl (*Athene cunicularia*; California Species of Special Concern)
- Long-eared owl (*Asio otus*; California Species of Special Concern)
- Short-eared owl (*Asio flammeus*; California Species of Special Concern)
- White-tailed kite (*Elanus leucurus*; California Fully Protected)
- Northern harrier (*Circus hudsonius*; California Species of Special Concern)
- Golden eagle (*Aquila chrysaetos*; California Fully Protected)
- Bald eagle (*Haliaeetus leucocephalus*; State Endangered, California Fully Protected)
- American peregrine falcon (*Falco peregrinus anatum*; California Fully Protected)
- Loggerhead shrike (*Lanius ludovicianus*; California Species of Special Concern)
- Vaux's swift (*Chaetura vauxi*; California Species of Special Concern)
- Olive-sided flycatcher (*Contopus cooperi*; California Species of Special Concern)
- Purple martin (*Progne subis*; California Species of Special Concern)
- Grasshopper sparrow (*Ammodramus savannarum*; California Species of Special Concern)

- Tricolored blackbird (*Agelaius tricolor*; State Threatened, California Species of Special Concern)
- Yellow warbler (*Dendroica petechia*; California Species of Special Concern)
- Townsend's western big-eared bat (*Corynorhinus townsendii*; California Species of Special Concern)
- Pallid bat (*Antrozous pallidus*; California Species of Special Concern)
- Western red bat (*Lasiurus frantzii*; California Species of Special Concern)
- San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*; California Species of Special Concern)
- American badger (*Taxidea taxus*; California Species of Special Concern)

Monarch Butterfly

The monarch butterfly is a federal candidate listed species that could breed within the project site. Monarch butterflies breed from June to September and require their obligate larval host plant, milkweed (*Asclepias* spp.), for laying eggs, larval development, and metamorphosis. This species utilizes other flowering species for nectaring during the breeding season. Although no milkweed was observed during LSA's reconnaissance-level field surveys and milkweed is not listed in the Friends of Five Creeks (2014) plant list, milkweed has been recorded at the HNA by the Western Monarch Milkweed Tracker (Xerces et al. 2023). Therefore, monarch butterflies could breed. Individual monarch butterflies were observed flying through the project site during the October 3, 2023, field survey.

Trees do provide suitable overwintering roosting habitat for monarch butterflies. The project site is situated approximately 1.5 miles from the San Francisco Bay shoreline, which falls within the distance in which monarchs overwintering roosts are known to occur (Xerces et al. 2023). According to a monarch study completed for the project site in 1993 by Entomological Consulting Services, Ltd. (ECHNA 1993), the project site may be situated at too high an elevation to allow monarchs to use the project site as an overwintering roost site. No CNDDB occurrences for monarch butterfly have been recorded at the project site, while the closest CNDDB occurrence for an overwinter roost is in Richmond, approximately 1.2 miles from the site. The project site is not listed as a location for Xerces Society's Thanksgiving Count for monarch butterflies (Xerces Society Western Monarch Count 2022).

Crotch and Western Bumble Bee

The crotch and western bumble bees are Candidate State Endangered listed species. These species are known to occur in grassland and scrub habitat where suitable native nectar plants are present. These species historically occurred in the region but are now considered rare. Due to the presence of suitable flowering plant species, these species, although unlikely due to their rarity, could be present.

California Red-Legged Frog

The California red-legged frog is not expected to occur on site due the lack of suitable aquatic habitat on or adjacent to the project site (the streams/drainages on-site carry minimal water flow and are isolated from other aquatic habitat, such as ponds and lakes). This species has not been recorded at the project site, but it does occur at Jewell Lake, approximately 1.5 miles from the site (CDFW 2023).

Alameda Whipsnake

Alameda whipsnake is a federally and State listed threatened species that occurs in chaparral and rock outcrops and adjacent habitats, such as riparian woodland, oak woodland, and grasslands. Although very little high-quality chaparral habitat is present, the project site provides suitable habitat for this species. Beeman and Associates (1993) conducted focused habitat field surveys for Alameda whipsnake at the project site in 1993 and determined that the site provides suitable habitat for this species. No CNDDB occurrences have been recorded at the project site. The closest non-historic CNDDB occurrence was recorded near the San Pablo Dam, approximately 2.7 miles from the project site. The likelihood that Alameda whipsnake occurs at the project site is low.

Northwestern Pond Turtle

The northwestern pond turtle is not expected to occur on site due the lack of suitable aquatic habitat on or adjacent to the project site (the streams/drainages on site carry minimal water flow and are isolated from other natural aquatic habitat). The stream channels that convey larger amounts of water could support northwestern pond turtles; therefore, this species could be present during periods of high flows.

Special-Status Birds and Other Nesting Bird Species

Several special-status bird species are known to occur at or near the project site (Table A; see list above). These bird species could nest, winter, and/or migrate through the project site. Some of these bird species, such as the American peregrine falcon, could forage on the project site, but are unlikely to nest at or adjacent to the site due to the lack of suitable nesting habitat. Special-status birds observed at the project site include white-tailed kite, olive-sided flycatcher, and Vaux's swift, among others (eBird 2023). Several other special-status birds have been recorded in the project vicinity (CDFW 2023, eBird 2023). Active nests of special-status and other native bird species are protected by the Migratory Bird Treaty Act and/or California Fish and Game Code.

Special-Status Bats and Other Bat Species

Several bat species, including special-status bat species, could roost and/or forage at the project site. All roosts of native bats, regardless of their status, are protected by California Fish and Game Code. Townsend's western big-eared bat (California Species of Special Concern) may briefly forage over the project site but would not roost on the project site due to the lack of suitable roosting habitat. Suitable habitat for pallid bat and western red bat, both of which are California Species of Special Concern) and other bat species could roost in the on-site trees. Pallid bats will roost in tree cavities and in structures, while western red bats roost in trees. Western red bats typically roost in riparian habitats but could roost in any of the larger on-site trees. This species does not breed in the

area but does occur in the spring and fall during migration. The western red bat has been observed approximately 1.5 miles from the project site near Jewell Lake (LSA pers. obs.).

San Francisco Dusky-Footed Woodrat

The San Francisco dusky-footed woodrat is a California Species of Special Concern. This species occurs in riparian woodland, woodland/forests, and scrub habitat and has been observed at the project site. LSA observed woodrat houses in the northern portion of the site, but this species could occur throughout the project site where suitable habitat is present.

American Badger

Grasslands present on the site may be suitable for the American badger, but this species is not likely to occur due to the project site's proximity to urban development and isolation from larger open grassland habitat. In addition, the soil characteristics of the rock outcrop-Xerorthents limit burrowing activities in the majority of the project area.

STREAMS/DRAINAGES

Several stream/drainage channels are present on the project site (Figure 3). Some of these drainages occur within concrete v-ditches. These streams/drainages are likely to be considered jurisdictional features by the USACE and RWQCB and subject to regulation under Section 404 and 401 of the Clean Water Act and/or the California Porter Cologne Act.

No other potential waters of the United States/State, such as seasonal wetlands or seeps, were observed during the reconnaissance-level field survey, but the survey was conducted during the dry season when wetlands and seeps are less identifiable. Therefore, additional jurisdictional features, such as wetlands and seeps, could be present at the project site.

RIPARIAN HABITAT AND SENSITIVE PLANT COMMUNITIES

Riparian Woodland

As described above, riparian woodland vegetation is present along the stream and drainage channels. The on-site riparian habitat contains both native and non-native trees and shrubs, including willows (*Salix* spp.), acacias (*Acacia* spp.), coast live oak, alder, and cottonwood. Riparian woodland is considered a sensitive plant community under CEQA.

Native Grasslands

As discussed above, scattered patches of native grasslands are present within the non-native grassland habitat. Species observed during LSA's 2023 reconnaissance-level field survey include purple needlegrass, but several native grasses have been identified at the project site (Friends of Five Creeks 2014, LSA 1987). Most native grasslands are considered sensitive natural communities under CEQA.

WILDLIFE MOVEMENT CORRIDORS

The project site provides a movement corridor for several wildlife species. The stream and riparian channels provide movement habitat for aquatic species during the wet season. Numerous species of birds, amphibians, reptiles, insects, and mammals also move through the project site. Wildlife movement within the streams, drainages, riparian, woodland, and grassland habitat will not be permanently impacted by the proposed fuel management activities. Wildlife that currently inhabit the project site are expected to continue to move through the site after the fuel reduction activities have been implemented.

WILDLIFE NURSERY SITES

The project site is not known to support important wildlife nursery sites, such as heron rookeries, but several species of birds and bats could breed at the project site. The recommended mitigation measures for nesting birds, roosting bats, and other wildlife species would protect wildlife nursery sites, if present.

HABITAT CONSERVATION PLANS

The project site is not situated within the limits of any adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan.

RECOMMENDED MITIGATION MEASURES

Based on the field investigation, literature review, and database search, LSA makes the following recommendations.

GENERAL AVOIDANCE AND MINIMIZATION MEASURES

The following general avoidance measures shall be implemented to avoid potential direct and indirect impacts to special-status wildlife species during all fuel reduction treatment activities:

- Biological surveys appropriate to special-status wildlife species potentially present shall be conducted by the qualified biologist within 5 to 7 days prior to initiation of fuel reduction treatments. All special-status wildlife species observed during surveys shall be reported to the CNDDB.

- Before any fuel reduction treatments activities begin on the project, the qualified biologist shall conduct a training session for fuel reduction workers and other personnel present during vegetation treatment activities. The training shall include a description of each special-status species that might occur and its respective habitat, as well as the general measures that are being implemented to protect each of the species as they relate to the project, and the physical boundaries within the project shall be accomplished. The training shall also provide instruction in the appropriate protocol to follow in the event that a special-status species is found on site, including contact telephone numbers.

- A qualified biologist or biological monitor shall be present to observe fuel reduction treatment activities and shall have the authority to halt work as necessary if special-status species are in harm's way or permit conditions or mitigation measures are being violated. If special-status wildlife species are found within or near fuel reduction treatment areas, all fuel reduction activities shall cease in the vicinity of the animal until the animal moves on its own outside of the project area (if possible). The wildlife resource agency(ies) with jurisdiction over the species shall be contacted if permits issued for the project do not address relocation of the species regarding any additional avoidance, minimization, or mitigation measures that may be necessary if the animal does not move on its own. The daily monitoring report prepared by the qualified biologist shall document the activities of the animal within the site; exclusion fence construction, modification, and repair efforts; and movements of the animal once again outside of the treatment area. This report shall be submitted to the City and the appropriate regulatory agency with jurisdiction over the wildlife species.

- Before starting ground-disturbing activities within fuel reduction treatment areas, the City and its contractors shall clearly delineate the boundaries of the fuel reduction treatment area with fencing, stakes, or flags. Contractors shall be required to restrict fuel reduction treatment-related activities to within the fenced, staked, or flagged areas. Contractors shall maintain fencing, stakes, and flags until the completion of fuel reduction activities in that area. Fencing stakes and flags shall be removed upon completion of work. Sensitive habitat areas, including

special-status wildlife species habitat, known plant populations, and jurisdictional wetlands, shall be clearly indicated on the fuel reduction treatment plans.

- Vehicles shall pass and turn around only within the delineated work area boundary or existing local road network. Where new access is required outside of existing roads or the work area, the route shall be clearly marked (i.e., flagged and/or staked) prior to being used, subject to review and approval of the qualified biologist.

- Where wildlife exclusion fencing is not installed and ground-disturbing activity (e.g., road or trail construction) is occurring, the qualified biologist shall approve the proposed disturbance in advance and clear the area prior to the start of ground disturbance activity.

- The introduction of exotic plant species shall be avoided first through prevention, followed by physical methods. All equipment shall arrive at the project area free of soil, seed, and vegetative debris to reduce the likelihood of introducing new weed species. Mechanical seeding equipment shall be inspected for residual seeds and cleaned prior to use on site. Equipment operators shall ensure that clothing, footwear, and equipment used during vegetation treatment and road construction are free of soil, seeds, vegetative matter, or other debris or seed-bearing material before entering the project site or from an area with known infestations of invasive plants and noxious weeds. Weed populations introduced into the site during treatment or construction shall be eliminated by mechanical means approved by the qualified biologist.

- Vehicles and equipment shall be in proper working condition to ensure that there is no potential for fugitive emissions of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials. Contractor equipment shall be checked for leaks daily prior to operation and repaired when leaks are detected. Fuel containers shall be stored within appropriately sized secondary containment barriers. The qualified biologist shall be immediately informed of any hazardous spills and not more than 24 hours of the incident occurrence. Hazardous spills shall be immediately cleaned up and the contaminated soil shall be properly disposed of at an appropriate facility. If vehicle or equipment maintenance is necessary, it may be performed in the designated staging areas, as shown on the treatment or construction plans or approved by the qualified biologist.

- Temporarily disturbed areas shall be returned to pre-project conditions or better.

- Herbicide will only be administered by Qualified Applicator Certificate holders (minimum qualification) from the California Department of Pesticide Regulation using best practices including from the United States Environmental Protection Agency (EPA) (2018b). Applicators must be trained by a biologist to recognize milkweed, monarch butterflies, and special-status bumble bees and their habitat.

- No herbicide application will take place within 125 ft of active monarch or bumble bee breeding sites (eggs, larvae, or active adult nectaring sites) when these insects are present (adults or larvae) based on Natural Resources Conservation Service and Monarch Joint Venture guidance (2022a). If herbicide application must occur within 125 ft of occupied monarch or bumble bee breeding and nectaring habitat, then application will only be conducted using targeted spraying,

cut stump, and wiping by a trained and licensed applicator and will be no closer than 2 ft to milkweed and other important nectar sources.

- Herbicide application by qualified applicators is only allowed to occur when the Qualified Applicator Certificate holder determines it is appropriate forecasted weather (e.g., no heavy winds above 15 miles per hour [mph] or any precipitation) and that the herbicide activities will not damage soil and/or vegetative cover. No herbicide application will be permitted 12 hours before or after a storm.

Special-Status Plants

If fuel reduction treatments are proposed within the native grasslands, riparian woodland, drainage channels, or less disturbed portions of the oak woodland and scrub habitat (such as areas where French broom is not present), focused plant surveys for special-status plants should be conducted according to CDFW's Protocols for *Surveying and Evaluating Impacts to Special Status Plant Populations and Natural Communities* (CDFW 2018).

Nesting Birds

The following general avoidance measures shall be implemented to avoid potential direct and indirect impacts to nesting birds during all fuel reduction treatment activities:

- Prior to fuel reduction treatment activities occurring during the nesting bird season (February 1 through August 31), a preactivity activity surveys for nesting birds shall be conducted by a qualified biologist to ensure that no nests will be disturbed during project implementation. Surveys will be conducted no more than 7 days prior to the initiation of fuel reduction treatment activities. During this survey, the biologist shall inspect all trees and other potential nesting habitats (e.g., shrubs, ground and structures) in the impact area plus a surrounding 300 ft buffer for nests. If removal of potential nesting substrate or project grading will occur during more than one nesting season, or in different parts of the site in phases over the course of a single season, then additional pre-activity surveys must be performed within 7 days prior to initiation of work in any particular area. If the preactivity activity survey does not identify the presence of any active nests on or within 300 ft of the site, construction or vegetation treatment activities may proceed.

- If nests known to have eggs or young, or that cannot be confirmed to be inactive or to lack eggs or young, are found, or adults are demonstrating nesting behavior, a qualified biologist shall establish an appropriate fuel reduction-free buffer around each nest. Generally, buffers of 300 ft for raptors and 100 ft for songbirds are adequate to avoid causing nest abandonment. The buffer shall remain in place until the qualified biologist has confirmed that the nest is no longer active.

- If less than a 100 ft nest buffer is necessary and determined to be appropriate for a particular nest or nests, a qualified biologist shall monitor the nest(s) before the activity to document baseline nesting behavior and monitor the nest during vegetation treatment or road construction to ensure nesting birds are not exhibiting signs of stress and territorial behavior. If signs of stress are observed during the monitoring, treatment or construction activities shall cease or the buffer shall increase, as determined by a qualified biologist, to a sufficient distance where the nesting birds are longer exhibiting signs of stress.

- To prevent encroachment, the buffer shall be clearly marked for avoidance. The established buffer shall remain in effect until the young have fledged or the nest is no longer active as confirmed by the biologist.

Roosting Bats

The following general avoidance measures shall be implemented to avoid potential direct and indirect impacts to bat species during all fuel reduction treatment activities:

- Prior to any tree removal during the maternity roosting period (April 15 through August 31) or hibernation period (October 15 through February 28), a focused tree habitat assessment shall be conducted by a qualified biologist of all trees that will be removed or impacted by vegetation treatment activities. Trees containing suitable potential bat roost habitat features would then be clearly marked. The habitat assessments should be conducted enough in advance to allow preparation of a report with specific recommendations, and to ensure tree removal can be scheduled during seasonal periods of bat activity if required. If it is determined that day-roosting bats are unlikely to occur, the tree may be removed as described below. If the absence of roosting bats cannot be confirmed, then the removal of trees providing suitable maternity or hibernation roosting habitat should only be conducted during seasonal periods of bat activity, including:
    - Between March 1 and April 15; or
    - Between September 1 and October 15.

- Appropriate methods will be used to minimize the potential of harm to bats during tree removal. Such methods may include but are not limited to using a two-step tree removal process. This method is conducted over 2 consecutive days and works by creating noise and vibration by cutting nonhabitat branches and limbs from habitat trees using chainsaws only (no other heavy machinery) on Day 1. The noise and vibration disturbance, together with the visible alteration of the tree, is highly effective in causing bats that emerge nightly to feed to not return to the roost that night. The remainder of the tree is removed on Day 2. A biologist qualified in two-step tree removal is required on Day 1 to supervise and instruct the tree-cutters who will be on the site conducting the work, but only for a sufficient length of time to train all tree cutters who will conduct two-step removal of habitat trees. The biologist is generally not required on Day 2, unless a very large cavity is present and a large colony is suspected. Fallen branches and trees should be left on site overnight to allow any bats that may be present to fly away during the nighttime hours.

- Removal of native oaks and riparian trees will be avoided where possible.

San Francisco Dusky-Footed Woodrat

- A qualified biologist shall conduct a pre-activity survey for San Francisco dusky-footed woodrat nests prior to the start of project activities. Surveys will be conducted in the immediate work area and a 25 ft buffer around those areas. If woodrat nests are present, the nests will be flagged in the field and delineated on project site maps in order to avoid potential impacts to woodrat nests during vegetation treatment activities. For any woodrat nests that cannot be

avoided, a woodrat nest relocation plan shall be prepared and submitted to CDFW for approval. At a minimum, the plan shall include the phased dismantling and relocation of the nest materials to a suitable location, and the installation of artificial shelters at a ratio of 1:1 per dismantled nest to provide readily accessible refugia for dispersing individuals. If breeding woodrats are present, relocation of houses shall be delayed until the breeding season is over or the qualified biologist otherwise determines that young are no longer present.

Monarch Butterfly

The project site is not known to support wintering monarch butterflies; therefore, winter roosts (which are considered sensitive habitat by CDFW) would likely not be impacted by fuel reduction activities. While it is possible that milkweed plants could be used by breeding monarchs, related impacts would be minimal because of the large area of open space maintained relative to project-related habitat alteration, and because winter roosts would not be disturbed. The following avoidance and minimization measures shall be observed:

- Prior to fuel treatment activities, appropriately timed field surveys (generally June through September) shall be conducted by a qualified biologist to identify, map, and estimate (a) stand sizes, densities, and number and species of milkweed (*Asclepias* spp. and others); (b) number and species of adult nectar plants in the entire project site; and (c) record any observations of monarch activity.

- Vegetation control activities may occur between December 1 and March 14 without special restrictions. The following restrictions are applicable from March 15 to November 30 for vegetation control practices (e.g., ground disturbance, tree removal, mowing, grazing, herbicide application, or hand removal) during the monarch breeding season in areas containing milkweed and nectar plants:

    a. During the monarch breeding season from March 15 through November 30, the City and its contractors may conduct vegetation control activities and other management actions provided:

        1) Site specific buffers are established by a qualified biologist around patches of milkweed and associated nectar plants where no vegetation control may occur.

        2) If milkweed and associated nectar plants cannot be avoided, a qualified biologist shall complete pre-activity surveys. If no monarch breeding activity is identified, contractors may proceed with vegetation control activities subject to conditions below. If monarch breeding activity is identified, the milkweed stand shall be avoided until a qualified biologist implements a salvage and relocation plan that has been reviewed and approved by the applicable resource agency.

        3) Unoccupied growing milkweed will be avoided by a minimum of 2 ft during the application of herbicides (target spray, cut stump, wiping and wicking). Herbicide application within 125 ft of a milkweed plant will be conducted with a low-pressure backpack sprayer to reduce the risk of drift.

4) No broad-spectrum herbicide application will take place within 125 ft of occupied monarch habitat when wind speeds exceed 10 mph or temperatures exceed 85 degrees Fahrenheit (°F) to minimize potential for drift and volatilization.

5) No persistent or pre-emergent herbicides will be used within 125 ft of milkweed or other occupied monarch habitats.

6) No prescribed fire treatment will occur within 125 ft of habitat occupied by monarchs during the active monarch season.

7) Mowing will not be conducted within 125 ft of active monarch breeding habitat (adults or larvae) during the breeding season of March 15 through November 30. Mowing projects affecting nectar plants any time of year within 125 ft of active monarch habitat shall only be conducted when temperatures are above 55°F on a sunny day and 60°F on cloudy days to avoid injuring adult monarchs (Monarch Joint Venture 2022b).

8) If mowing occurs from March to June near areas where breeding occurs, mowing height will be set to a minimum of 10–12 inches to avoid cutting newly emerged milkweed plants.

Crotch's and Western Bumble Bees

A minimum of two preactivity surveys shall be conducted within 30 days during appropriate activity periods (i.e., March through September) prior to the start of ground disturbing activities to identify bumble bee activity. The preactivity surveys shall occur when temperatures are above 60°F and not during wet conditions (e.g., foggy, raining, or drizzling). The survey shall be conducted at least 2 hours after sunrise and 3 hours before sunset, and shall occur at least 1 hour after rain subsides. Preferably, the survey should be conducted during sunny days with low wind speeds (less than 8 mph), but surveying during partially cloudy days or overcast conditions is permissible if the surveyors can still see their own shadow.

If western bumble bees, or potential Crotch or western bumble bees (since bumble bees can be difficult to identify in the field), are observed within the project site, a plan to protect Crotch and/or western bumble bee nests and individuals shall be developed and implemented in consultation with CDFW and USFWS. The plan shall include, but not be limited to, the following measures:

- Specifications for fuel treatment timing and sequencing requirements (e.g., avoidance of raking, mowing, tilling, or other ground disturbance until late March to protect overwintering queen bumble bees);

- Establishment of appropriate no-disturbance buffers for bumble bee nest sites to avoid impacts to the bees and monitoring by a qualified biologist to ensure compliance if bumble bee nests are identified;

- Restrictions associated with fuel treatment practices, equipment, or materials that may harm bumble bees (e.g., avoidance of pesticides/herbicides, best management practices to minimize the spread of invasive plant species);

- Provisions to avoid western bumble bees, or potential western bumble bees if observed away from a bumble bee nest during project activity (e.g., ceasing of project activities until the animal has left the active work area on its own volition); and

- Prescription of an appropriate restoration seed mix targeted for the western bumble bee, including native plant species known to be visited by native bumble bee species and containing a mix of flowering plant species with continual floral availability through the entire active season of the western bumble bee (March through September).

Waters of the United States/Waters of the State

Potential impacts to potentially jurisdictional features, such as the on-site streams/drainages (and seasonal wetlands/seeps, if present), are subject to regulation by the USACE, RWQCB, and/or CDFW. These features will be avoided during the fuel reduction activities, where possible. No fill, including plant cuttings, rocks, or soils will be placed in these jurisdictional features without the appropriate permits from the regulatory agencies. If these features are impacted, the City would need to obtain the required permits from the relevant regulatory agencies, including the USACE, CDFW, and RWQCB. These permits would include conditions and BMPs that the City would implement during fuel reduction activities. These permits may also specify mitigation, which the City would provide as specified by the regulatory agencies.

Riparian Vegetation

To minimize disturbance to riparian habitat occurring adjacent to the fuel reduction area, riparian areas shall be clearly delineated by a qualified biologist. Riparian areas shall be separated and protected from the work area through silt fencing, amphibian/reptile-friendly fiber rolls (i.e., no mono-filament), or other appropriate erosion control material. Material staging, and all other project-related activity shall be located as far as possible from riparian areas with no driving or parking of vehicles or equipment within the dripline of a riparian tree.

Native Grasslands and Other Sensitive Natural Communities

If feasible, the proposed fuel treatments shall avoid/minimize impacts to the purple needlegrass grasslands, other native grasslands, and other sensitive natural communities. The stands of native grasslands shall be avoided during fuel treatment activities.

If the native grasslands cannot be avoided, the loss of native grasslands shall be mitigated by restoring an equivalent amount of native grasslands on site. The City shall reseed temporarily disturbed areas of native grassland habitat that are disturbed by fuel reduction activities with an appropriate weed-free native seed mix that contains the particular native grass seed and/or plugs. Any restored native grassland areas shall be monitored and reported on an annual basis, as required by CDFW.

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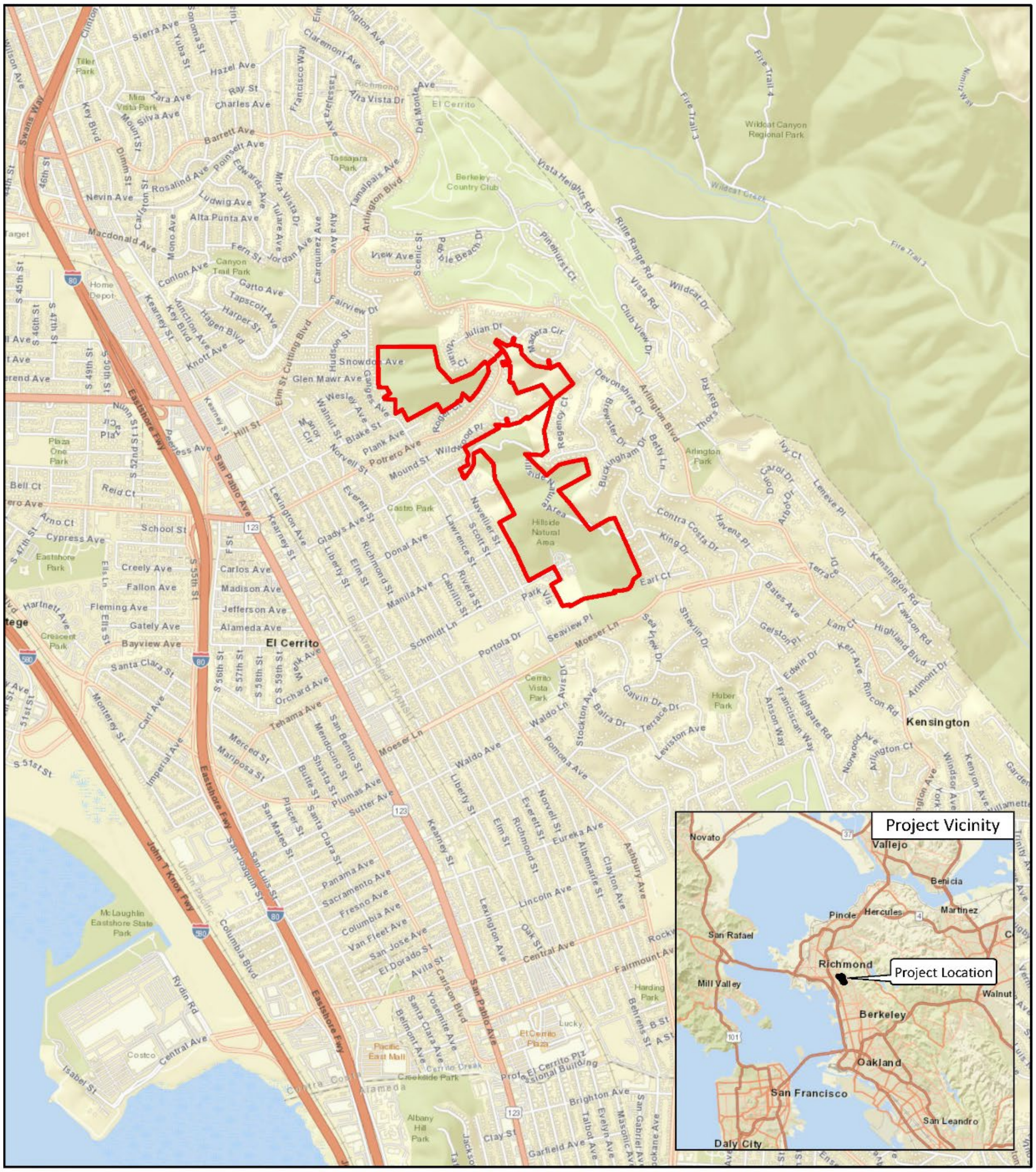
APPENDIX A

FIGURES



LEGEND

Project Site

FIGURE 1

0 1000 2000
FEET

Hillside Natural Area Fire Resilience and Forest Conservation Management Plan El Cerrito, Contra Costa County, California

Regional Location

SOURCE: Contra Costa County (05/2024); Esri (2024).

I:\2023\20231296\GIS\MXD\Bio Report\Figure 1_Hillside Natural Area, El Cerrito.mxd (7/5/2024)

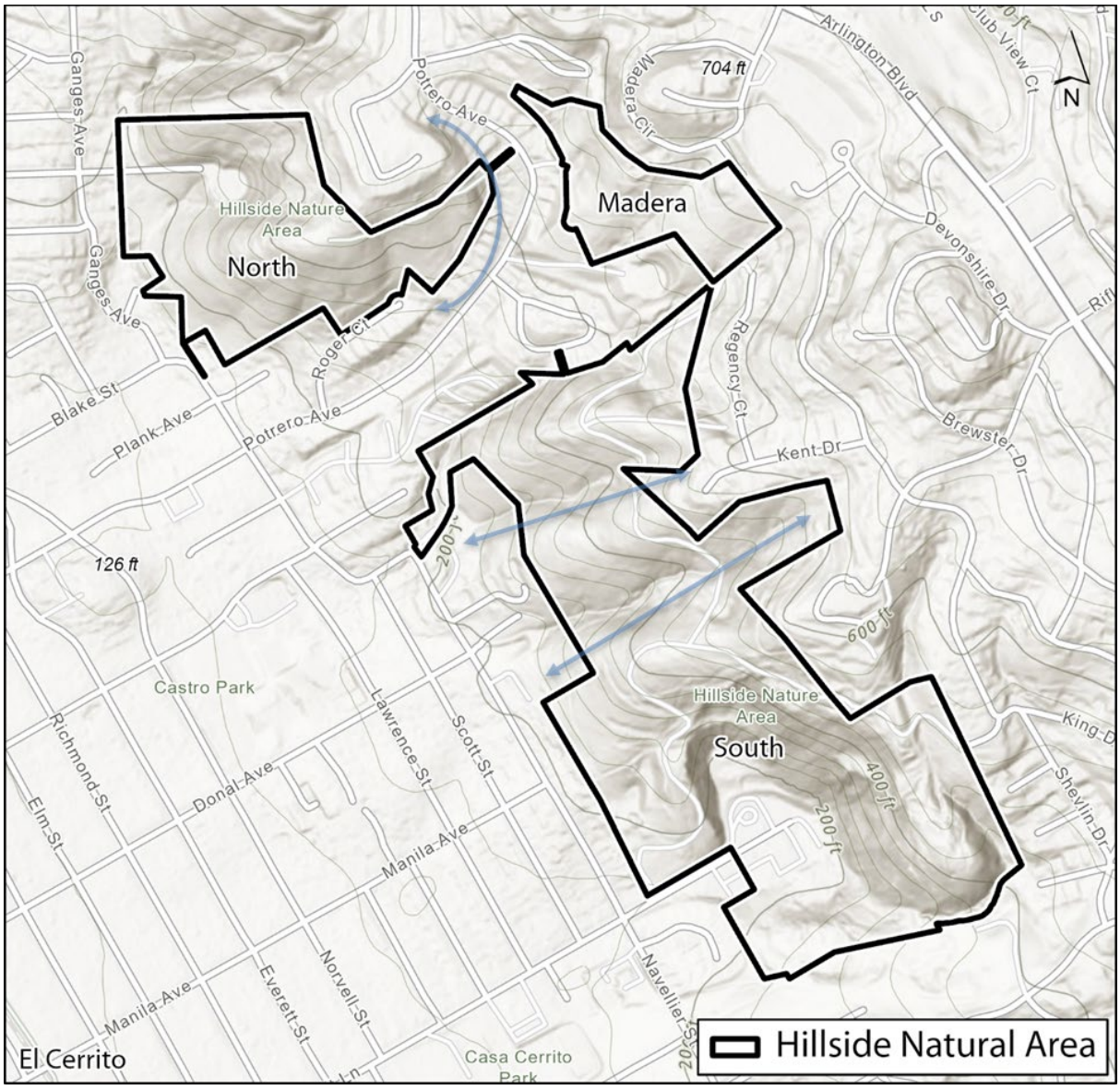


Figure 2: Project Site Topography (blue arrows indicate major drainages).

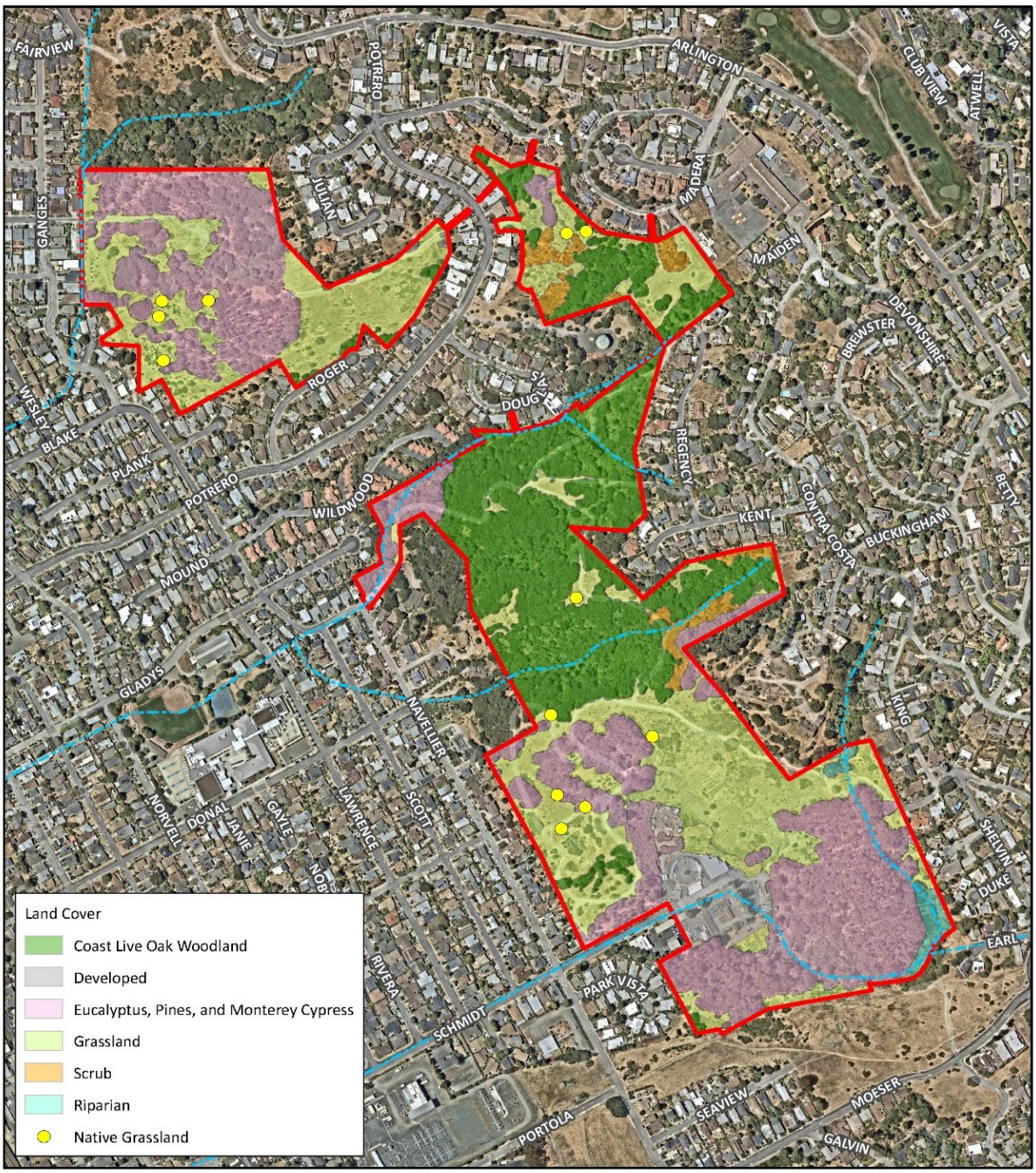


FIGURE 3

Hillside Natural Area Fire Resilience and Forest Conservation Management Plan
El Cerrito, Contra Costa County, California

Land Cover

SOURCE: LSA (2023, 2024); Contra Costa County (05/2024); Nearmap (07/2023).

I:\2023\20231296\GIS\MXD\Bio Report\Figure 6_Land Cover Types.mxd (7/6/2024)

Map Unit	Description
CnE	CUT AND FILL LAND-LOS OSOS COMPLEX, 9 TO 30 PERCENT SLOPES
CoE	CUT AND FILL LAND-MILLSHOLM COMPLEX, 9 TO 30 PERCENT SLOPES
CoF	CUT AND FILL LAND-MILLSHOLM COMPLEX, 30 TO 50 PERCENT SLOPES
GcF	GILROY CLAY LOAM, 30 TO 50 PERCENT SLOPES
Qa	QUARRY
Re	ROCK OUTCROP-XERORTHENTS ASSOCIATION
TaC	TIERRA LOAM, 2 TO 9 PERCENT SLOPES

LSA

LEGEND

Project Site

Soil Map Units

N

0 300 600
FEET

FIGURE 4

Hillside Natural Area Fire Resilience and Forest Conservation Management Plan
El Cerrito, Contra Costa County, California

Soil Types

SOURCE: NRCS (10/2023); Contra Costa County (05/2024); Nearmap (07/2023).

I:\2023\20231296\GIS\MXD\Bio Report\Figure 5_Soils.mxd (7/6/2024)

APPENDIX B

FIRE RISK ASSESSMENT

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DRAFT

FIRE RISK ASSESSMENT

HILLSIDE NATURAL AREA FIRE RESILIENCE AND FOREST CONSERVATION MANAGEMENT PLAN

EL CERRITO, CALIFORNIA

DRAFT

FIRE RISK ASSESSMENT

HILLSIDE NATURAL AREA FIRE RESILIENCE AND FOREST CONSERVATION MANAGEMENT PLAN

EL CERRITO, CALIFORNIA

City of El Cerrito
10890 San Pablo Avenue
El Cerrito, California 94530

Prepared by:

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Project No. 20231296

Funding provided by:

Coastal Conservancy

Project No. 20231296

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Executive Summary

Fire hazards are a special concern in the El Cerrito Hillside Natural Area (HNA), a community-serving park and recreation facility located in the center of El Cerrito, California (Figure 1). The area is located in the interface between wildlands and developed areas where fires may spread from wildlands to homes, possibly damaging structures or creating risk to public health. These wildlands are also subject to increased ignition potential and fire spread from elevated levels of human activities because most fires in the coastal mountains are human-caused.

This evaluation uses fire behavior modeling to assess fire risk in the HNA. It serves as a platform for recommendations to minimize threat to life, safety, and damage from wildfire to homes and natural resources. It is based on a review of the terrain, weather, fuels, and fire history of the area compared to the values at risk and likely scenarios of fire ignition and spread.

Because of the steep slopes and abundant fuel, along with moderately warm temperatures and occasional strong winds, the risk of wildfire in and around the El Cerrito HNA is significant. Long flame lengths and tree torching are expected for most of the area in the HNA; these pose threats to the hillside residences and the community. Fortunately, the moderate fire spread rates expected in the HNA may assist fire containment when fire suppression efforts are not thwarted by long flames. The level of risk (based on flame lengths, rate of fire spread, and values at risk) are among the highest in the East Bay Hills, similar to Oakland and Berkeley.

Fire risk can be reduced by three actions: vegetative fuel management (including removal of highly flammable invasive species) in the HNA and, in residential yards, retrofitting structures to be ignition-resistant and diligence in ignition prevention. The areas of highest priority for vegetative fuel management are those nearest homes (both above and below the HNA) and those locations with greatest flame lengths. Ignition prevention involves the entire community focusing on fire-safe behaviors, along with creation and maintenance of fuels (both vegetative and structural) that are ignition-resistant.

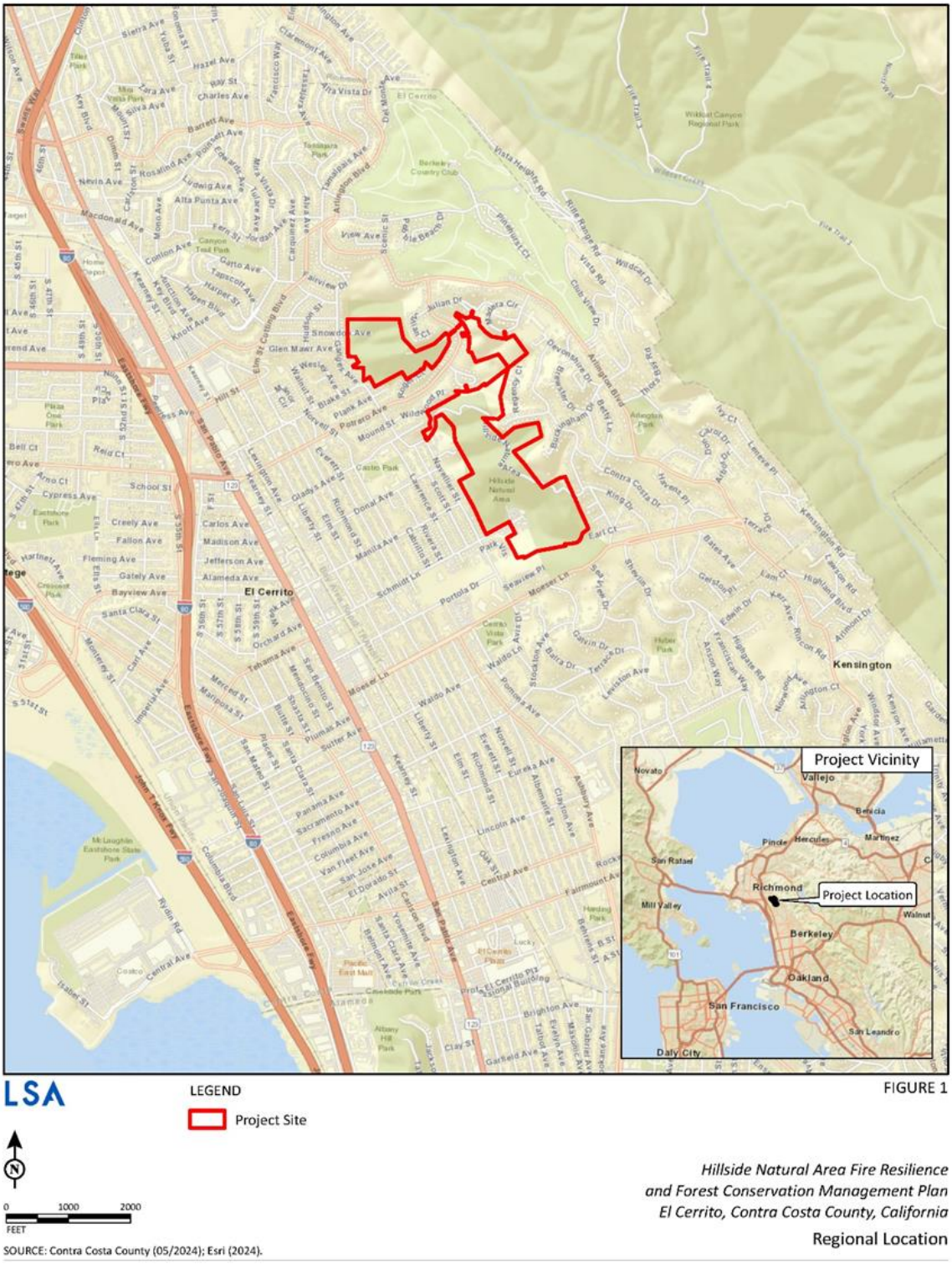

Figure 1: Regional Location

Introduction

Area of Interest

Topography

The HNA has undulating contours, encompassing a broad range of slopes and aspects. There are two drainages in HNA South, running from northeast to southwest. Two very steep slopes (45–90 degrees) exist in the HNA: one is an exposed rock face in HNA South that rises up from the area near the City of El Cerrito (City) Recycling and Environmental Resources Center (Recycling Center) on Schmidt Lane (formerly a quarry), and one is at Motorcycle Hill (HNA North) at the end of Snowdon Avenue.

Topographic features, such as slope and aspect (orientation with respect to sun and wind) and the overall form of the land, have a profound effect on fire behavior. Topography affects a wildfire's intensity, direction, and rate of spread. An area's topography also affects local winds, which are either bent or intensified by topographic features. Topographic features can also induce daily upslope and downslope winds. The speed, regularity, and direction of these winds (and other winds) directly influence the direction of wildfire spread and the shape of the flaming front.

The topography of the site is characterized as west-facing slopes that receive full afternoon sun, when it is the hottest. The slopes are generally steep; a steeper slope will result in a faster-moving fire, with longer flame lengths. Any slope can potentially increase the amount of heat a structure will be subject to during a wildfire. Within the slopes, several drainages run east to west and can funnel heat up and down the hillside during a wildfire, as shown on Figure 2.

Slope

Slope is the degree of incline of a hillside. Fire usually spreads faster uphill than downhill because fuels are more efficiently preheated by uphill spreading of heat and flames. A steeper slope will result in a faster-moving fire, with longer flame lengths. Any slope can potentially increase the amount of heat a structure will be subject to during a wildfire. Throughout the HNA, slopes range from essentially 0 degrees (flat) to over 90 degrees (very steep). The steeper slopes (over 30 degrees) are concentrated in areas along either side of the dominant northeast-to-southwest aligned ridges and canyons found in HNA North and South (Figure 3), with the steepest slopes being found along an exposed rock face that rises up from the area near the Recycling Center on Schmidt Lane (formerly a quarry) in HNA South and rising from the area at the end of Snowdon Avenue in HNA North.

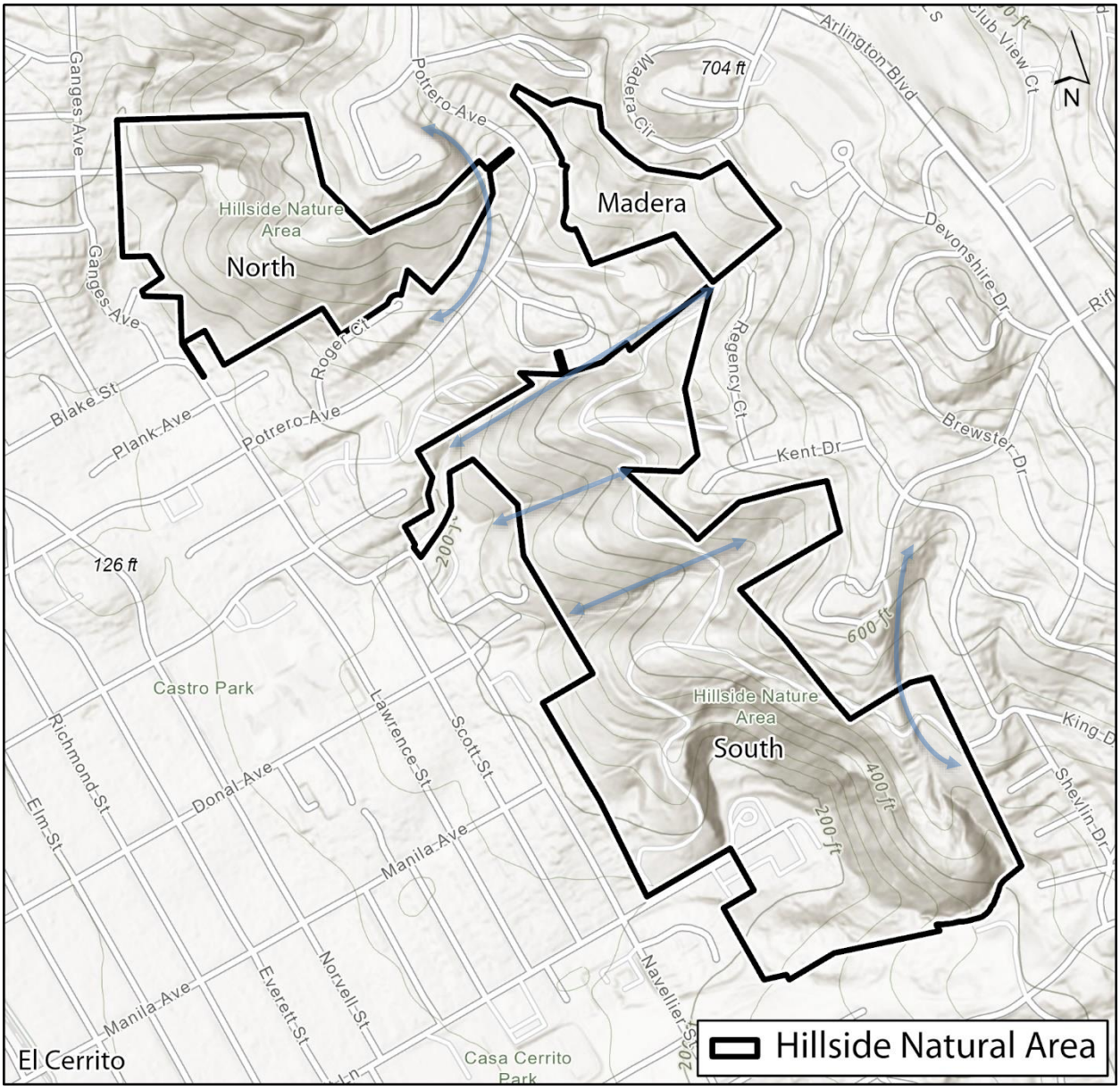

Figure 2: Topographic map. HNA boundary is shown in black, and canyons that may funnel winds shown in blue.

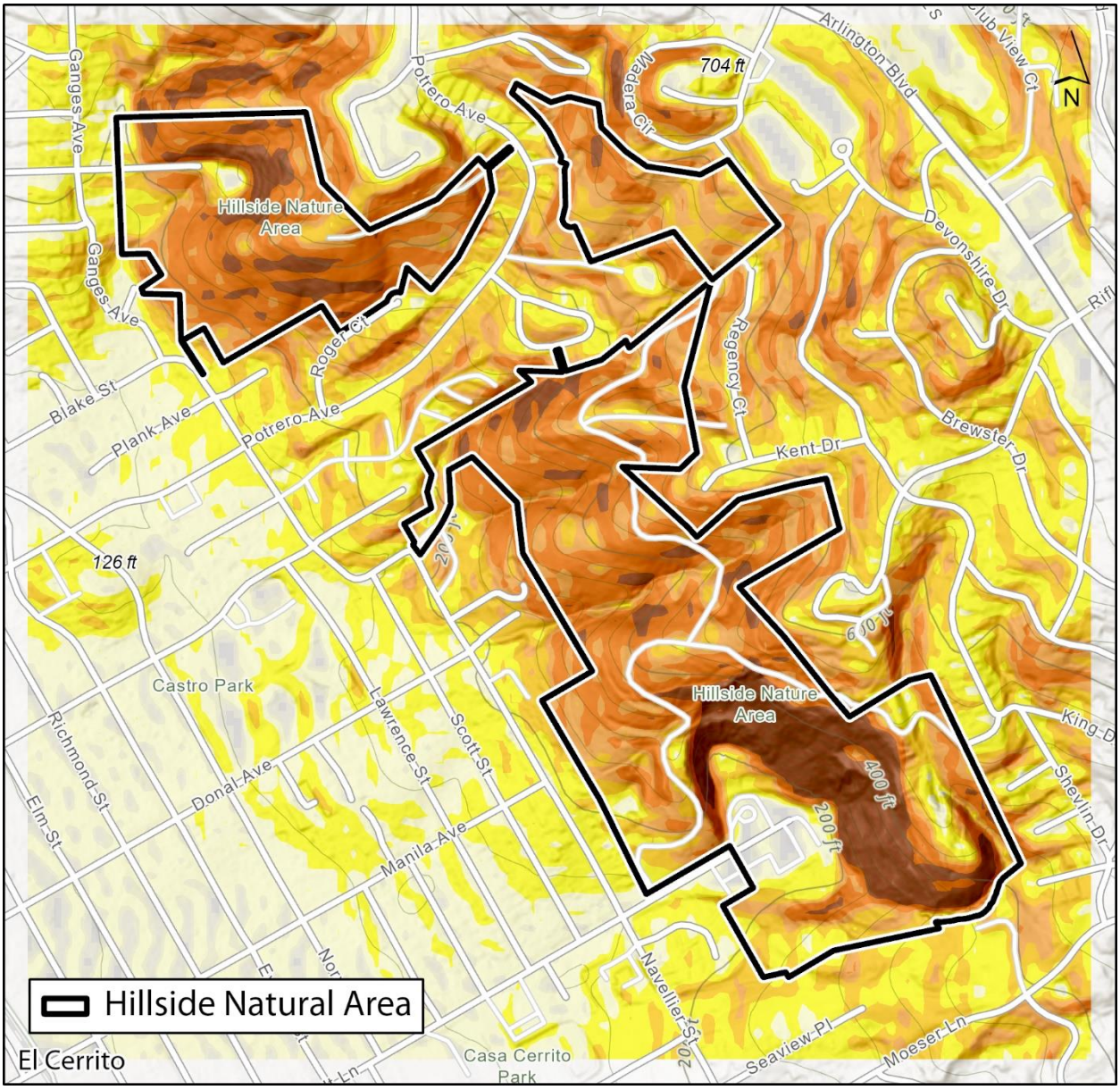

Figure 3: Slope map. HNA boundary is shown in black, and darker shading represents steeper slopes.

Aspect

The aspect toward which a slope faces (i.e., north, south, east, or west) has an effect on fire behavior and intensity. South-facing slopes tend to dry out faster resulting in more frequent opportunities for ignition. South-facing aspects also have hotter, drier fuels, which usually burn with greater heat output. In contrast, north-facing slopes tend to have denser vegetation because more moisture is available. Although north slopes tend to burn less frequently than south slopes, they can burn with more intensity due to the higher fuel volume.

Most of the forest and woodlands in the HNA are on north-facing slopes and in protected canyons (Figure 4).[1] In contrast, grass is found on south-facing slopes.

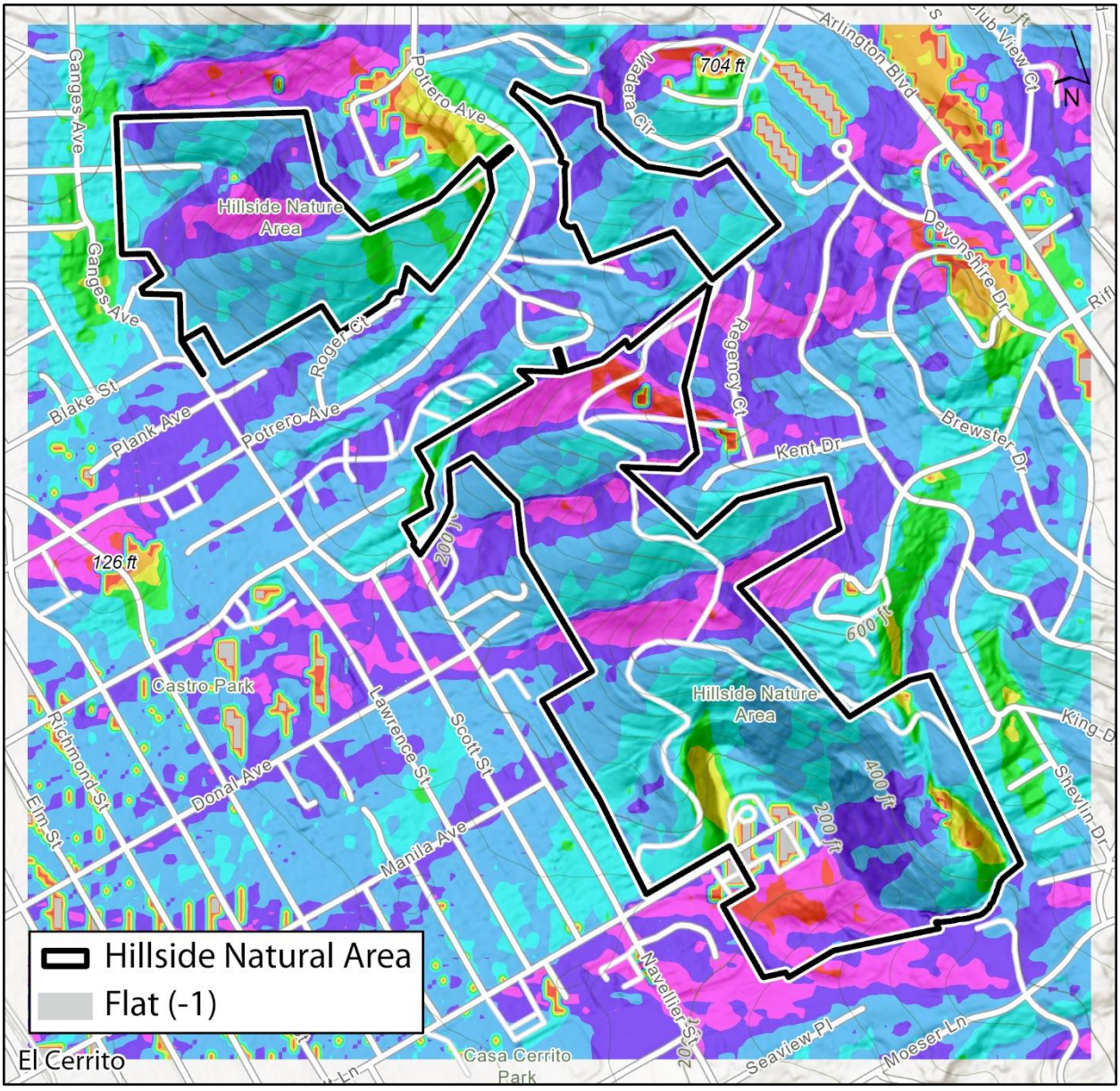

Figure 4: Aspect map. HNA boundary is shown in black; grey areas are flat; and prevailing main aspects are west (blue), south (yellow), north (pink) and east (green).

[1] "Trees of Hillside Natural Area" by El Cerrito Tree Committee (n.d.) – website: https://www.ectrailtrekkers.org/uploads/1/4/2/8/142875193/trees-of-hillside-natural-area.pdf.

Weather

Summer days in El Cerrito are usually warm but comfortable; temperatures normally range from lows in the 40s degrees Fahrenheit (°F) to highs in the 70s°F, with an occasional high reaching 80°F. Humidity can drop to the single digits in the summer and fall.

The HNA area of interest lies in a relatively protected area and would be subject to occasional episodes of still, stagnant air formed by an area of stationary high pressure during summer months. This overall weather pattern, characterized by continuous high temperatures and low relative humidities, enhances the possibilities of ignition, extreme fire behavior, and extreme resistance to fire control.

Weather conditions significantly impact both the potential for ignition and the rate, intensity, and direction in which fires burn. The most important weather factors used to predict fire behavior are wind, temperature, and humidity.

The most important influence on fire behavior is wind. Wind can greatly affect the rate of a fire's spread and the output of a fire. Wind increases the flammability of fuels both by removing moisture through evaporation and by angling the flames so that they preheat the fuels in the fire's path. The direction and velocity of winds can also control the direction and rate of the fire's spread. Winds can carry embers and firebrands downwind that can ignite spot fires ahead of the primary front. Gusty winds cause a fire to burn erratically and make it more difficult to contain. Wind will tend to follow the path of least resistance and is therefore frequently deflected and divided by landforms. Canyon slopes produce pronounced daily up-canyon and down-slope winds caused by differential heating and cooling of air during the day. This occurs region-wide and on a local scale.

Most of the area is characterized by northeast-to-southwest aligned ridges and canyons. These ridges can act as funnels for the dominating westerly winds and could produce strong up-slope and erratic winds, as shown in Figure 2. The winds that create the most severe fire danger typically blow from the north, usually in October. Winds from the east and north bring low humidity and elevated fire danger and can hasten fire spread in the forested and chaparral-covered areas.

Surface Fuels and Vegetation

Fuels are classified into surface fuels and canopy fuels. Surface fuels are those that will carry the fire near the ground, generally below 12 feet in height. Surface fuels can be comprised of grass; foliage of both herbaceous and woody plants; and various sizes of dead twigs, branches and logs. Canopy fuels are those in the tree canopy, comprised of living and dead foliage and branches and bark attached to the tree trunk.

The forest structure metrics were initially derived directly from airborne light detection and ranging (LiDAR) data,[2] hosted by the United States Geological Survey (USGS) 3D Elevation Program. Information from LiDAR enables measurements of canopy characteristics as well as vegetation density and spatial arrangement under the tree canopy. These forest structure patterns were identified from a statewide 3D Elevation Program

The surface fuel models are represented in the database as numbers. These fuel types and their corresponding numbers are:

- Nonburnable (NB) – from 91 to 99
- Grass (GR) – 100s
- Grass-Shrub (GS) – 120s
- Shrub (SH) – 140s
- Timber-Understory (TU) – 160s
- Timber Litter (TL) – 180s
- Slash-Blowdown (SB) – 200s

The names of the fuel types include a reference to “Timber,” which also applies to the woodlands found in the HNA, as shown on Figure 5.

Surface fuels, along with elevation, slope, aspect, and other canopy characteristics, form the basis of the fire behavior predictions in this assessment. The majority of the surface fuels in all three sections of the HNA are classified as Moderate Load Humid Climate Forest-Shrub (shown as light green in Figure 5) and Forest-Grass-Shrub (shown as darker green in Figure 5). There are also smaller patches of Low Load Humid Climate Grass (shown as yellow in Figure 5) scattered throughout all three sections. A swath of High Load Conifer Litter (shown as blue in Figure 5) and Very High Load Broadleaf Litter (shown as dark teal in Figure 5) crossed HNA South in an east-west direction. A small number of barren rock outcrops and developed areas also exist in the HNA. Each vegetation type burns differently based on the amount of biomass available to burn, the distribution of biomass in the vegetation, and the moisture and oil content of the foliage and dead material. The vegetation in the HNA includes forests, woodlands, shrubs, grasslands, and riparian areas. Over half of the area is wooded, with coast live oak being the predominant species. Other trees and shrubs that are common in the area include: eucalyptus, willow, toyon, coyote bush, ceanothus, and coast sagebrush. Pine and redwood trees can be found in the Memorial Grove area.

[2] LiDAR is an acronym of "light detection and ranging" or "laser imaging, detection, and ranging." Laser light is sent from a transmitter and reflected from objects. The reflected light is detected by the system receiver and the time of flight is used to develop a distance map of the objects.

Figure 5: Surface fuels map. HNA boundary is shown in black.

Canopy Fuels

Canopy fuels are not categorized into different models. Instead, they are measured in terms of canopy base height, canopy bulk density, and canopy cover. Each of these measurements influences fire behavior in distinctly different ways, as explained in the following sections. The values and spatial patterns of each are shown in Figures 6–9.

Canopy Height

Canopy height describes the average height of the top of the forest canopy. Canopy height is an influence in the distance embers can be distributed, with taller trees enabling longer ember cast.

The tallest trees are the eucalyptus trees, found west of Wildwood Place and southeast of the Recycling Center. Most of the HNA has a high canopy cover, indicating a dense forest, where tree crowns touch each other and are intermingled.

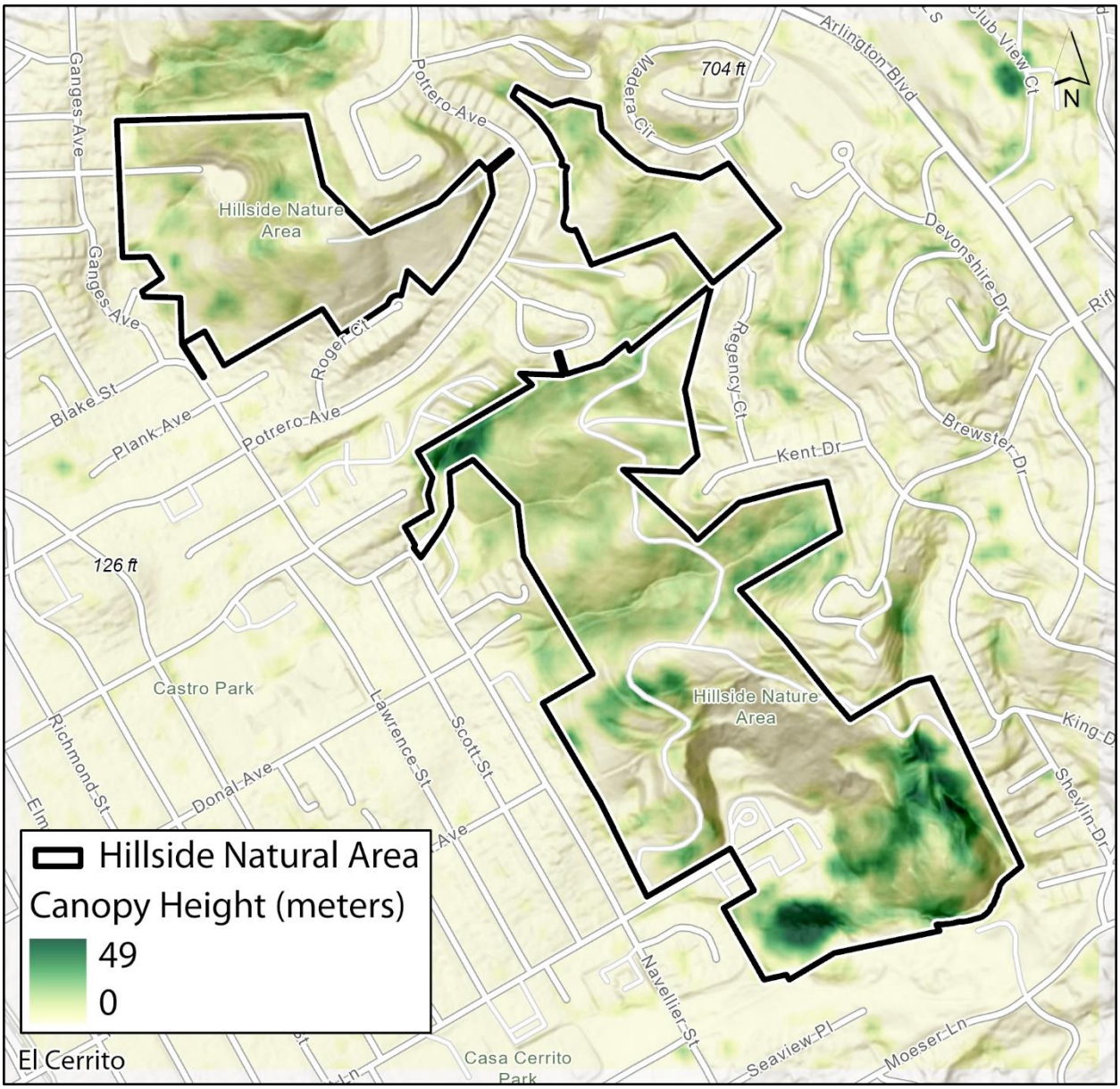

Figure 6: Canopy height map. HNA boundary is shown in black.

Canopy Base Height in the HNA

Canopy base height is the height at which there is enough fuel to spread fire up into the canopy. Usually, it is foliage; however, it could also be tree bark, shrubs, small trees, or an accumulation of dead twigs in the tree canopy. This characteristic indicates the presence of ladder fuels (the volume of vegetation under the tree canopy that leads fire into the canopy).

Because the canopy base height influences the likelihood of torching, it is important to note that it is quite low throughout the HNA, with the exception of the northwest corner of City property, in the drainage south of Wildwood Place, and immediately northwest and southeast of the Recycling Center (Figure 7).

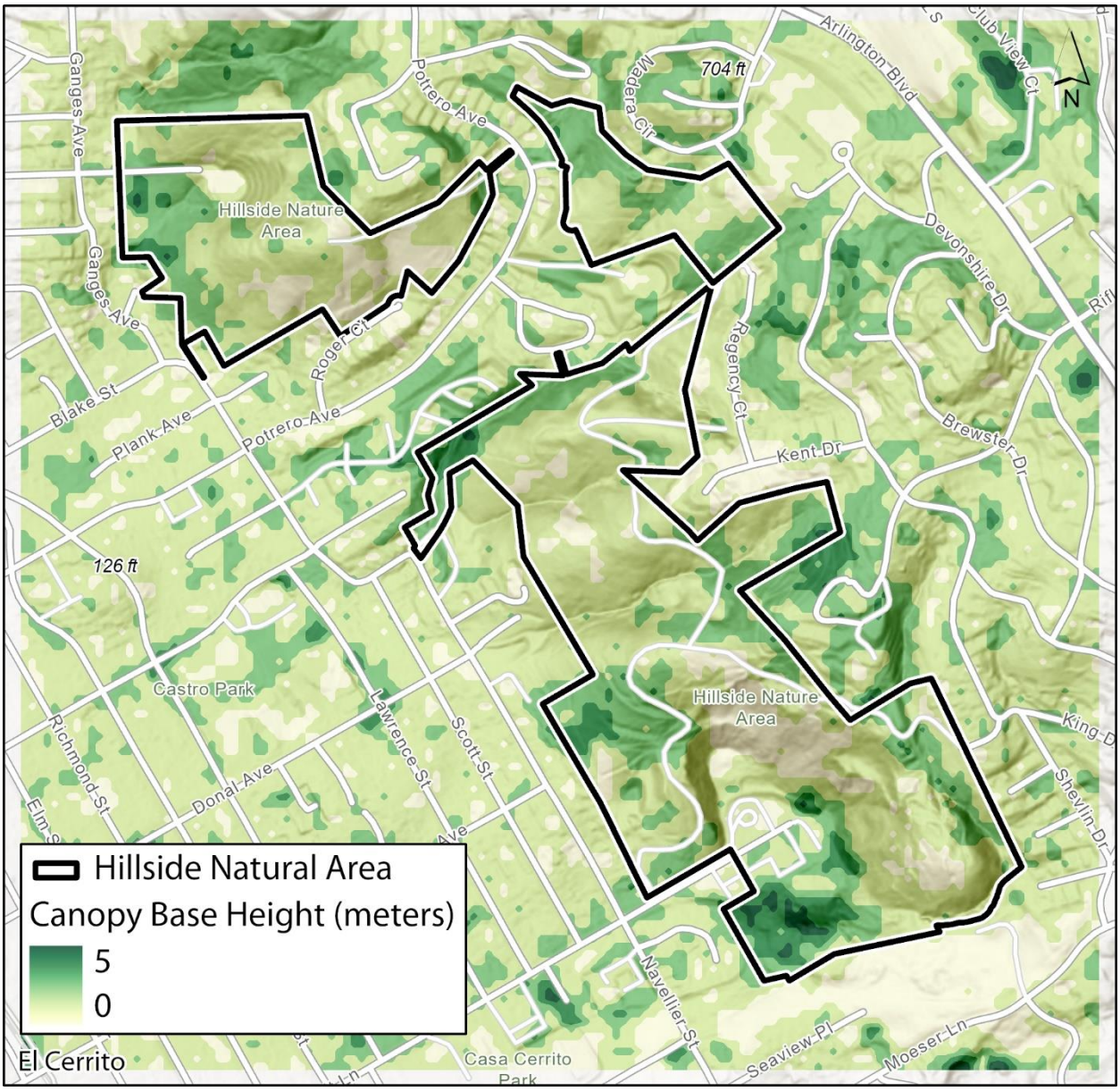

Figure 7: Canopy base height map. HNA boundary is shown in black.

Ladder Fuel Density

Ladder fuel density (Figure 8) describes how dense the understory vegetation is. The understory may be comprised of lower branches or shrubs. Both provide a fire's path to the tree canopy. A majority of the forested areas at the HNA have a high ladder fuel index, in both native hardwood and eucalyptus stands; locations without trees have very low values for ladder fuel density.

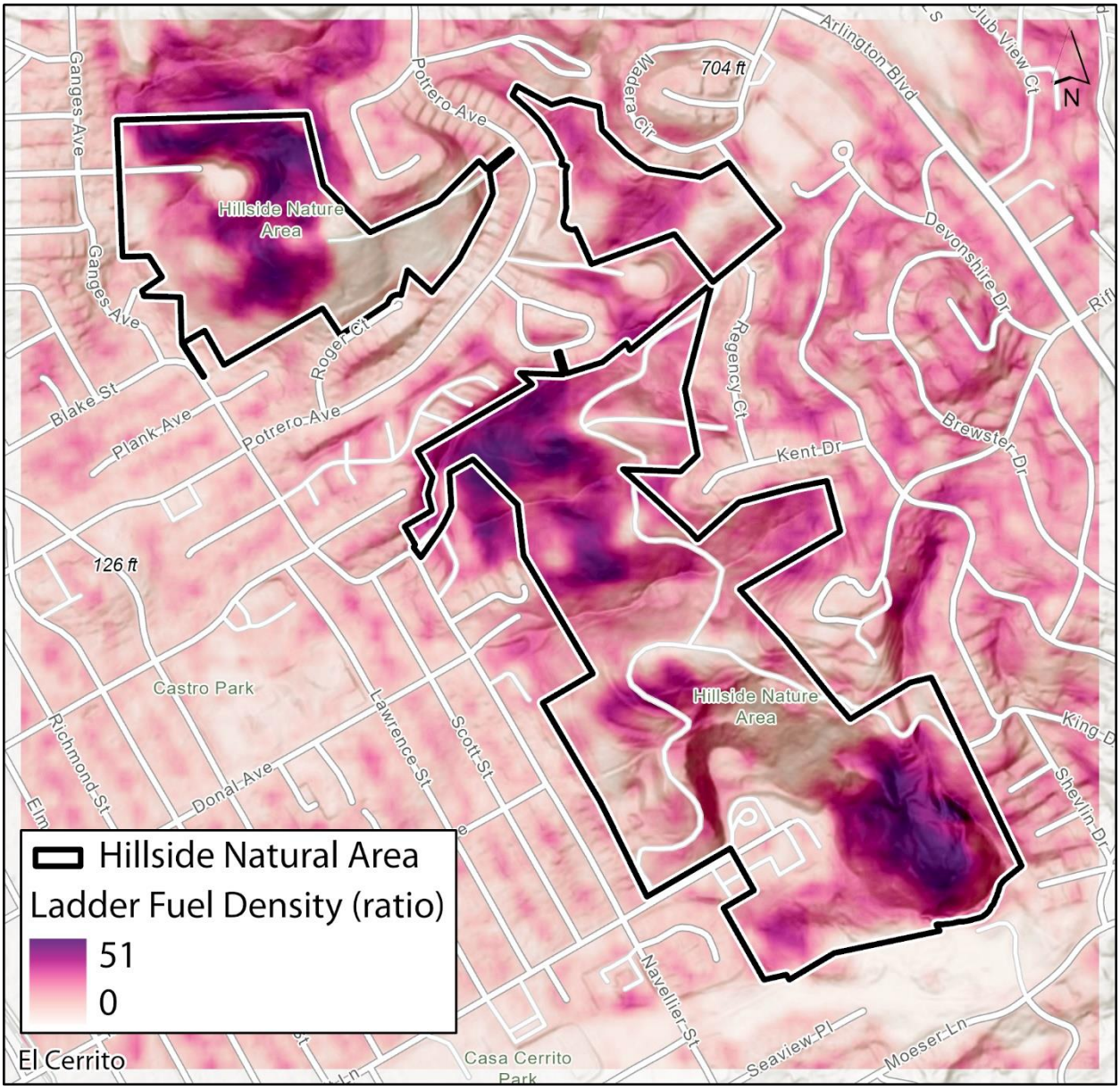

Figure 8: Ladder fuel density map. HNA boundary is shown in black.

Canopy Cover in the HNA

Canopy cover (Figure 9) is the percent of the area covered with tree canopy. Canopy cover factors into the possibility of fire traveling from one tree crown to another without the support of a surface fire. Most of the HNA has a high canopy cover, indicating a dense forest, where tree crows touch each other and are intermingled. The same places with low ladder fuel density (in grasslands and shrublands) also have low canopy cover. The locations of the densest canopy cover are at the base of the HNA above Navellier Street and east and above the Recycling Center.

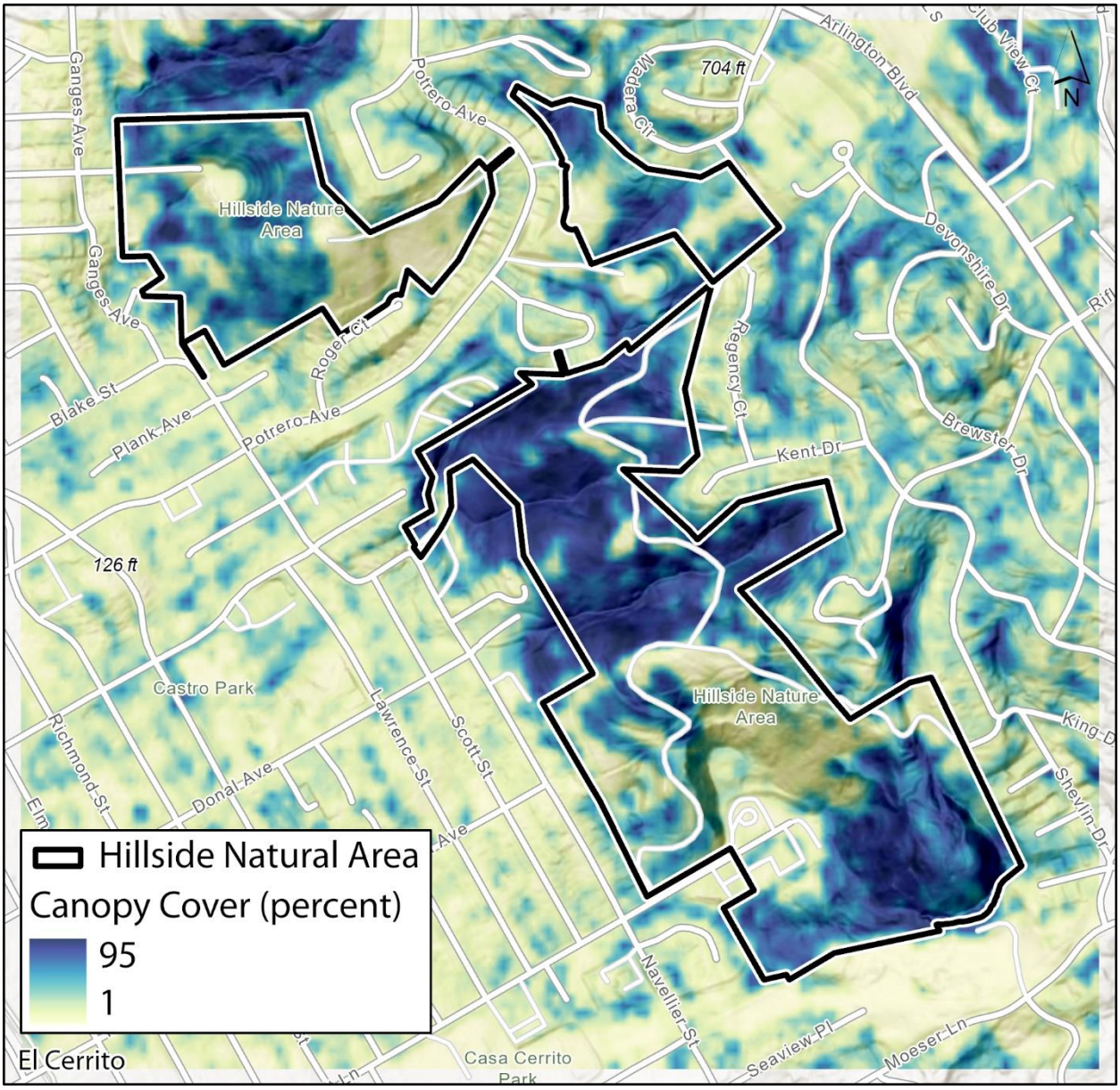

Figure 9: Canopy cover map. HNA boundary is shown in black.

Values At Risk

The most important values at risk are life safety, then improvements to property (residential structures), then natural resources. The HNA is surrounded by homes and businesses with only a few major roads leading away from the park boundary (Moeser Lane, Arlington Boulevard, and Potrero Avenue). Many homes are located on long, winding roads and in culs-de-sac with little access to quick evacuation in the event of a fire. Because the area surrounding the HNA is a densely populated residential area, the threat to human life is significant. A number of trails and service roads run through the HNA, which are used for recreation and service access. Just outside the park boundary, there is an assisted living center, Recycling Center, sanitary district,

both City and other government offices, churches, meditation center, schools, and various other businesses.

Homes surrounding the HNA are at risk from wildfire for a number of reasons. Structures are generally older, dating before the requirement for ignition resistant construction. Most roofs are less flammable; however, wood siding, decks, and unprotected vents that are part of most homes, all make the buildings prone to ignition. Wooden fences are the norm and present the driest fuels (along with wooden parts of structures) in the area. These wooden fences currently abut vegetation that is outside the area required for defensible space and are therefore more prone to ignite and burn intensely. In terms of natural values at risk, the HNA offers a network of trails through wildlife habitat, native vegetation, and riparian corridors with views of San Francisco, Oakland, the Golden Gate Bridge, Mount Tamalpais, and the San Francisco Bay. The park is of great value to the community.

Past Fire Occurrence

The East Bay hills' combination of hot dry summers, conducive topography, flammable vegetation, dense urban development, limited fire-fighting access, and Diablo winds present significant risks to the public, structures, and property located along the wildland-urban interface. Historic wildfire ignitions in the East Bay hills have not been well documented but are almost all directly related to human activity. Since 2005, several fires have burned in the area. All of these were started outside the HNA boundary, and all but one (in August of 2020) were human-caused. In 2020, a lightning strike started a wildfire south of Moeser Lane.

Fire history is compiled from newspaper articles, old fire planning studies and recent fire perimeters collected by fire departments. A University of California, Berkeley, Wildland Vegetative Management Plan reported the wildfire history of the East Bay hills, south of the City of El Cerrito from 1905 to 2017 and indicates a potential for wildfire in the area. Of these fires, 11 fires that burned under Diablo wind conditions burned 9,840 acres of the East Bay hills between 1923 and 1998. Most of these losses occurred from two fires: the 1923 Berkeley Fire and the 1991 Oakland Tunnel Fire, which destroyed 3,542 homes and killed 26 people, with more than 2 billion dollars in financial loss in current dollars. During the same period, three large west-wind fires burned 1,230 acres of grass, brush, trees, and four homes in the East Bay hills.

Fire Behavior Modeling

A fine-scale analysis of potential fire behavior across the HNA is useful to determine the possible effects of wildfire and the potential for spread and containment of a wildland fire. For this purpose, a worst-case scenario was used to reflect conditions during an event of high impact. Several fire behavior prediction software applications have been developed by the United States Forest Service. These include a wide variety of applications designed to specifically meet firefighting or fire prevention needs. For this analysis, the application FlamMap (version 6.1) was used.

FlamMap is a fire behavior mapping and analysis program that computes potential fire behavior characteristics. The FlamMap fire mapping and analysis system[3] describes potential fire behavior for constant environmental conditions (weather and fuel moisture). Flame length, rate of fire spread, crown fire potential, and maximum spotting distance are presented in this report. The FlamMap fire mapping and analysis system calculates fire behavior for each pixel within the landscape file independently, so FlamMap does not calculate fire spread across a landscape. FlamMap assumes the entire area is on fire under the same weather and fuel moisture conditions, with no active firefighting activities. Outputs are well-suited for landscape level comparisons of fuel treatment effectiveness because fuel is the only variable that changes. Outputs and comparisons can be used to identify combinations of hazardous fuel and topography, aiding in prioritizing fuel treatments.

Scenarios

Weather data from a nearby remote automated weather station (in Berkeley off Grizzly Peak Boulevard near Marlborough Terrace) was compiled to reflect a fairly dry fuel moisture regime (i.e., a worst-case scenario, though not necessarily the most extreme case). These are conditions that occur in 90th and 97th percentiles of a 10-year dataset (January 1995 to May 2021). Due to climate change and other factors, a worst-case scenario that reflects the most extreme case has proven to be unpredictable. Regardless, to predict fire behavior, the three following essential data categories are needed:

1. Fuel model characteristics
2. Weather conditions
3. Fuel moisture conditions

Two scenarios were developed: one with winds blowing from the northeast, under Diablo wind conditions, and another with winds from the northwest. The wind speeds are the same in both scenarios. Two different wind scenarios were used to analyze potential fire behavior because not all fires burn under the same wind directions. Winds from the northeast are associated with hot, dry weather and damaging fires. These winds, known as Diablo winds, commonly occur in the fall, sometimes as frequently as a third of the days in October. Winds from the west can also be damaging; they occur most often and are usually faster than northeasterly winds but are usually associated with higher humidities. In El Cerrito, a fire driven by a westerly wind will also be sped by the upward trending slopes, with the wind and slope combining to pre-heat and dry fuels in advance of the flaming front. The inputs into the FlamMap scenarios, both the south/southwest and east/northeast (Diablo) scenarios, are summarized in Table A. Fuel moisture conditions used for fire behavior predictions are shown in Table B.

[3] Finney, M. A. 2006. An overview of FlamMap fire modeling capabilities. In: Fuels management—how to measure success: conference proceedings. 2006 March 28-30; Portland, Oregon. Proceedings RMRS-P-41. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 213-220. (647 KB; 13 pages)

TABLE A. WIND DIRECTION AND SPEED USED FOR FIRE BEHAVIOR PREDICTION SCENARIOS

Scenario	Wind Direction	Wind Speed
South/Southwest	205 degrees	20 mph
East/Northeast	68 degrees	20 mph

Source: Compiled by Coastal Conservancy (2024).
mph = miles per hour

TABLE B. FUEL MOISTURES USED FOR FIRE BEHAVIOR PREDICTIONS BASED ON FIREFAMILY PLUS[4] ANALYSIS

Fuel Model	1 hr time lag class	10 hr time lag class	100 hr time lag class	Live herbaceous fuel moisture	Live woody fuel moisture
All models	3	4	5	70	70

Source: Compiled by Coastal Conservancy (2024).
hr = hour

Flame Length

Flame length is often correlated to the ability to control a fire. A flame length of 4 feet is the limit of what can be attacked with hand crews, and 8 feet is usually treated as a cut-off point for strategic firefighting decisions on whether to attack the fire directly or instead attempt control through indirect methods.[5] Indirect attack is a method of suppression in which the control line is located some considerable distance away from the fire's active edge.

Flame length is closely related to structural damage—the higher the flame length, the more likely structures surrounding the HNA could be lost. Flame lengths are also often highly correlated with natural resource impacts. Long flame lengths can be expected in shrublands and forests where understory is present. Flame length predictions for the HNA in both a northeast wind scenario (Figure 10) and a northwest wind scenario (Figure 11) are presented below. Flame lengths in both scenarios are expected to be high (i.e., over 12 feet and, in some places, over 20 feet) in some areas of each of the three sections of the HNA due to heavy fuels, especially in the mixed forest and chaparral. Where a well-developed understory is present under the oak canopies, fires are expected to burn with high intensity. Fires can be expected to burn fast when they are propelled by dry grass and chaparral.

[4] FireFamily Plus is a software package used to calculate fuel moistures and indices using hourly or daily fire weather observations primarily from remote automated weather stations.

[5] Andrews, Patricia L. and Richard C. Rothermel. 1981. Charts for Interpreting Wildland Fire Behavior. Gen. Tech. Rep INT-131. Ogden, UT. September 1982. U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station 8440. 21 p.

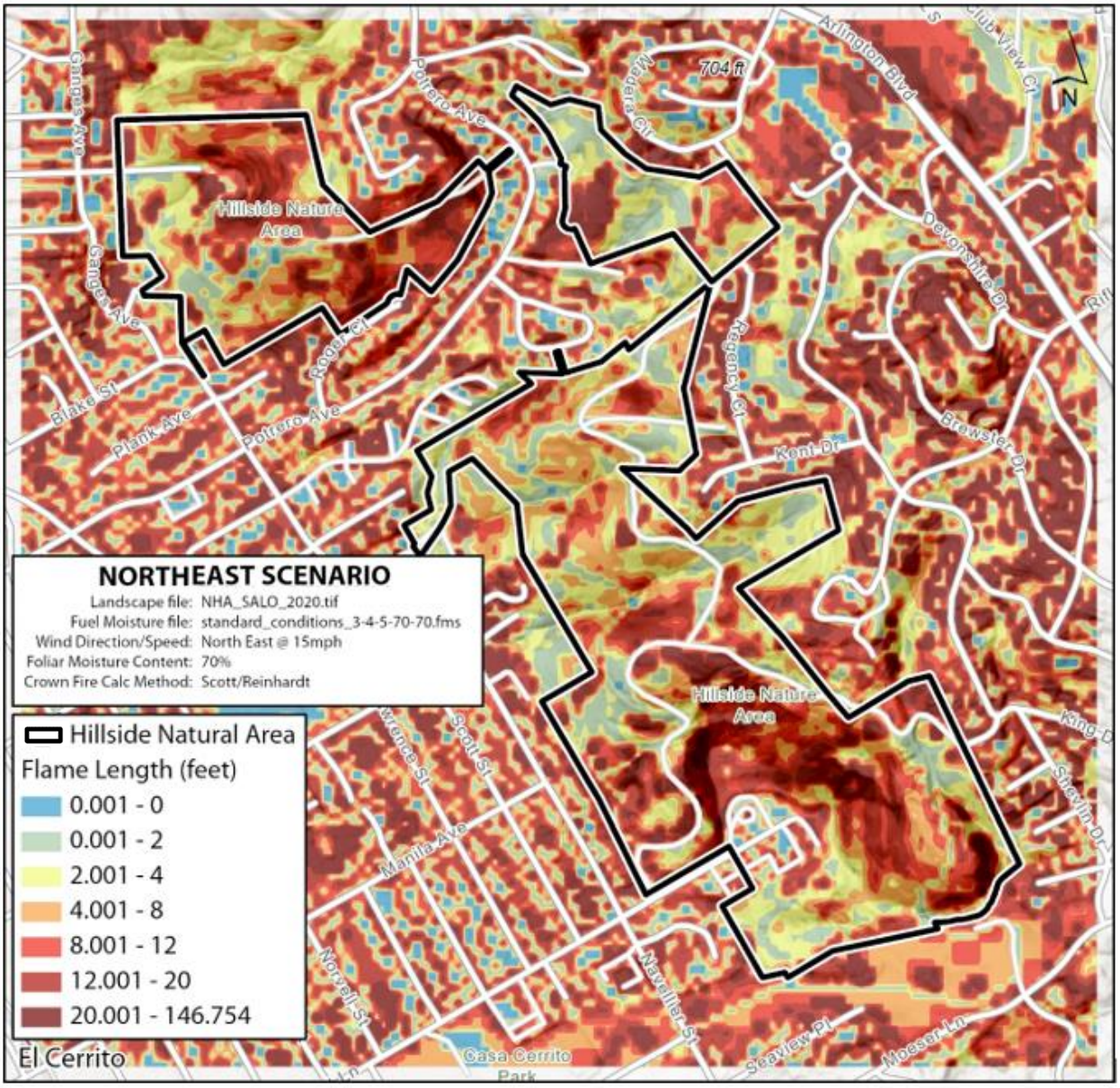

Figure 10: Flame length map – northeast wind scenario. HNA boundary is shown in black.

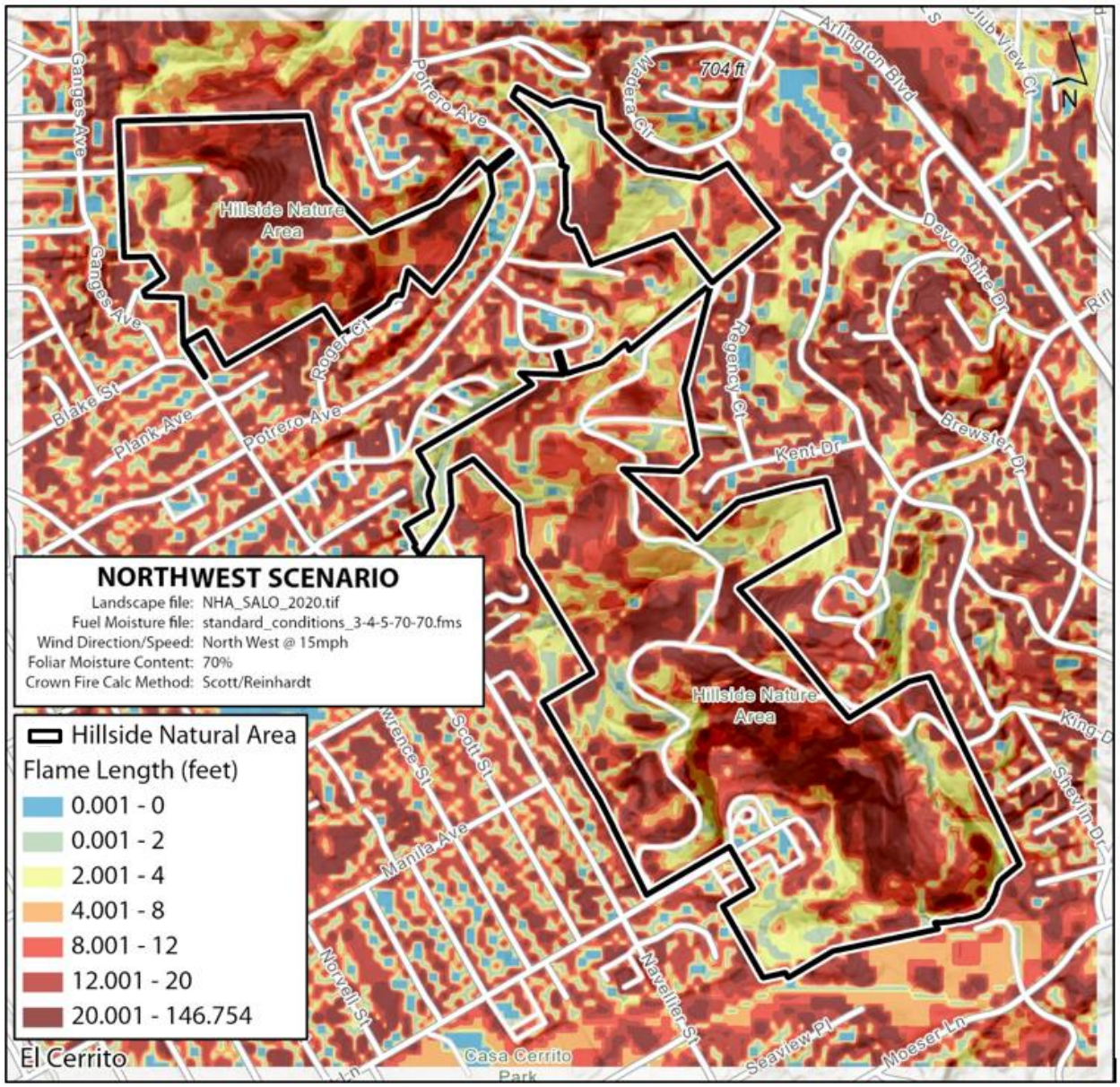

Figure 11: Flame length map – northwest wind scenario. HNA boundary is shown in black.

Northeast Wind Scenario

HNA South

In HNA South, there are areas of very high flame lengths predicted in the northeast wind scenario, concentrated in the center and southeastern portion of the HNA. Extremely high flames (over 20 feet) and very high flames (over 12 feet) are predicted in the forest-shrub areas on the steep slopes above the Recycling Center and across the rocky grass-shrub and forest-grass-shrub areas, continuing toward the southeastern corner of the park.

Moderate flame lengths (less than 8 feet) are predicted in the northern half and the southwestern corner of HNA South (in the oak woodlands), although smaller pockets of high

flame lengths also occur in those areas. In the residential areas along the boundary of HNA South, there are several areas where very high and extremely high flame lengths are predicted, including along Navellier Street on the western boundary and in the area near Regency Court and Kent Drive on the north-eastern boundary, as well as pockets along the eastern boundary below Shevlin Drive and King Drive.

HNA North

In HNA North, both extremely high flame lengths and very high flame lengths (12–20 feet) are predicted, concentrated above the eastern end of Snowdon Avenue and southeast of Motorcycle Hill. Lower flame lengths (less than 4 feet) are predicted in the western half of HNA North near the residents, although smaller pockets of high flame lengths also occur in those areas. Extremely high and very high flame lengths are predicted along the boundaries between HNA North and the surrounding residential area, particularly along the north side of Roger Court, with pockets on the western boundary of the HNA. Much of the area between Potrero Avenue and the park is expected to burn with flames at 12–20 feet and over 20 feet.

Madera Property

Lower flame lengths (less than 4 feet) are predicted in both the wooded center portion and the northeastern corner of the Madera Property section of the HNA. Between these two areas is a predicted area of very high and extremely high flame lengths, both within the park boundary and to the west, between the park and Potrero Avenue in the shrubby vegetation. Another predicted area of very high flame lengths is outside the park along the northern boundary just south of Madera Court and Madera Elementary School. Small patches of high flame lengths are also predicted in the eastern portion of the Madera property.

Northwest Wind Scenario

HNA South

In the northwest wind scenario, both extremely high flame lengths (over 20 feet) and very high flame lengths (over 12 feet) are predicted throughout much of HNA South. Although concentrated in the center and across the southeastern portion above the Recycling Center, areas of very high and extremely high flame lengths are also predicted throughout the remainder of the HNA South area.

Patches of moderate flame lengths (less than 8 feet) and low flame lengths (less than 4 feet) that are interspersed with patches of higher flame lengths are predicted throughout the western and northwestern portions of HNA South in the northwest wind scenario. As in the northeast wind scenario, there are several areas in the northwest wind scenario where very high and extremely high flame lengths are predicted along the boundary between HNA South and the surrounding community.

HNA North

Both extremely high flame lengths and very high flame lengths are predicted throughout most of HNA North in the northwest wind scenario, with concentration in the eastern two-thirds (most

particularly the center and northeastern portions) of HNA North. A small area of moderate flame lengths is predicted in the western part of HNA North just south of Snowdon Avenue, and very small pockets are mixed in with much higher flame lengths in the southwestern part of the property. Extremely high and very high flame lengths are predicted along the boundaries between HNA North and the surrounding community, particularly the northern, eastern, and southern boundaries.

Madera Property

When the winds blow from the west, extremely high flame lengths and very high flame lengths are predicted in the vegetation comprised of a grass/shrub mix located northwest of the East Bay Municipal Utility District water tank. There are also some small areas mixed in with more moderate flame lengths predicted along the eastern boundary of the property, below Madera Circle. As in the northeast wind scenario, moderate flame lengths are predicted in the central, southeast, and far northwest portions of the property in the northwest wind scenario. Extremely high and very high flame lengths are predicted below and west of the Madera boundary to the west as well as along Madera Circle.

Comparison (Northeast versus Northwest winds)

When comparing the impact of northeast winds and northwest winds on the fire behavior of the HNA (Figure 12), it is clear that in the northwest wind scenario, larger areas of the park have very high and extremely high flame lengths. The highest flame lengths predicted with the northwest winds are in the southeastern portion of HNA South, the northeastern quadrant of HNA North, and a section of the western part of Madera, as well as areas outside of all three sections of the park along boundaries with the surrounding community.

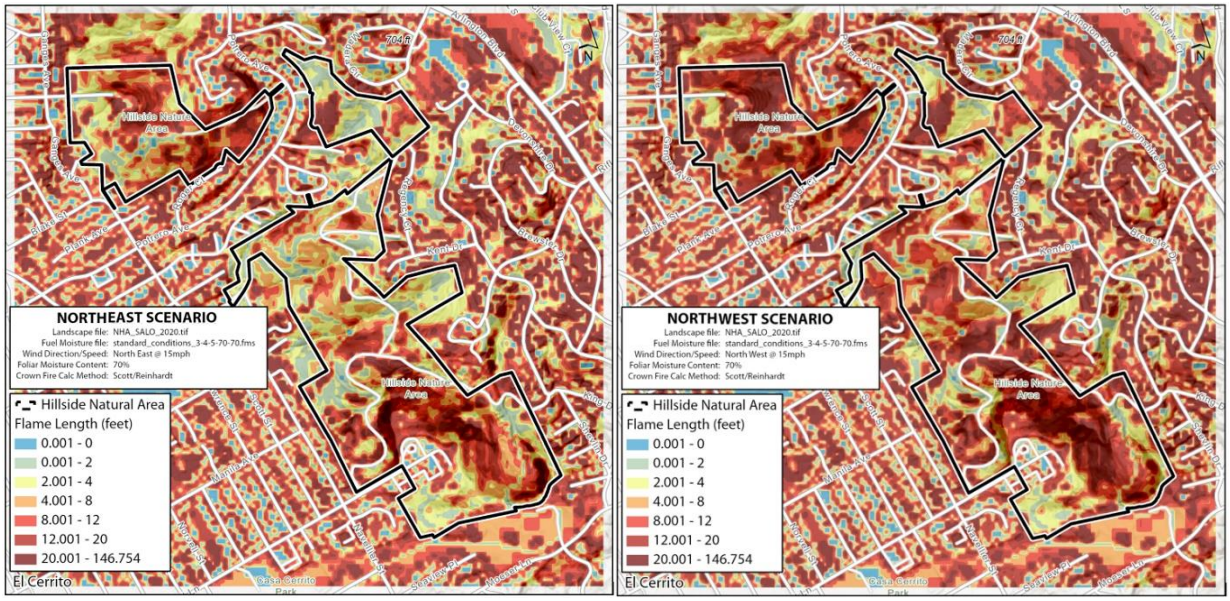

Figure 12: Flame length map comparison – northeast wind scenario is on the left and northwest wind scenario is on the right side of page. HNA boundary is shown in black.

Rate of Spread

Rate of spread measures how quickly a fire moves across a landscape. Rate of spread is dependent on surface fuel types, moisture, wind, and slope. Fine fuels and flat, dry, windy areas will burn at a much faster rate than areas with thicker surface fuels, more rugged topography, moisture, and less wind. The rate of spread is of concern when considering fire containment, response times, and evacuation. A slow-moving fire (e.g., slower than 0.125 mile per hour or 11 feet per minute) might be easily contained, whereas a fast-moving fire (e.g., faster than 1 mile per hour or 88 feet per minute) challenges containment and has the potential to move into high value sensitive areas before containment can occur. Although a fast rate of spread does not necessarily result in a problematic fire, a fast-moving fire coupled with high flame lengths cannot be suppressed with a hand-crew. Rate of spread predictions in both a northeast wind scenario (Figure 13) and a northwest wind scenario (Figure 14) are presented below.

Northeast Wind Scenario

Although based on the worst-case modeling much of the HNA is expected to burn at a low to moderate rate of spread (0 to 10 feet per minute), when the wind blows from the northeast, there is also a considerable amount of the HNA that is expected to burn at a high rate of spread (over 10 feet per minute). These areas are concentrated in more exposed, grassy areas on south-facing slopes in each of the three sections of the park (Figure 13).

HNA South

Roughly half of HNA South is expected to burn at a moderate rate of spread and the other half at a high rate of spread. Areas of high rate of spread are scattered throughout the center of HNA South and are concentrated in the southeast portion of the property on the exposed grassy areas surrounding the Recycling Center. The area just south of the HNA South boundary is of great concern, with winds blowing from the northeast, and is expected to also burn at a high rate of spread.

HNA North

The grassy areas in the central and southeastern portions of HNA North are expected to burn at a high rate of spread, whereas the northern, western, and southwestern portions of HNA North are expected to burn at a moderate rate of spread. Some small sparsely vegetated sections of Motorcycle Hill are expected to burn at a low rate of spread.

Madera

The Madera property is expected to burn at a slightly lower rate of spread than the rest of the HNA. A majority of the area is expected to burn at a moderate rate of spread, including the northeast corner, southeast corner, and the center. Higher rates of spread are located in steep grassy patches in the western and easternmost sections of the property.

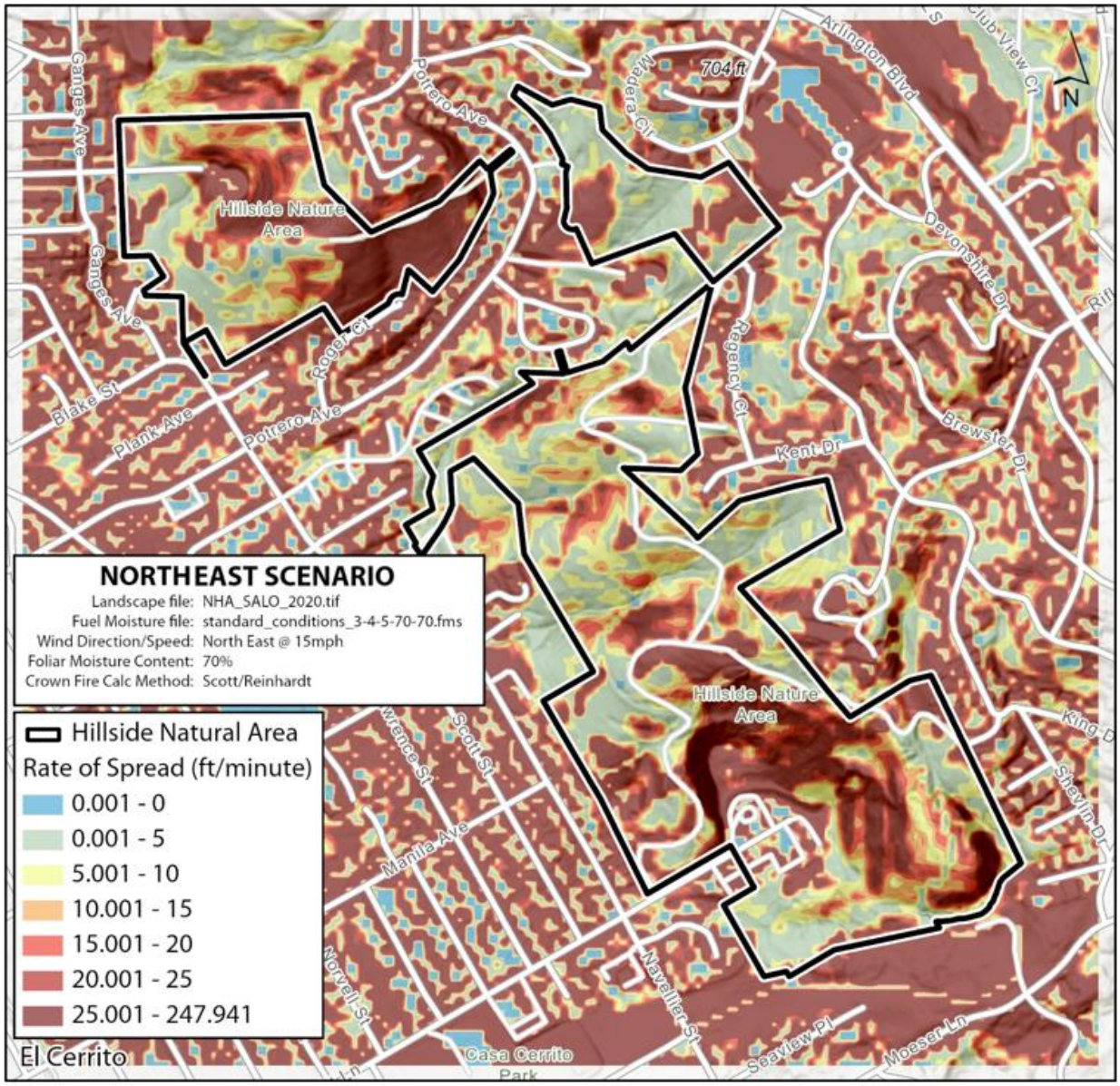

Figure 13: Rate of spread map – northeast wind scenario. HNA boundary is shown in black.

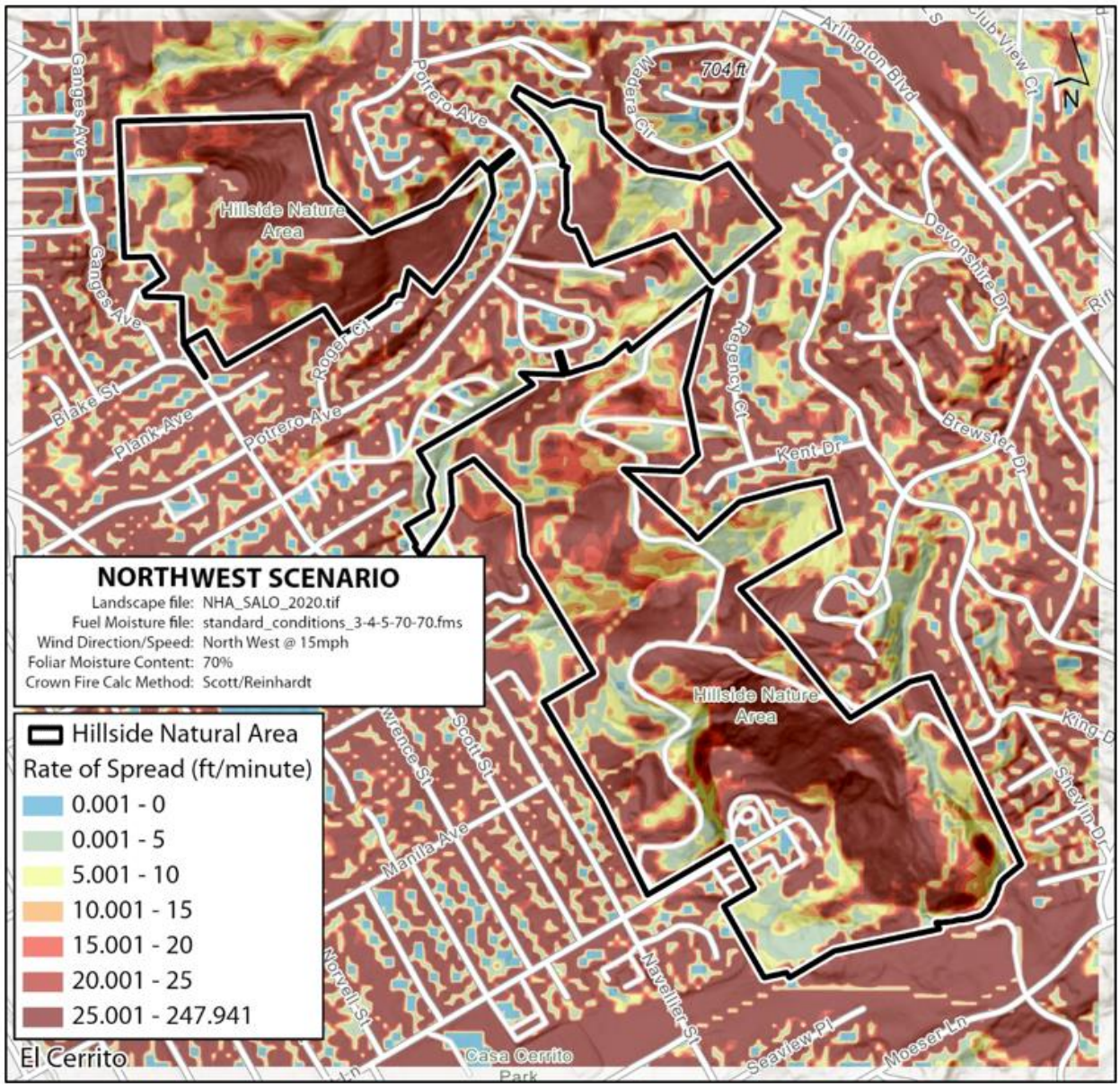

Figure 14. Rate of spread map – northwest wind scenario. HNA boundary is shown in black.

Northwest Wind Scenario

In the northwest wind scenario, the majority of the HNA is expected to burn at a high rate of spread (over 10 feet per minute), with smaller pockets throughout the HNA predicted to burn at a moderate rate of spread (5 to 10 feet per minute). Even smaller pockets are expected to burn at a low rate of spread, most of which are located in areas of urban/developed lands.

HNA South

Most of HNA South is expected to burn at a high rate of spread, especially the central and southeastern portions. The southeast portion of the property surrounding the Recycling Center is expected to burn at the highest rate of spread. Areas of low and moderate rate of spread are

interspersed with areas of higher rates of spread throughout the rest of HNA South. Although the southwest corner within the HNA south boundary is predicted to burn at a moderate rate of spread, the area outside the park on the entire southern boundary is of great concern and is expected to burn at a very high rate of spread.

HNA North

In the northwest wind scenario, most of HNA North is expected to burn at a high rate of spread. There are small, scattered sections of HNA North predicted to burn at moderate or low rates of spread, some of which are urban/developed lands. The high rates of spread continue into the community on both the northern and southern boundaries of HNA North, and these areas are of concern.

Madera

The Madera property is expected to burn at a slightly lower rate of spread than the rest of the HNA. Roughly half of the area is expected to burn at a moderate rate of spread and the other half at a high rate of spread, with patches to the east and west expected to burn at a high rate of spread and the north, south, and center patches expected to burn at a more moderate rate of spread.

Comparison (Northeast versus Northwest winds)

The comparison between the wind scenarios (Figure 15) for rate of spread follows the same pattern as the comparison of the two wind scenarios for flame length. There are more areas of high rate of spread, which increase with a northwest wind. The greatest differences appear in the Motorcycle Hill and Madera area, where more of the area burns faster. Rates of fire spread are also quite fast in HNA North, and the highest rates of spread appear in HNA South, above the Recycling Center. Areas outside the HNA are predicted to burn at the same rates of spread with both wind directions, with the exception that the eastern neighborhood is expected to burn faster under a northwest wind scenario.

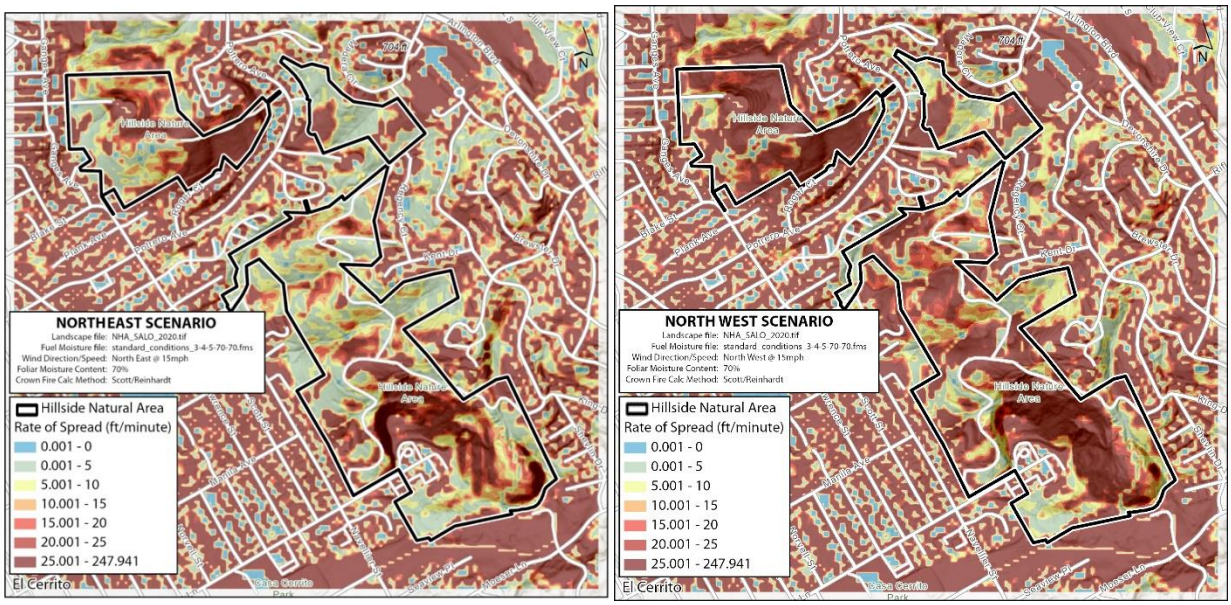

Figure 15: Rate of spread map comparison – northeast wind scenario on the left and northwest wind scenario on the right side of page. HNA boundary is shown in black.

Predicted Crown Fire Activity

The description of crown fire activity includes four possible model outputs: surface fire, torching fire, crown fire, or no predicted fire (Figure 16). Surface fires are limited to fire burning in grass, short shrubs, and the understory of a wooded environment or locations with tall shrubs. The transition from a surface fire to the crowns of trees is known as torching or passive crown fire. Trees are said to torch when a surface fire intermittently ignites the crowns of trees or shrubs as it advances, and the foliage ignites and flares up, usually from bottom to top. Crown fire indicates locations where fire is expected to spread into and possibly consume the canopy of trees or shrubs. Fire spread from tree crown to tree crown is considered active crown fire and is based on the rate of fire spread, the density of the tree crown, and wind speed.

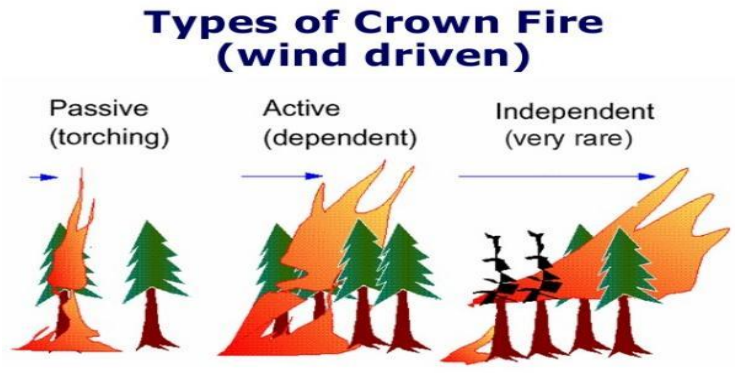

Figure 16: Three types of crown fire

It is important to keep in mind that crown fires and torching can occur only where there are trees and tall shrubs. Short shrub stands can burn intensely and still not torch. When a fire burns through trees or tall shrub crowns, countless embers are produced and distributed, sometimes

at long distances. These embers can start new fires called spot fires, which can each grow and confound the finest fire suppression forces. Spotting potential or crowning potential describes the propensity of vegetation to create and disperse embers that have the potential to start new fires well in advance of the main fire. In terms of ecological effects, prediction of torching or crown fire is highly correlated with fire severity and greater environmental impact. Although coniferous, eucalyptus and oak forests can torch, oak forests are less likely to have fire reach to the tree crowns unless vegetation is burning underneath.

Most of the HNA is predicted to burn with torching fire (Figure 17). In the HNA, torching fire is predicted to be concentrated in the wooded and shrub areas of each of the three sections of the park, especially where a well-developed understory is present. Crown fire predictions in both a northeast wind scenario and a northwest wind scenario are presented below.

Northeast Wind Scenario

In the northeast wind scenario, the majority of both HNA South and HNA North are predicted to burn with torching fire; torching in the Madera Property is concentrated in the west. Some of the HNA is predicted to burn with surface fire. Small patches of surface fire are expected along the outskirts of HNA North and HNA South, and a large swath through the center of the Madera Property is predicted to burn with surface fire.

Along the HNA borders, in the interface between residential and wildland areas, primarily torching fire is predicted with some patches of surface fire. Areas with a higher density of eucalyptus forests are the most at risk of crown fires. In the northeast wind scenario, none of the HNA is expected to burn with a tree-to-tree crown fire.

Northwest Wind Scenario

Like in the northeast wind scenario, in the northwest wind scenario (Figure 18) most of the HNA is predicted to burn with torching fire. In HNA South, torching is predicted throughout most of the area, with a few small patches on the edges of the park that are expected to burn with surface fire. There is a small patch outside the park, near the central east boundary, that is expected to burn within the tree canopy (i.e., crown fire).

In HNA North, torching is again expected throughout most of the area, with a few small patches expected to burn with surface fire in the west and southeast. In the northwest wind scenario, three small patches in the north and west portions of HNA North are expected to burn as a crown fire, as well as a small patch outside of the HNA North boundary to the west.

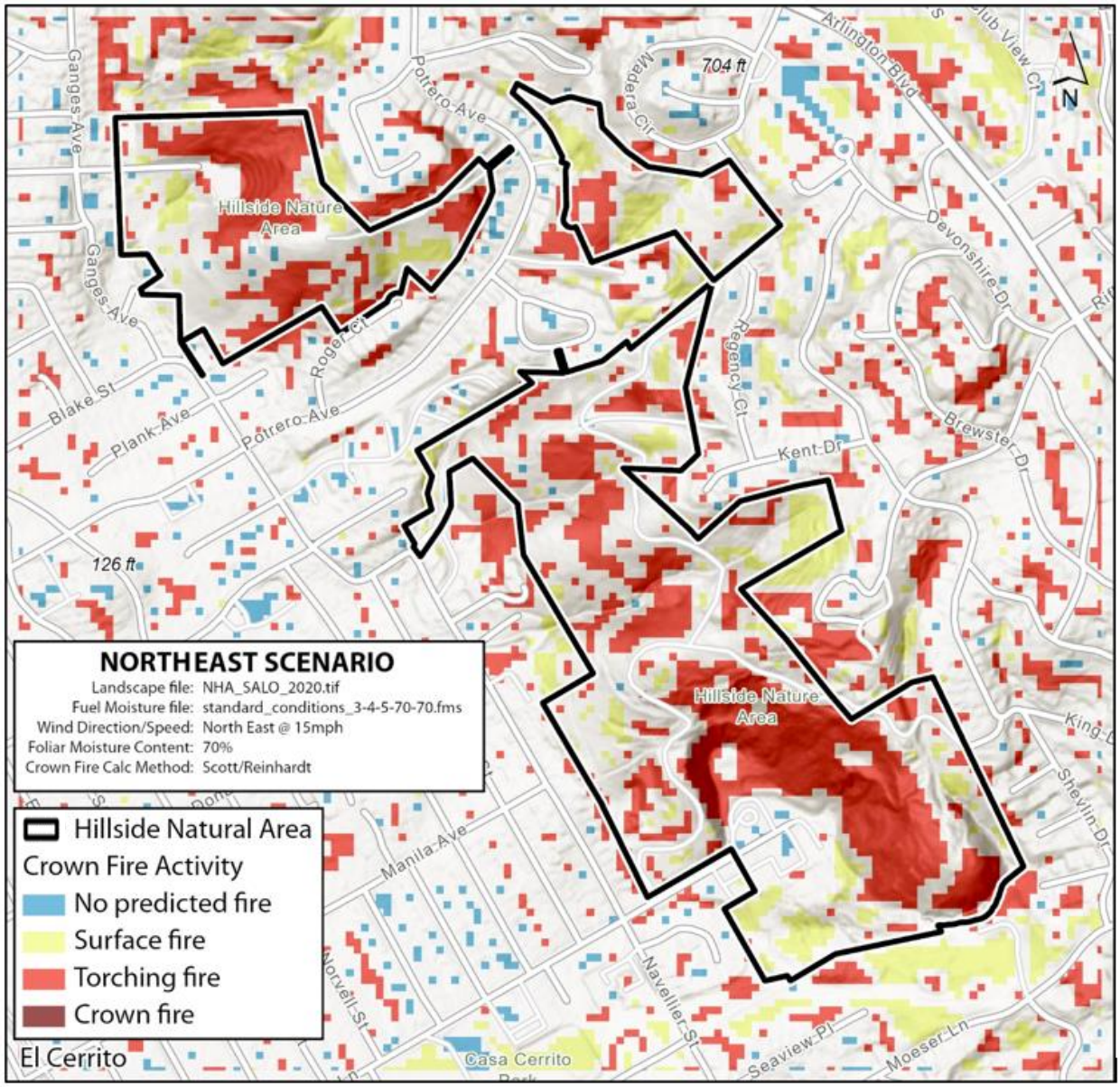

Figure 17: Crown fire activity map – northeast wind scenario. HNA boundary is shown in black.

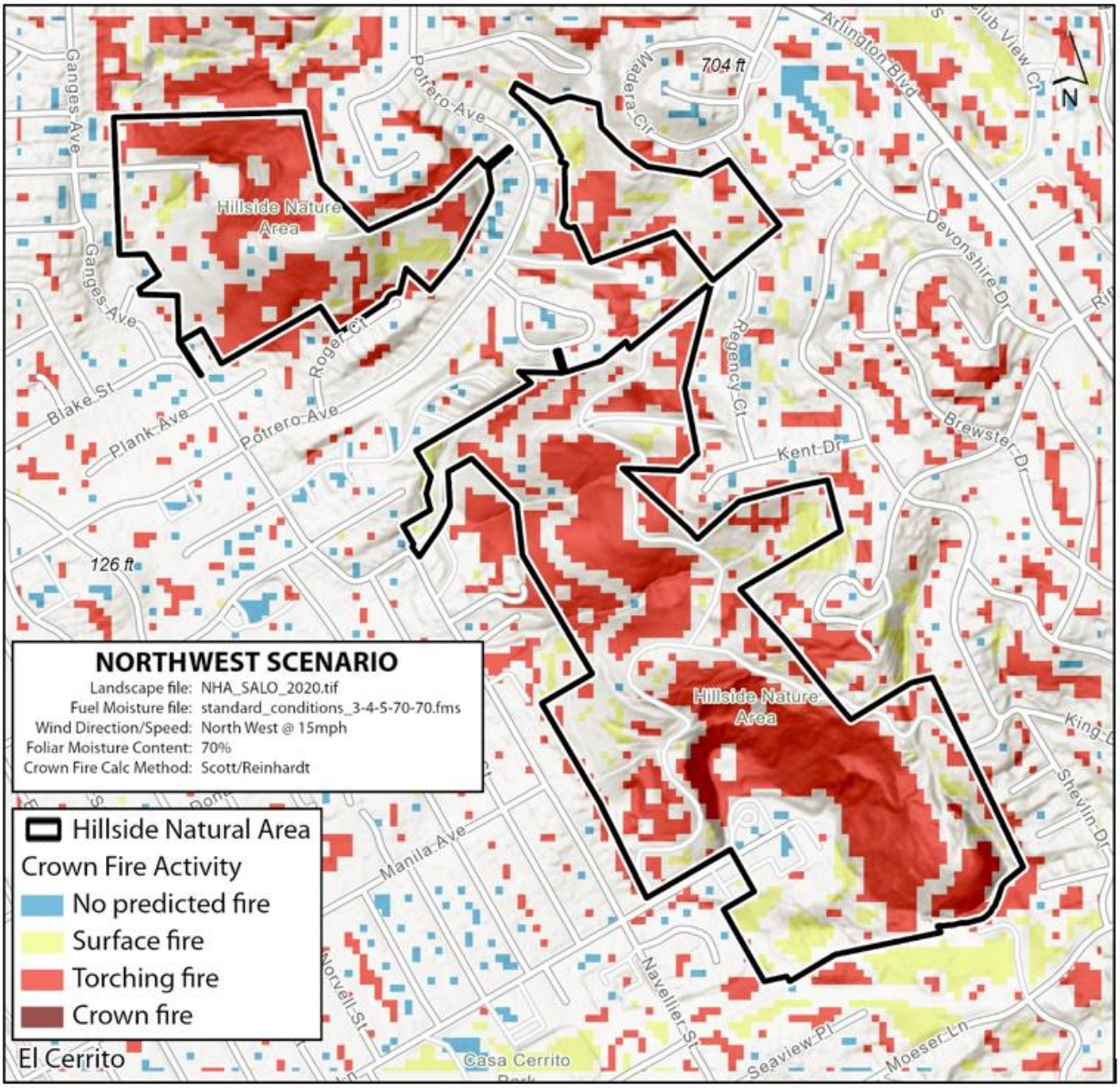

Figure 18: Crown fire activity map – northwest wind scenario. HNA boundary is shown in black.

Torching is predicted throughout the Madera Property in the northwest wind scenario interspersed with small patches that are expected to burn with surface fire. None of the Madera property is expected to burn with a tree-to-tree crown fire. Along the HNA borders, in the interface between residential and wildland areas, primarily torching fire is predicted with some patches of surface fire and very small patches of crown fire (outside the park boundary).

Comparison (Northeast versus Northwest winds)

When comparing the impact of northeast winds and northwest winds (Figure 19) on crown fire activity in the HNA, the presence of torching fire increases slightly in the northwest wind scenario. Crown fire, while remaining relatively low, is present in the northwest wind scenario in

small patches in HNA South and HNA North, whereas it was not present at all in the northeast wind scenario.

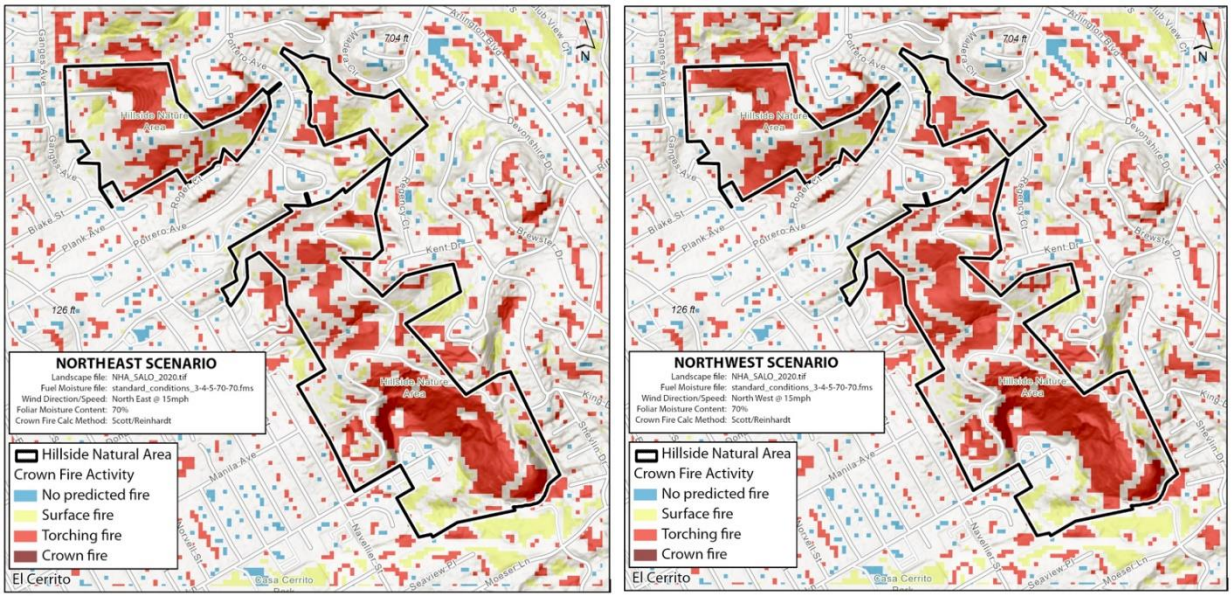

Figure 19. Crown fire activity map comparison – northeast wind scenario on the left and northwest wind scenario on the right side of page. HNA boundary is shown in black.

Maximum Spot Distance

The maximum spot distance is created from an extended set of outputs from FlamMap.[6] The fire behavior is calculated for each landscape node (nodes are defined as a fixed grid equal to the landscape spatial resolution). If a node experiences passive or active crown fire, embers are lofted and followed to determine the maximum spotting distance and direction. Spotting is simulated only from torching trees for passive and active crown fire. Maximum spot distances of embers are calculated for each pixel that is predicted to torch. This metric is not intended to simulate the numbers of embers, exact locations embers would land, or locations of resulting spot fires. The predicted spot distance is relatively high; however, only a small portion of the area is predicted to actually produce spot fires (Figure 20). These areas are located in the central portion of the study area (i.e., in the eucalyptus stands south of Wildwood Place and in the oak woodlands below Kent Court) as well as the wooded area north of Motorcycle Hill and in the eucalyptus trees southeast of the Recycling Center.

Northeast Wind Scenario

The locations where spot fires are expected to travel the farthest are located in HNA South, at the northeastern corner of the HNA. The Madera site is predicted to cast embers from much of the forest; however, the distance the embers are predicted to cast is not as far as those in HNA South. The HNA North site is also expected to distribute embers far, produced in the location of

[6] FlamMap. n.d. Spotting documentation for FlamMap. Accessed on August 25, 2021 at: http://flammaphelp.s3-website-us-west-2.amazonaws.com/.

the eucalyptus stand at the top of Motorcycle Hills. The area north of the HNA is also expected to cast embers, as are small areas sprinkled throughout the neighborhoods above the HNA.

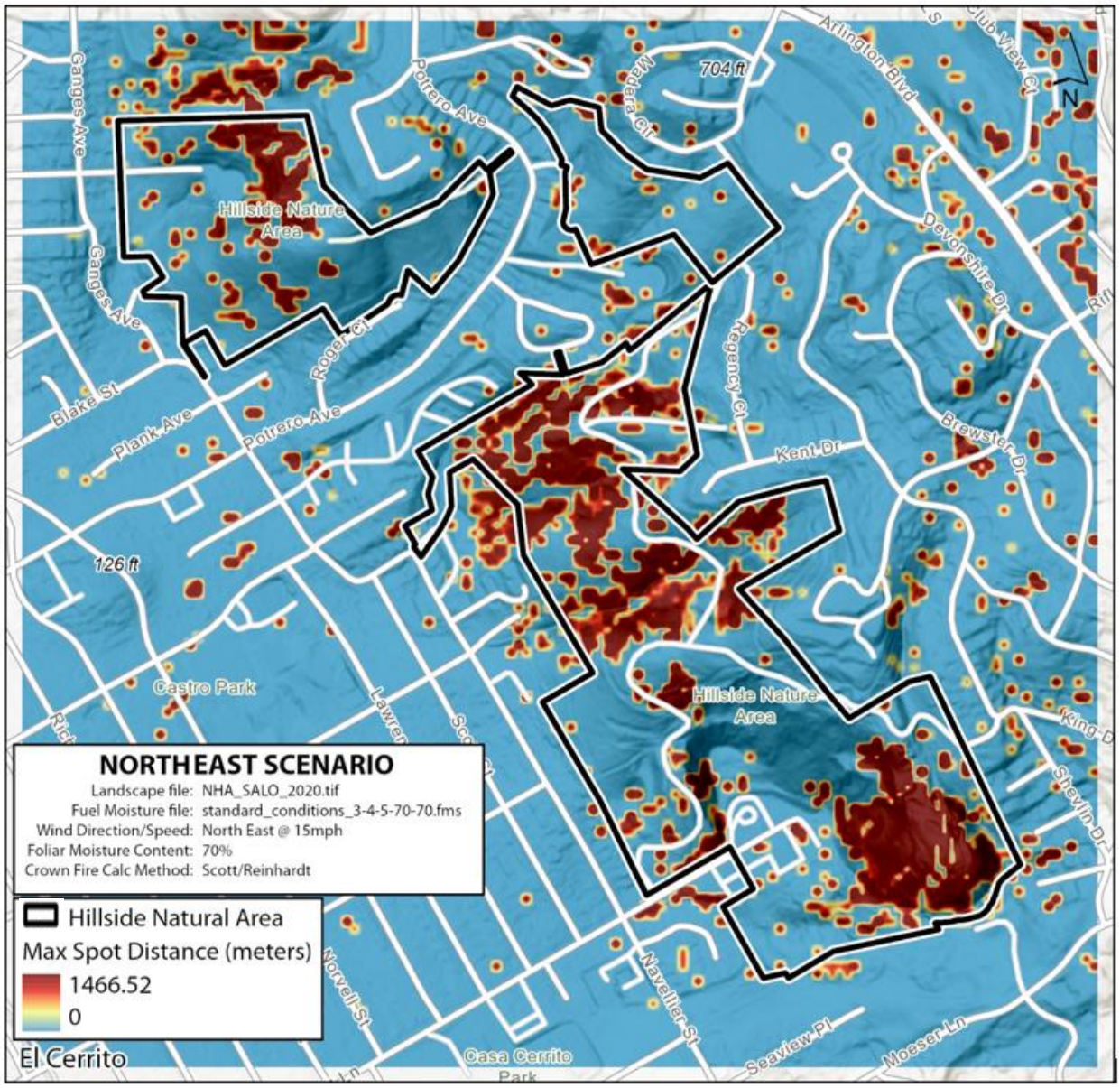

Figure 20: Maximum spot distance map under a northeast wind scenario. HNA boundary is shown in black.

Northwest Wind Scenario

Almost all of the forested areas are expected to distribute embers under a northwest wind scenario. HNA South is predicted to distribute embers well into the residential community, produced by the oak woodlands and the eucalyptus stands and by the woodlands at the base of the slope and top of the slope (Figure 21). The Madera site is an exception in that it is not expected to have many locations that will spread embers; however, in the locations it is expected to spread embers, the ember distance is quite far.

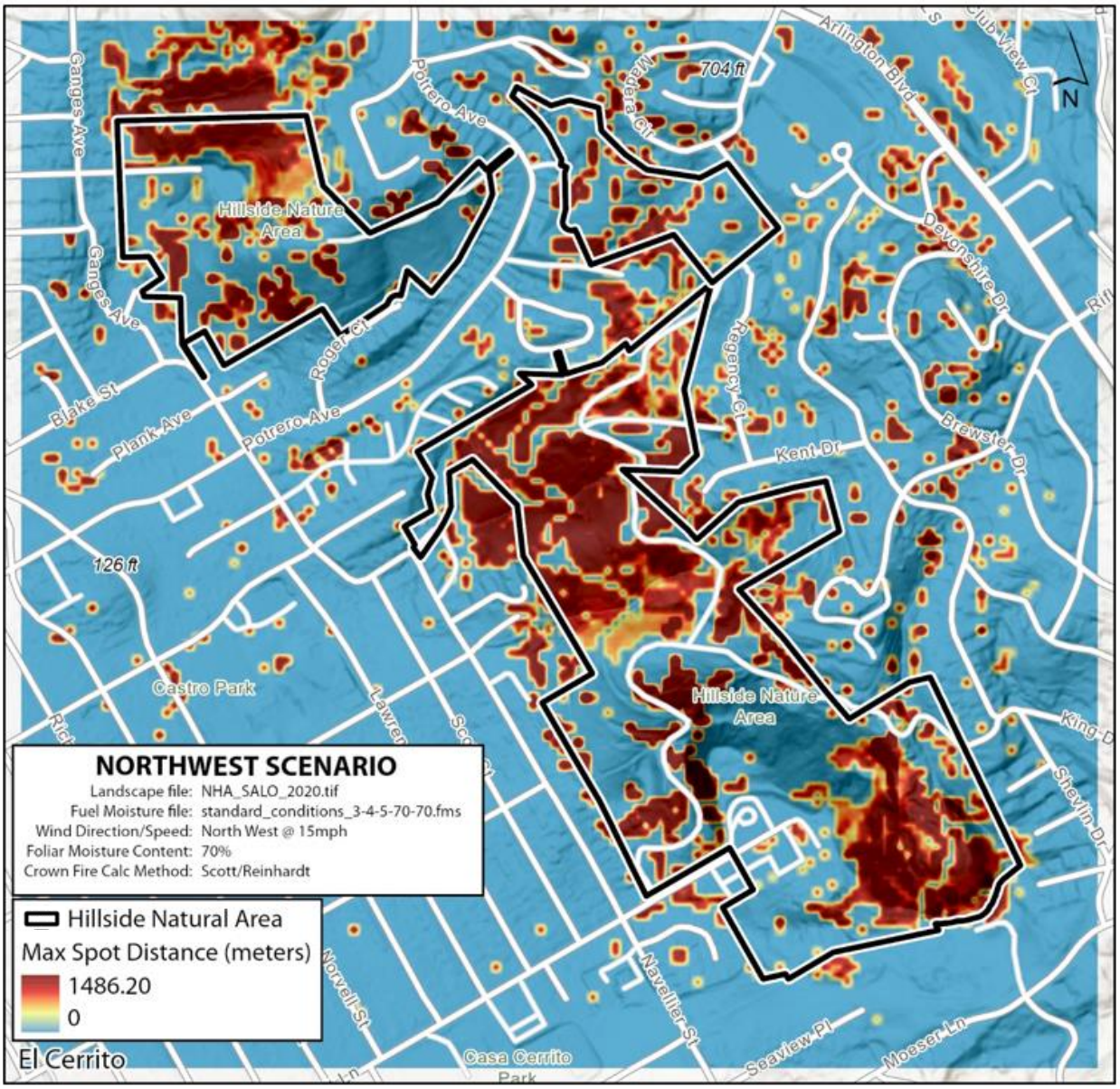

Figure 21: Maximum spot distance map under a northeast wind scenario. HNA boundary is shown in black.

Comparison of the Northwest and Northeast Wind Scenarios

With a northeast wind, a smaller proportion of the HNA is expected to cast embers. With a northwest wind, a greater proportion of the HNA is expected to create spot fires; however, the average spot fire distance is shorter (Figure 22).

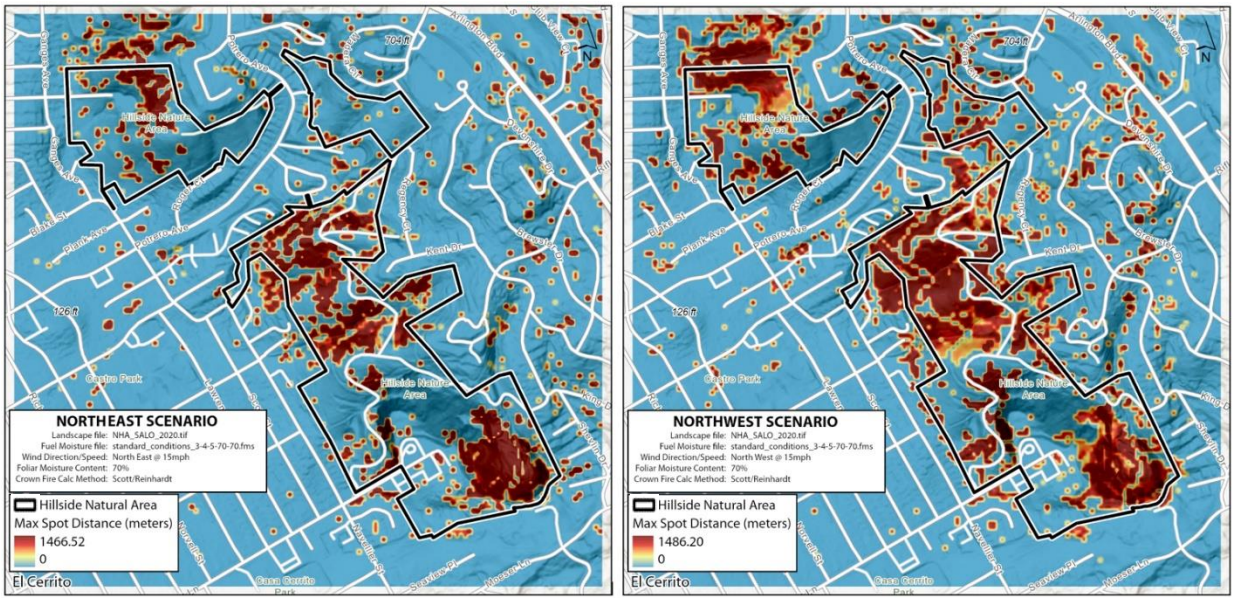

Figure 22: Comparison of maximum spotting distance, comparing a northeasterly wind scenario with a northwesterly wind scenario.

Conclusion

Because of the steep slopes and abundant fuel, along with hot dry temperatures and occasional strong winds, the risk of wildfire in and around the El Cerrito HNA is quite high. Long flame lengths and tree torching are expected for most of the area in the HNA, which pose threats to the hillside residences and the community. Fortunately, the moderate fire spread rates expected in the HNA may assist fire containment when fire suppression efforts are not thwarted by long flames. The level of risk (based on flame lengths, rate of fire spread, and values at risk) are among the highest in the East Bay Hills.

Most wildfire assessments consider worst-case scenarios; because almost all damaging fires in the East Bay have been when the winds blow from the northeast, this wind direction is normally considered the worst-case conditions. However, in regard to the HNA, steep slopes trend upward to the east, and residences and other valued assets at risk are located uphill from those slopes. The slopes themselves are covered with abundant fuels of various types. A dense population is located west of the HNA; because ignitions are associated with human activity, the chance of an ignition west of the HNA should not be discounted. Should a fire originate west of the HNA when winds blow from the west, the wind would facilitate spread up the slopes to assets above the HNA. Containment within the HNA is hampered by lack of access, abundant fuels, and steep terrain. Thus, this assessment included wind from the west as well as from the northeast, so that a fuller suite of conditions could be considered.

The results influence management decisions in the following ways:

1. Fuel management should acknowledge risks uphill from the HNA and point to creation and maintenance of fuel breaks along the eastern portion of the HNA.
2. Management recommendations should emphasize the importance of defensible space for properties along the entire perimeter of the HNA, not just the residences that would be most vulnerable from a fire that burns with winds from the northeast (those that abut the western boundary of the HNA).
3. Public education regarding fire-safe behavior as a way to prevent ignitions should encompass the neighborhoods west of the HNA.

The risk assessment indicates:

1. Flame lengths are predicted to be very long and extreme (more than 12 feet) in more locations under a westerly wind than an easterly wind. The rates of fire spread follow the same pattern; more locations burn at extremely fast spread rates with westerly winds, and the same locations are affected more by westerly winds. Not surprisingly, the areas of greatest potential to torch (and distribute embers) are in the same locations that are predicted to burn intensely.
2. Steep grassy and shrubby slopes in all parts of the HNA can be expected to burn intensely and faster under any wind direction. These are located in areas:
    a. Surrounding the Recycling Center;
    b. Uphill from the eastern end of Snowden Drive;
    c. On the grassy slope above Roger Court and Potrero Avenue;
    d. In the eucalyptus stand south of Wildwood Lane; and
    e. On the steep grass/shrub slope below Madera Circle.
3. The oak woodlands and most of the eucalyptus groves are expected to burn with less intensity than grasslands under a northeasterly wind.

Most of the HNA boundary abuts residences, and a fire in the areas would directly affect and be affected by the condition of those residential properties. A property adjacent to and near the HNA should be included in all efforts to promote defensible space and structure retrofitting to be ignition resistant. Priority should be placed on parcels that immediately abut the HNA and then nearby parcels. For those segments of the HNA boundary that touch other wildlands, the City should work with those landowners to ensure that neighboring parcels also address the hazards.

In summary, this level of risk can be reduced by three actions: vegetative fuel management in the HNA and in residential yards, retrofitting structures to be ignition-resistant, and diligence in ignition prevention. The areas of highest priority for vegetative fuel management are the nearest homes to the HNA (both above and below the HNA) and locations with greatest flame lengths. Ignition prevention involves the entire community focusing on fire-safe behaviors, along with creation and maintenance of fuels (both vegetative and structural) that are ignition-resistant.

Appendix A: Terms Used in This Report

1h Fuel Class – Group of fuels possessing common characteristics. Dead fuels are grouped according to 1-, 10-, 100-, and 1000-hour time lag, and living fuels are grouped as herbaceous (annual or perennial) or woody.

10h Fuel Class – Group of fuels possessing common characteristics. Dead fuels are grouped according to 1-, 10-, 100-, and 1000-hour time lag, and living fuels are grouped as herbaceous (annual or perennial) or woody.

100h Fuel Class – Group of fuels possessing common characteristics. Dead fuels are grouped according to 1-, 10-, 100-, and 1000-hour time lag, and living fuels are grouped as herbaceous (annual or perennial) or woody.

Active crown fire – A fire in which a solid flame develops in the crowns of trees.

Canopy base height – A property of a plot, stand, or group of trees, not of an individual tree. For fire modeling, canopy base height is an effective value that incorporates ladder fuel, such as tall shrubs and small trees.

Canopy bulk density – A bulk property of a plot, stand, or group of trees, not of an individual tree. The most basic methods for estimating canopy bulk density use a tree list in conjunction with allometric equations to predict individual tree biomass. The biomass data are then summarized by any of several methods to provide an estimate of bulk density or to create a vertical profile of bulk density in horizontally thin layers.

Canopy cover – The percent of a fixed area covered by the crown of an individual plant species or delimited by the vertical projection of its outermost perimeter; small openings in the crown are included.

Canopy height – The height of the foliage above ground for any point of the canopy. For example, tree height is the height of the tree apex (topmost point) above ground.

Crosswalk – A crosswalk is any system or table designed to assist a user in cross-referencing one vegetation classification to another; in this case, a fuel model classification.

Crown fire – A fire that advances from top to top of trees or shrubs more or less independent of a surface fire. Crown fires are sometimes classed as running or dependent to distinguish the degree of independence from the surface fire.

Crown fire activity – See crowning potential. The presence of a crown fire or torching in any one area.

Crown fire activity (or potential) – Results from a fire prediction software. Predictions are either Non-burnable, Surface Fire, Passive Crown Fire, and Active Crown Fire.

Crowning potential – A probability that a crown fire may start, calculated from inputs of foliage moisture content and height of the lowest part of the tree crowns above the surface. See also "spotting potential."

Fire behavior – The manner in which a fire reacts to the influences of fuel, weather, and topography.

Fire hazard severity – Fire hazard severity zones are based on the combination of vegetation, topography, weather, crown fire potential, ember production and movement, and the likelihood of an area burning. Buildings constructed in Very High Fire Hazard Severity Zones are required to be built using fire-resistive features.

Fireline intensity – The product of the available heat of combustion per unit of ground and the rate of spread of the fire, interpreted as the heat released per unit of time for each unit length of fire edge. The primary unit is Btu per second per foot of fire front. The rate of heat release per unit time per unit length of fire front. Numerically, it is the product of the heat yield, the quantity of fuel consumed in the fire front, and the rate of spread.

Flame length – The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface) and an indicator of fire intensity.

FlamMap – A software program that simulates potential fire behavior characteristics (spread rate, flame length, fire line intensity, etc.), fire growth and spread, and conditional burn probabilities under constant environmental conditions (weather and fuel moisture).

Flaming front – The zone of a moving fire where the combustion is primarily flaming. Behind this flaming zone combustion is primarily glowing or involves the burning out of larger fuels (greater than about 3 inches in diameter). Light fuels typically have a shallow flaming front, whereas heavy fuels have a deeper front.

Foliar moisture content – The weight of water compared with the weight of cellulose, expressed as a percentage. A 100 percent moisture content is found when that portion of a plant has equal weights of water and cellulose.

Fuel – Any combustible material, especially petroleum-based products and wildland fuels.

Fuel bed – An array of fuels usually constructed with specific loading, depth, and particle size to meet experimental requirements; also, commonly used to describe the fuel composition.

Fuel continuity – A description of the spacing between individual fuel elements. For example, tree crowns touching the crowns of all its neighbors or tree crowns moderately, or even widely, spaced.
Fuel characteristics – Factors that make up fuels such as compactness, loading, horizontal continuity, vertical arrangement, chemical content, size and shape, and moisture content.

Fuel model – Simulated fuel complex for which all fuel descriptors required for the solution of a mathematical rate of spread model have been specified.

Fuel moisture – The quantity of moisture in fuel expressed as a percentage of the weight when thoroughly dried at 212 degrees Fahrenheit.

Fuel type – An identifiable association of fuel elements of distinctive species, form, size, arrangement, or other characteristics that will cause a predictable rate of spread or resistance to control under specified weather conditions.

Ladder fuels – Vegetative fuels that provide a pathway for fire to move from the surface to the tree canopy.

LANDFIRE – The LANDFIRE program produces geo-spatial products and databases covering the United States of America. LANDFIRE is a partnership between the wildland fire management programs of the United States Department of Interior, the United States Department of Agriculture Forest Service, and the Nature Conservancy.

Live Herbaceous Fuel Class – Group of fuels possessing common characteristics. Dead fuels are grouped according to 1-, 10-, 100-, and 1000-hour time lag, and living fuels are grouped as herbaceous (annual or perennial) or woody.

Live Herbaceous Fuel Moisture (LiveH) – Fuel moisture for the Live Herbaceous Fuel Class.

Live Woody Fuel Class – Group of fuels possessing common characteristics. Dead fuels are grouped according to 1-, 10-, 100-, and 1000-hour time lag, and living fuels are grouped as herbaceous (annual or perennial) or woody.

Live Woody Fuel Moisture (LiveW) – Fuel moisture for the Live Woody Fuel Class.

Moisture of Extinction (X Moist) – The fuel moisture content, weighed over all the fuel classes, at which a fire will not spread.

Passive crown fire – A fire in the crowns of trees in which trees or groups of trees torch, ignited by the passing front of the fire.

Pixel – A picture element that reflects the same characteristics over a specified size of the surface.

Rate of spread – The relative activity of a fire in extending its horizontal dimensions. It is expressed as rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in area, depending on the intended use of the information. Usually it is expressed in chains (66 feet) or acres per hour for a specific period in the fire's history.

Relative humidity – The ratio of the amount of moisture in the air to the maximum amount of moisture that air would contain if it were saturated.

Residence time – The length of time a wildfire burns at a single location. This behavior characteristic is typically defined by the fuel size categories that are present and dominant**.**

Surface fire – A fire that burns on the surface of the ground and is primarily fueled by short vegetation and twigs or dried leaves. Surface fires range from low to high intensity depending on the conditions. While they may scorch a tree canopy, surface fires will not consume its foliage. Surface fires often spread slowly but can begin to spread rapidly when they occur in an area that has a steeply sloped landscape or are pushed by wind. That said, most surface fires ultimately die out before they are able to develop into the next level of classification: crown fires.

Spotting – Behavior of a fire producing sparks or embers that are carried by the wind and start new fires beyond the zone of direct ignition by the main fire. Large glowing firebrands are carried high into the convection column and then fall out downwind beyond the main fire, starting new fires. Such spotting can easily occur 0.25 mile or more from the firebrand’s source.

Time lag – Time needed under specified conditions for a fuel particle to lose about 63 percent of the difference between its initial moisture content and its equilibrium moisture content. If conditions remain unchanged, a fuel will reach 95 percent of its equilibrium moisture content after four time lag periods.

Torching – The burning of the foliage of a single tree or a small group of trees, from the bottom up.

Appendix B: Fuel Model Parameters for All Standard Fuel Models

This table describes the fuel characteristics used as inputs to the FlamMap fire behavior prediction software and includes fuel loads (volumes) by time lag/size class.

Fuel model code	Fuel load (t/ac)					Fuel model type[a]	SAV ratio (1/ft)[b]			Fuel bed depth (ft)	Dead fuel extinction moisture (percent)	Heat content BTU/lb)[c]
	1-hr	10-hr	100-hr	Live herb	Live woody		Dead 1-hr	Live herb	Live woody			
GR1	0.10	0.00	0.00	0.30	0.00	dynamic	2200	2000	9999	0.4	15	8000
GR2	0.10	0.00	0.00	1.00	0.00	dynamic	2000	1800	9999	1.0	15	8000
GR3	0.10	0.40	0.00	1.50	0.00	dynamic	1500	1300	9999	2.0	30	8000
GR4	0.25	0.00	0.00	1.90	0.00	dynamic	2000	1800	9999	2.0	15	8000
GR5	0.40	0.00	0.00	2.50	0.00	dynamic	1800	1600	9999	1.5	40	8000
GR6	0.10	0.00	0.00	3.40	0.00	dynamic	2200	2000	9999	1.5	40	9000
GR7	1.00	0.00	0.00	5.40	0.00	dynamic	2000	1800	9999	3.0	15	8000
GR8	0.50	1.00	0.00	7.30	0.00	dynamic	1500	1300	9999	4.0	30	8000
GR9	1.00	1.00	0.00	9.00	0.00	dynamic	1800	1600	9999	5.0	40	8000
GS1	0.20	0.00	0.00	0.50	0.65	dynamic	2000	1800	1800	0.9	15	8000
GS2	0.50	0.50	0.00	0.60	1.00	dynamic	2000	1800	1800	1.5	15	8000
GS3	0.30	0.25	0.00	1.45	1.25	dynamic	1800	1600	1600	1.8	40	8000
GS4	1.90	0.30	0.10	3.40	7.10	dynamic	1800	1600	1600	2.1	40	8000
SH1	0.25	0.25	0.00	0.15	1.30	dynamic	2000	1800	1600	1.0	15	8000
SH2	1.35	2.40	0.75	0.00	3.85	N/A	2000	9999	1600	1.0	15	8000
SH3	0.45	3.00	0.00	0.00	6.20	N/A	1600	9999	1400	2.4	40	8000
SH4	0.85	1.15	0.20	0.00	2.55	N/A	2000	1800	1600	3.0	30	8000
SH5	3.60	2.10	0.00	0.00	2.90	N/A	750	9999	1600	6.0	15	8000
SH6	2.90	1.45	0.00	0.00	1.40	N/A	750	9999	1600	2.0	30	8000
SH7	3.50	5.30	2.20	0.00	3.40	N/A	750	9999	1600	6.0	15	8000
SH8	2.05	3.40	0.85	0.00	4.35	N/A	750	9999	1600	3.0	40	8000
SH9	4.50	2.45	0.00	1.55	7.00	dynamic	750	1800	1500	4.4	40	8000
TU1	0.20	0.90	1.50	0.20	0.90	dynamic	2000	1800	1600	0.6	20	8000
TU2	0.95	1.80	1.25	0.00	0.20	N/A	2000	9999	1600	1.0	30	8000
TU3	1.10	0.15	0.25	0.65	1.10	dynamic	1800	1600	1400	1.3	30	8000
TU4	4.50	0.00	0.00	0.00	2.00	N/A	2300	9999	2000	0.5	12	8000
TU5	4.00	4.00	3.00	0.00	3.00	N/A	1500	9999	750	1.0	25	8000
TL1	1.00	2.20	3.60	0.00	0.00	N/A	2000	9999	9999	0.2	30	8000
TL2	1.40	2.30	2.20	0.00	0.00	N/A	2000	9999	9999	0.2	25	8000
TL3	0.50	2.20	2.80	0.00	0.00	N/A	2000	9999	9999	0.3	20	8000
TL4	0.50	1.50	4.20	0.00	0.00	N/A	2000	9999	9999	0.4	25	8000
TL5	1.15	2.50	4.40	0.00	0.00	N/A	2000	9999	1600	0.6	25	8000
TL6	2.40	1.20	1.20	0.00	0.00	N/A	2000	9999	9999	0.3	25	8000
TL7	0.30	1.40	8.10	0.00	0.00	N/A	2000	9999	9999	0.4	25	8000
TL8	5.80	1.40	1.10	0.00	0.00	N/A	1800	9999	9999	0.3	35	8000
TL9	6.65	3.30	4.15	0.00	0.00	N/A	1800	9999	1600	0.6	35	8000
SB1	1.50	3.00	11.00	0.00	0.00	N/A	2000	9999	9999	1.0	25	8000
SB2	4.50	4.25	4.00	0.00	0.00	N/A	2000	9999	9999	1.0	25	8000
SB3	5.50	2.75	3.00	0.00	0.00	N/A	2000	9999	9999	1.2	25	8000
SB4	5.25	3.50	5.25	0.00	0.00	N/A	2000	9999	9999	2.7	25	8000

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APPENDIX C

CULTURAL RESOURCES EVALUATION

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CULTURAL RESOURCES TECHNICAL MEMORANDUM

Date: October 18th, 2023
To: LSA Associates, Inc.
From: Solano Archaeological Services, LLC

Subject: Cultural Resources Investigation – Hillside Natural Area Fire Resilience and Forest Conservation Management Plan, City of El Cerrito, Contra Costa County, California

INTRODUCTION

This technical memorandum summarizes the background research, Native American community outreach, archaeological survey, and study findings for the proposed Hillside Natural Area (HNA) Fire Resilience and Forest Conservation Management Plan in the City of El Cerrito (the City), Contra Costa County, California (the Project). As a discretionary effort, the Project is subject to California Environmental Quality Act (CEQA) requirements, and Solano Archaeological Services, LLC (SAS) has prepared this report to support compliance with the cultural resources provisions of CEQA.

PROJECT LOCATION

The project area consists of approximately 107.18-acre (ac.) on three discontiguous but adjacent lots generally located to the northwest, and southeast of Potrero Avenue. (Attachment A, Figure 1). The project area is depicted on the *Richmond*, *California* U.S. Geological Survey (USGS) topographic 7.5 minute quadrangle in Township 1 North, Range 4 West, sections 15, 16, 21, and 22 (Attachment A, Figures 2, 3).

PROJECT DESCRIPTION

Community concerns regarding fire risk in the City's HNA and surrounding residential communities have significantly increased. The City has responded with ongoing and increased vegetation maintenance activities, completing work largely based on planning efforts completed in the 1990s. However, the need for more robust, comprehensive, and balanced vegetation management practices was identified in the City's 2015 Urban Greening Plan. Additionally, in 2019, the El Cerrito Parks and Recreation Facilities Master Plan specifically called for action to "support the El Cerrito-Kensington Wildfire Action Plan goals and policies by creating defensible spaces, increasing weed abatement, and managing dead or diseased trees and other vegetation, especially in the Hillside Natural Area". El Cerrito voters passed a measure (Measure H) to further fund park maintenance activities that same year and the City has since increased its fire fuel reduction and vegetation management activities, in part with these park maintenance funds. Given the ongoing and historic drought, rising global temperatures and community concerns regarding the risk of wildfire, an updated plan with the required environmental site analysis is needed now to guide the City in performing and budgeting for the most effective, sustainable, and cost-efficient fuel reduction and forest conservation activities. To assist in this effort, the City of El Cerrito was awarded a $145,000 State Coastal Conservancy grant in September 2022 to complete the Plan by September 2024.

The purpose of this project is to establish and adopt a comprehensive fire hazard reduction and vegetation management plan for the City's HNA. The proposed plan will:

- identify and protect critical resource areas,
- guide the City's fire fuel reduction, native forest conservation, and maintenance activities, and
- evaluate fire road and trail network conditions.

REGULATORY SETTING

CEQA requires that public agencies having authority to finance or approve public or private projects assess the effects of those projects on cultural resources. Cultural resources include buildings, sites, structures, objects, or districts, each of which may have historical, architectural, archaeological, cultural, or scientific significance. CEQA states that if a proposed project would result in an effect that may cause a substantial adverse change in the significance of a significant cultural resource (termed a "historical resource"), alternative plans or mitigation measures must be considered. Because only significant cultural resources need to be addressed, the significance of cultural resources must be determined before mitigation measures are developed.

CEQA §5024.1 (Public Resources Code [PRC] §5024.1) and §15064.5 of the State CEQA Guidelines (14 California Code of Regulations [CCR] §15064.5) define a *historical resource* as "a resource listed or eligible for listing on the California Register of Historical Resources." A historical resource may be eligible for inclusion in the California Register of Historical Resources if it:

1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage
2) Is associated with the lives of persons important to our past
3) Embodies the distinctive characteristics of a type, period, region, or method of construction represents the work of an important creative individual; or possesses high artistic values; or
4) Has yielded, or may be likely to yield, information important to prehistory or history

In addition, CEQA also distinguishes between two classes of archaeological resources: archaeological sites that meet the definition of a historical resource, and "unique archaeological resources." An archaeological resource is considered unique if it:

- Is associated with an event or person of recognized significance in California or American history or of recognized scientific importance in prehistory
- Can provide information that is of demonstrable public interest and is useful in addressing scientifically consequential and reasonable research questions
- Has a special or particular quality such as oldest, best example, largest, or last surviving example of its kind
- Is at least 100 years old and possesses substantial stratigraphic integrity; or
- Involves important research questions that historical research has shown can be answered only with archaeological methods (Public Resources Code §21083.2)

According to the CEQA Guidelines, a project with an effect that may cause a substantial adverse change in the significance of a historical resource, or a unique archaeological resource is a project that may have a significant effect on the environment (14 CCR §15064.5[b]). CEQA further states that a substantial adverse change in the significance of a resource means the physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of a historical resource would be materially impaired.

NATURAL AND CULTURAL SETTING

The project area lies within the east bay region of the San Francisco Bay Area, where warm, dry summers are complemented by cool, wet winters with rainfall averaging 25–50 inches per year. This climate is complemented by a diverse topographic landscape bounded on the west by the Pacific Ocean, to the east by low coastal mountains and the Central Valley, and to the south by the southern coast mountain ranges. Accordingly, this region has a rich and diverse natural environment with lush stands of redwood, pine, and fir trees, as well as grassland, oak, and chaparral zones. Large expanses of these varied vegetation zones form extensive, highly productive interfaces where prehistoric people exploited staples, such as acorns. Moreover, these widespread verdant areas support abundant species of wildlife, also a staple resource for prehistoric people (Baumhoff 1978).

The geologic legacy of the San Francisco Bay area also proved important to local Native American groups. Rocks and minerals for tool production and other uses were abundant in the general region. Sources of obsidian continue to be present at Napa Mountain and Anadel, and Franciscan chert can be found in local streambeds. Equally important were deposits of asphaltum (a tar-like substance originating from natural oil seepage) in Marin County and hematite and cinnabar in Sonoma County. The geology of the project area vicinity is also an important consideration when evaluating factors that affect archaeological site visibility. The geomorphic setting of the project area and vicinity includes alluvial, colluvial, and estuarine environments that actively deposited sediments during the Holocene epoch. The region has also been subject to widespread filling during the historic and modern periods (Rice et al. 2002; Wagner et al. 2002) which may have buried prehistoric and early historic-period archaeological sites and remains.

Prehistoric Setting

The prehistoric cultural chronology for the Bay Area was developed over a century of organized archaeological survey, from N. C. Nelson in 1906 to the present day. Since the 1950s, archaeological work in Marin, San Francisco, and Contra Costa Counties has led to identification and refinement of a cultural sequence of early Native American occupation. This sequence consists of the Early Holocene (*Lower Archaic*), Early Period (*Middle Archaic*), Lower Middle Period (*Initial Upper Archaic*), Upper Middle Period (*Late Upper Archaic*), Initial Late Period (*Lower Emergent*), and Terminal Late Period.

The Early Holocene or Lower Archaic (8,000 B.C. – 3,500 B.C.) is characterized as a mobile forager pattern, with milling slabs, handstones, and a variety of large, wide-stemmed and leaf-shaped projectile points, largely composed of local Franciscan chert dominating archaeological assemblages (Hylkema 2002:235; Milliken et al. 2007:114). During the Early Period or Middle Archaic (3,500 B.C. – 500 B.C.), several technological and social developments emerged including new groundstone technology and the first cut shell beads in mortuaries suggest new levels of sedentism and increased regional trade in the Bay Area (Vellanoweth 2001). The Lower Middle Period or Initial Upper Archaic (500 B.C. – A.D. 430) is marked by a "major disruption in symbolic integration systems" (Milliken et al. 2007:115) and new bone tools appeared for the first time, including barbless fish spears, elk femur spatulas, tubes, and whistles, as well as coiled basketry manufacture (Bennyhoff 1986:70; Bieling 1998:218). During the Upper Middle Period or Late Upper Archaic, (A.D. 430 – 1050), many sites from the previous period were abandoned, and single-barbed bone fish spears, ear spools, and large mortars were developed (Milliken et al. 2007:116).

Following the Archaic Period, the Initial Late Period or Lower Emergent (A.D. 1050 – 1550) is marked by an increase in sedentism, status ascription, and ceremonial integration in lowland Central California (Fredrickson 1973). Increased social stratification throughout the Bay Area after 1250 A.D. is expressed in mortuary practices through the quality of goods in high-status burials and cremations (Fredrickson 1994). The Terminal Late Period is defined by changes in artifact types and mortuary objects including toggle harpoons, hopper mortars, plain corner-notched arrow-sized projectile points, clamshell disk beads, magnesite tube beads, and secondary cremation in the North Bay (Bennyhoff 1994:54; Wickstrom 1986).

Ethnographic Context

During the early decades of the 20th century, pioneering anthropologists including Alfred Kroeber of the University of California at Berkeley, laid the groundwork for understanding the cultures of California's indigenous peoples (Lightfoot 2005). Due to the extensive cultural diversity that existed within pre-colonial California, Kroeber and other early anthropologists created a framework to organize populations into language groups. The people living in central coastal California at the time of Euro-American contact were grouped into the Costanoan language family (also referred to as Ohlone), which occupied the coastal area from San Francisco Bay to south of Monterey Bay. Eight separate language groups are believed to have been within this family. Around fifty politically autonomous groups referred to as tribelets ranged in population from 50 to 500 individuals (Levy 1978). Linguistically, the Costanoan people were divided into large groups consisting of sets of tribelets that spoke a common dialect within a particular geographical area. The dialect spoken amongst the tribelets that occupied the Palo Alto area is believed to have been *Chochenyo*, one of the eight linguistically separate groups within the Costanoan family (Levy 1978). The closest documented village to the project area where Chochenyo was likely spoken was *Huchiun*, several miles to the northwest of the HNA. According to (Bennyhoff 1977:142), *Huchiun Costanoan is firmly established in the Point San Pablo-Richmond region. The tribelet center was probably CCO-270, in the present town of San Pablo*.

The Costanoan carefully managed the landscape within their territory with wildlife habitat and desirable fauna being enhanced through controlled burns. This burning also eased the gathering of acorns; a staple food for the Costanoans. Other plants utilized ethnographically include nuts of buckeye, laurel and hazelnut trees, seeds of various plants, numerous berries, and roots. Animals consumed by the Costanoan included deer, elk, antelope, grizzly bear, sea lion, whale, various small mammals, numerous species of birds and waterfowl, and several species of fish including steelhead, salmon, and sturgeon. The Costanoan people traded mussels, abalone shells, salt, and dried abalone with neighbors to the east, and obtained piñon nuts, obsidian, and other items in return (Levy 1978).

With the establishment of seven Spanish missions within traditional Costanoan territory beginning in 1769, native peoples experienced dramatic cultural changes. The introduction of Spanish administration led to the relocation of many native Californians from their villages to missions for the purpose of being "converted" and to serve as laborers. The exact timing and nature of the relocation of the Chochenyo speakers is difficult to determine. Mission Santa Clara began converting Native Americans in 1777 but prior to 1806 their records are problematic for determining tribal group affiliation. In 1797, Mission San Jose de Guadeloupe (Mission San Jose) began converting native peoples, yet their registers provide no tribal names until 1803 (Milliken 1995). Despite this information gap, more than likely, the Chochenyo group was brought under Spanish administration sometime between 1801, and 1806 in the Santa Clara, and San Jose Missions (Milliken 1995), and possibly Mission San Francisco de Asís (Mission Dolores) when other Costanoan groups were subjected to the same fate.

At the missions, native groups were subjected to a daily routine of agricultural labor and a regimented lifeway. By 1810, the indigenous people of present-day Contra Costa and the surrounding counties had been entirely relocated to the missions. With notable exceptions, such as the village of *Alisal* (in present-day Alameda County) where the traditional native social system persisted into the 20th century, the indigenous mode of existence had largely disappeared by 1810. By 1935, for all practical purposes the Costanoan language was extinct and, by 1968, less than 200 people could claim probable Costanoan/Ohlone descent (Levy 1978). Today, however, the Ohlone people are reinvesting in their culture and traditional lifeways. Through new-found political, economic, and social influence Costanoan peoples constitute a thriving native community within the broader context of present-day California.

Historic Period Setting

Although Spanish expeditions to the California coastline date to the 16th and early 17th centuries (e.g., Juan Rodriguez Cabrillo in 1542, Sebastian Rodriguez Cermeño in 1595, and Sebastián Vizcaino in 1602), the conventional date for the beginning of the Spanish Period in California is 1769, the date of the founding of the first mission in California, *Mission San Diego de Alcalá*. Spanish exploration of the San Francisco Bay Area and surrounding lands also began in 1769 when Gaspar de Portola led his expedition into Alta California to locate Monterey Bay. In 1774, Don Fernando de Rivera y Moncada headed another party to identify potential mission sites, and Juan Bautista de Anza followed with an expedition in 1776 (Beck and Haase 1974).

The Franciscans eventually established 21 missions and four presidios (military bases) between Sonoma and San Diego between 1769, and 1823 (Beck and Haase 1974). The missions were situated so that they could be reached within a day's ride of each other. The presidios were spread out evenly among the missions although some missions also housed soldiers within their walls. Most missions included a Convento (padre's residence), housing for the neophytes, and various other facilities such as school rooms, shops, mills, tanneries, storehouses, sheds, and livestock corrals. Other amenities, such as gardens, vineyards, orchards, cultivated fields, and grazing land were developed in and around the missions (Blackmar 1976) that were self-sustaining as they raised a variety of grains and crops as well as sheep and cattle.

Mexico achieved independence from Spain in 1821 at which time Alta California was declared a territory of the Mexican republic. In 1834, the Mexican government secularized the missions and divided their land holdings into ranchos including Rancho San Pablo within which the NHA is located. Rancho San Pablo was a 17,938-ac. land grant given to Francisco María Castro, a former soldier at the San Francisco Presidio and one-time *alcalde* of the Pueblo of San José, in 1823 (Beck and Haase 1974). With the cession of California to the United States following the Mexican–American War, the 1848 Treaty of Guadalupe Hidalgo provided that the land grants would be honored. As required by the California Land Act of 1851(9 Stat. 631), a claim for Rancho San Pablo was filed with the Public Land Commission by Joaquín Ysidro Castro in 1852, and the grant was patented to Joaquín Ysidro Castro in 1878.

El Cerrito

The most notable Euro-American to settle in what would become the City of El Cerrito was Wilhelm F. Rust, a native of Hannover (Germany) who immigrated to California in 1883. He leased property, built a blacksmith shop and his business grew supporting the local cattle ranches, dairies, and farms. As a community grew around his shop and a hardware store he later purchased, the settlement was named Rust in his honor. The town remained generally quiet and unremarkable until 1906 when the Sand Francisco earthquake destroyed much of the city and refugees fled to the east side of the San Francisco Bay and quickly settled in. The town of Rust essentially became official in 1909 when a post office was established in Rust's hardware store, and he took on the role as the Postmaster.

The town rapidly grew and was formally incorporated at El Cerrito (*little hill* in Spanish) in 1917 with a population of 1,500 residents. One of the first orders of business after the City was incorporated was to impose a license fee for each of the saloons in town to pay the wages of marshal, clerk and treasurer, and for other needs of the City. As there were nearly twenty saloons scattered about the community, mostly along San Pablo Avenue, the revenue was significant and for the first time, fire and police protection were also available to the new city's residents. Priority was given to a street paving program and soon after the incorporation the driving of cattle down San Pablo Avenue to a slaughterhouse on Central Avenue was stopped (El Cerrito Historical Society 2023).

Being just across from San Francisco, El Cerrito grew quickly, reaching a population of 3,852 in 1930, and 7,000 in 1940. During the World War II years, the population sky-rocketed to over 16,000 and with the post-war housing boom, to over 18,000 in 1950. Today, El Cerrito has a population of 24,000 and serves as an economic and cultural hub for the Bay Area.

Chung Mei Home

In 1923, Dr. Charles R. Shepard founded the Chung Mei Home for Chinese Boys after seeing dozens of hungry, abandoned Chinese boys in San Francisco's Chinatown. Shepard noted that "No other orphanage would take in children of color or Asiatic races." The home was first located in an old wooden building in Berkeley, but in part due to the efforts of the boys themselves, money was raised to build a larger facility and the location in El Cerrito was eventually chosen. The home (Chung Mei Home Historic District) was built in 1935 on a hillside bordered by Elm Street to the west and by existing residential housing to the north, east, and south. The home consisted of a main building, a maintenance building, an art studio, an L-shaped classroom building, a gymnasium, a library/classroom building, and numerous additional structures, buildings, and features. From 1935 to 1954, the home provided residential care, guidance, and structure for neglected and abandoned Chinese boys. The present-day Chung Mei Home for Chinese Boys Historic District (the District) still reflects its institutional design and integrity. LSA Associates of Richmond, California completed a Historical Resources Evaluation of the district in 2007. The evaluation concluded that the District appeared eligible for listing on the California Register of Historical Resources for its association with the Chinese experience in California and the San Francisco Bay Area.

NATIVE AMERICAN COMMUNITY OUTREACH

Public Resources Code (PRC) Sections 21080.1, 21080.3.1, and 21080.3.2 require public agencies to consult with the appropriate California Native American tribes identified by the Native American Heritage Commission (NAHC) for the purpose of mitigating impacts to cultural resources. To meet PRC requirements, on August 15th, 2023, SAS emailed a letter and a map depicting the project area and surrounding vicinity to the NAHC requesting a Sacred Lands File (SLF) search, and a list of Native American community representatives who might have an interest in, or concerns with the proposed Project. The NAHC responded to SAS on August 24th stating that the search of the SLF was positive, indicating that a culturally sensitive property had been identified within or near the project area (Attachment B).

The NAHC also provided a list of appropriate local tribal organizations and individual contacts each of which SAS by mailed letter on August 30th, 2023, informing them of the proposed Project and inquiring if they had any knowledge of cultural properties within or near the project area. On September 11th, Francis Ranstead, Tribal Administrator for the Confederated Villages of Lisjan Nation (Lisjan Nation), emailed SAS and noted that:

> *The Tribe would like to consult for this project. You can find our Calendly link below to schedule a consultation at your earliest convenience. Please make sure to include the project name in the notes section when scheduling the consultation to help us prepare for our meeting.*

Francis Ranstead, in a separate email, also requested:

> *…a copy of the final CHRIS, Sacred Lands File and EIR for this project, along with the SLF from Native American Heritage Commission and any additional archeological reports. Our physical address is: PO BOX 6487 Oakland CA 94603 or if you would prefer to send them electronically, please send them to this email address.*

Since SAS cannot directly engage in Consultation and requests for Project documentation have to go through the City, SAS forwarded these requests to the City for further action. No other requests have been forwarded from any of the contacts suggested by the NAHC. If additional outreach or requests for Consultation are received, SAS will forward them to the City and prepare an addendum to this report if necessary.

The Lisjan Nation also engaged directly with the City in a meeting on October 18th, 2023. At this meeting, the Lisjan Nation representatives requested confirmation that ground disturbances would not occur near creek bottoms and that the City would notify them if the scope changed. The representatives also requested a copy of this report which the City provided.

CALIFORNIA HISTORICAL RESOURCES INFORMATION SYSTEM RECORDS SEARCH

The Northwest Information Center (NWIC) of the California Historical Resources Information System provided the results of a record search request to SAS on September 18th, 2023 (NWIC File No. 23-0215). This search included a review of the NWIC archives for previously known or recorded cultural resources, studies, and isolates within the project area and a half-mile (mi.) radius. The search also included, but was not necessarily restricted to, a review of the following sources:

- The *National Register of Historic Places* (Historic Properties Directory, California Office of Historic Preservation)
- The *California Register of Historic Places* (Historic Properties Directory, California Office of Historic Preservation)
- The *California Historical Landmarks* (California Office of Historic Preservation)
- The *California Points of Historical Interest* (California Office of Historic Preservation)
- The *California Inventory of Historic Resources* (California Department of Parks and Recreation).

The NWIC record search indicated that one cultural resource, a house built in 1898 on Navellier Street (P-07-000995), was located immediately adjacent to the project area. NWIC also reported six additional cultural resources within one half-mi. of the project area:

- P-07-002714: Prehistoric shell midden at 8420 Buckingham Ave.
- P-07-002910: Chung Me Home for Chinese Boys District / Windrush School
- P-07-002911: Main building - Chung Me Home for Chinese Boys
- P-07-002912: Maintenance building - Chung Me Home for Chinese Boys
- P-07-002913: Windrush School classroom building
- P-07-003064: Indian mound at Navellier Street

The NWIC also noted that two previous cultural resources investigations included at least a portion of the current project area and an additional five studies have been conducted within the half-mi. search area.

ADDITIONAL RESEARCH

In order to ascertain patterns of public-private land ownership within the project area and identify potential undocumented cultural resources and sensitive landforms, SAS conducted additional archival research focused on historic mapping and federal land transfer records. This research consisted of reviews of the Bureau of Land Management's General Land Office (GLO) archives including patent records, historical USGS topographic quadrangle maps, and aerial photography.

USGS mapping showing the project area and surrounding region dates to as early as 1895 with regular modifications and re-prints throughout the 20th century. The early topographic quadrangle (1895) does not show any developments within the project area other than a possible building at the current-day intersection of Arlington Boulevard and where Scenic Drive would be constructed in the mid-late 1940s (outside the HNA). This building appears on USGS mapping between 1895, and 1947 after which time development was clearly shown encroaching on the area where the HNA would eventually be established. Historic aerial photography, which only dates to as early as 1946, does not show any indications of a structure or building at the Arlington Boulevard/Scenic Drive location. The duration of its depiction on USGS mapping well into the 1940s suggests the symbol for the building on the USGS mapping was an error simply transferred onto later printings long after the actual building or structure was gone.

Aerial photography generally confirms a lack of buildings, structures, or substantial road alignments in the HNA parcels. However, a clear picture of encroaching urban/suburban development can be seen during the latter half of the 20th century.

A review of GLO land patent records detailing the transfers of public land to private individuals and companies (or the State of California) shows that only one patent was issued for lands encompassing the project area. This was for the 17,938-ac. Rancho San Pablo which, under the California Land Act of 1851, was formally patented to Francisco Maria Castro, Juaquin Isidro Castro, and Juaquin Y. Castro. The 1867 GLO plat map of Township 1 North, Range 4 West shows the boundaries of the Rancho San Pablo but no other developments, natural features, or survey markers are depicted which was common practice at the time for Mexican land grant properties.

FIELD SURVEY

Methods

On September 27th, 2023, SAS archaeologists conducted an intensive pedestrian survey of the project area utilizing pedestrian transects spaced no greater than approximately 10 meters apart. A sub-meter accurate Trimble GPS unit was utilized to verify project area boundaries and to record locations of landscape features and cultural resources. In areas where extremely steep hillsides and/or impenetrably dense vegetation were present, opportunistic survey techniques were employed as necessary using existing trails within the HNA.

Results

The project area consists of a rugged landscape of slopes, drainages, and dense woodlands on a series of steep-sided hills with a western aspect towards San Francisco Bay. Ground surface visibility was poor throughout the project area due to heavy vegetation with the exception of small erosional areas along established trails, and in rodent burrows. One previously documented historic-era resource, the 1898 house on Navellier Street (P-07-000995) was noted by the SAS field team. No other historic-era or early Native American sites, features, sensitive landforms or soil types (e.g., midden) or artifacts were recorded. Representative photographs of the overall project area as encountered in the field survey are included as Attachment C.

SUMMARY AND RECOMMENDATIONS

Archival research, outreach to the Native American community, and an intensive field survey did not document indications of prehistoric activities in the project area. Although the NAHC noted that a culturally significant property was known to be present within or near the project area, none of the tribal contacts and representatives have expressed any concerns regarding this possible site. In addition, an intensive field survey did not identify any potentially sensitive landforms or significant level terrain in the project area, suggesting it retains a low level of sensitivity for containing traces of early Native American occupation. Concerning historic period resources, historic mapping, aerial photographs, archival research, and the field survey indicated that no developments of any kind occurred in the project area although P-07-000995 is located immediately adjacent. Consequently, SAS proposes a low level of sensitivity for the project area to exhibit potentially significant historic-era sites, features, or artifacts. As P-07-000995 would not be affected by the proposed Project, no Native American representatives or groups have expressed concerns regarding the Project, and research did not identify any cultural resources or sensitive landforms, SAS recommends that the Project would have *no impact on historical resources* per CEQA.

If human remains or any associated funerary artifacts are discovered during construction, all work must cease within the immediate vicinity of the discovery. In accordance with the California Health and Safety Code (Section 7050.5), the Contra Costa County Sheriff/Coroner must be contacted immediately. If the Coroner determines the remains to be Native American, the Coroner will notify the Native American Heritage Commission, which will in turn appoint a Most Likely Descendent (MLD) to act as a tribal representative. The MLD will work with the City and a qualified archaeologist to determine the proper treatment of the human remains and any associated funerary objects. Construction activities will not resume until either the human remains are exhumed, or the remains are avoided via Project construction design change.

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ATTACHMENT A

Figures

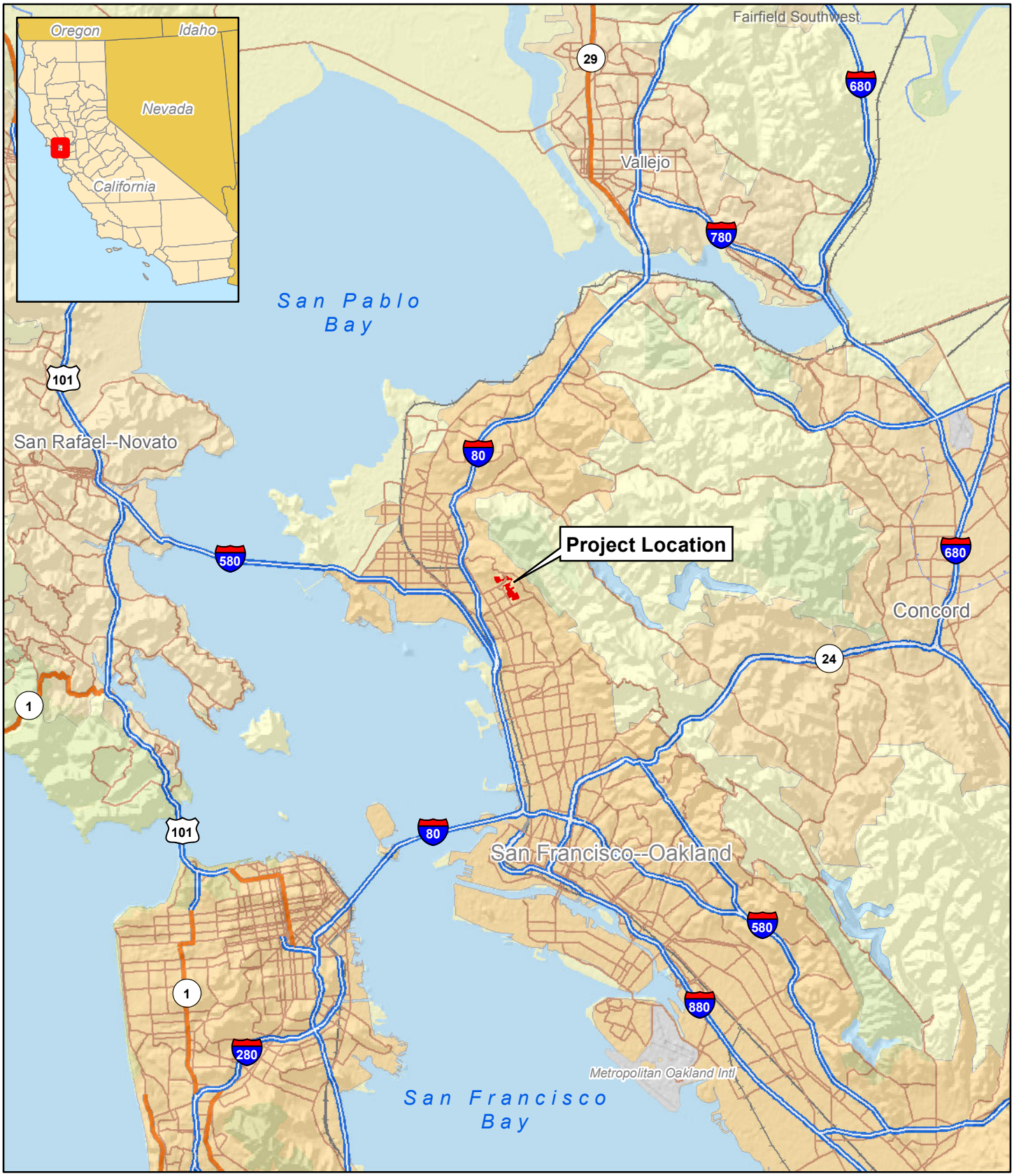


Figure 1. Project Vicinity Map.

Hillside natural Area Plan Project Area

Sources: *USA Base Map* [layer],*Data and Maps* [CD]. ESRI, 2006.

1:250,000

0 3 Miles

0 6 Kilometers

SAS ARCHAEOLOGICAL SERVICES

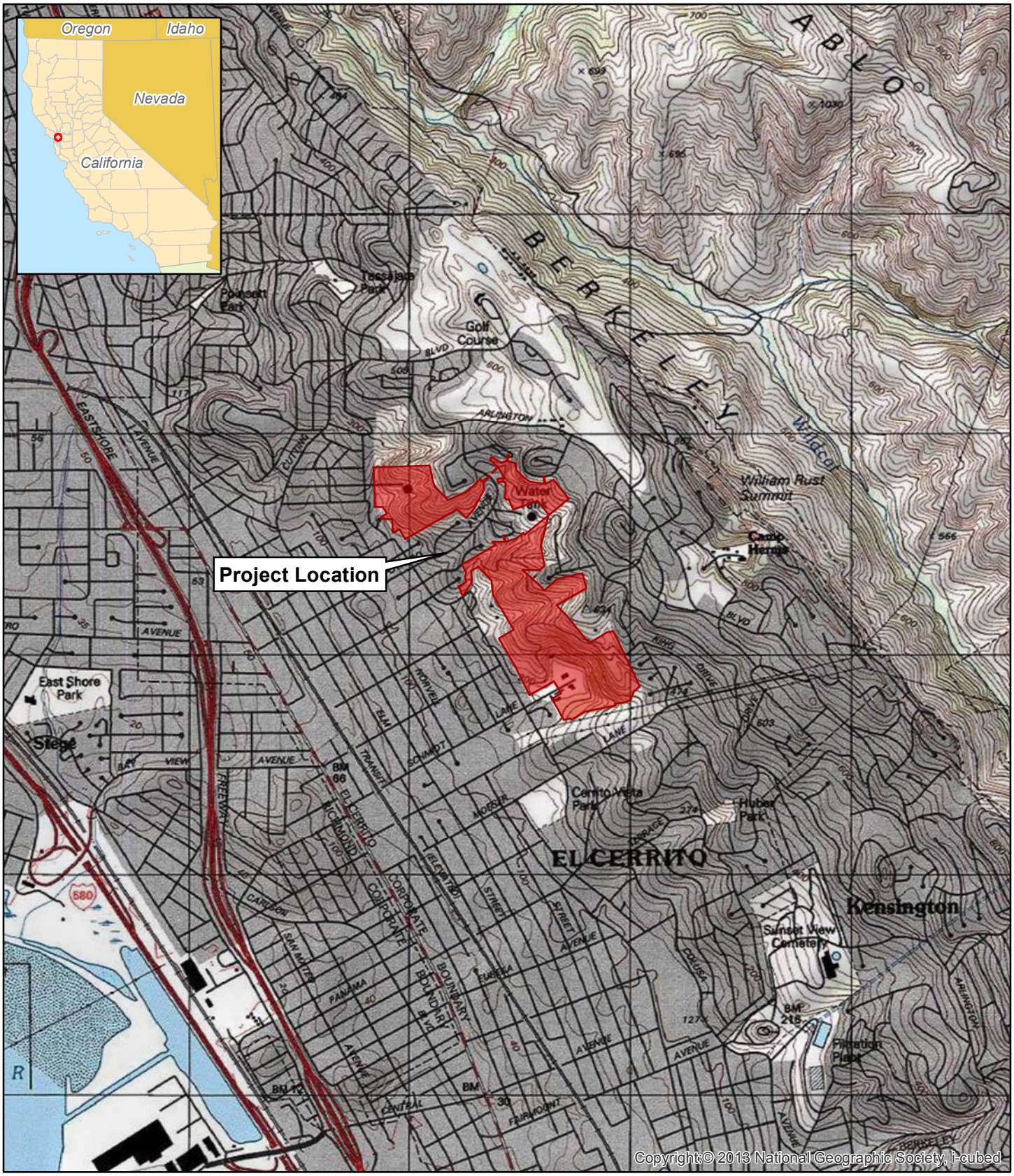


Figure 2. Project Location Map.

Hillside Natural Area Plan Project Area

San Pablo Land Grant (Presumed T01N, R04W, Secs 15, 16, 21 and 22).
Richmond 7.5' Series Quadrangle, USGS, 1980.

1:24,000

0.5 Miles

1 Kilometers

Figure 3. Project Area Map.

Hillside Natural Area Plan Project Area

Total Acres: 106.22

1:10,000

0 500 Feet

0 250 Meters

ATTACHMENT B

Native American Community Outreach

NATIVE AMERICAN HERITAGE COMMISSION

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

August 24, 2023

Brian Ludwig, Ph.D.
Solano Archaeological Services

Via Email to: brian@solanoarchaeology.com

Re: Native American Tribal Consultation, Pursuant to the Assembly Bill 52 (AB 52), Amendments to the California Environmental Quality Act (CEQA) (Chapter 532, Statutes of 2014), Public Resources Code Sections 5097.94 (m), 21073, 21074, 21080.3.1, 21080.3.2, 21082.3, 21083.09, 21084.2 and 21084.3, Hillside Natural Area Fire Resilience and Forest Conservation Management Plan Project, Alameda County

To Whom It May Concern:

Pursuant to Public Resources Code section 21080.3.1 (c), attached is a consultation list of tribes that are traditionally and culturally affiliated with the geographic area of the above-listed project. Please note that the intent of the AB 52 amendments to CEQA is to avoid and/or mitigate impacts to tribal cultural resources, (Pub. Resources Code §21084.3 (a)) ("Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource.")

Public Resources Code sections 21080.3.1 and 21084.3(c) require CEQA lead agencies to consult with California Native American tribes that have requested notice from such agencies of proposed projects in the geographic area that are traditionally and culturally affiliated with the tribes on projects for which a Notice of Preparation or Notice of Negative Declaration or Mitigated Negative Declaration has been filed on or after July 1, 2015. Specifically, Public Resources Code section 21080.3.1 (d) provides:

Within 14 days of determining that an application for a project is complete or a decision by a public agency to undertake a project, the lead agency shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, which shall be accomplished by means of at least one written notification that includes a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation pursuant to this section.

The AB 52 amendments to CEQA law does not preclude initiating consultation with the tribes that are culturally and traditionally affiliated within your jurisdiction prior to receiving requests for notification of projects in the tribe's areas of traditional and cultural affiliation. The Native American Heritage Commission (NAHC) recommends, but does not require, early consultation as a best practice to ensure that lead agencies receive sufficient information about cultural resources in a project area to avoid damaging effects to tribal cultural resources.

The NAHC also recommends, but does not require that agencies should also include with their notification letters, information regarding any cultural resources assessment that has been completed on the area of potential effect (APE), such as:

1. The results of any record search that may have been conducted at an Information Center of the California Historical Resources Information System (CHRIS), including, but not limited to:

- A listing of any and all known cultural resources that have already been recorded on or adjacent to the APE, such as known archaeological sites;
- Copies of any and all cultural resource records and study reports that may have been provided by the Information Center as part of the records search response;
- Whether the records search indicates a low, moderate, or high probability that unrecorded cultural resources are located in the APE; and
- If a survey is recommended by the Information Center to determine whether previously unrecorded cultural resources are present.

2. The results of any archaeological inventory survey that was conducted, including:

- Any report that may contain site forms, site significance, and suggested mitigation measures.

  All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure in accordance with Government Code section 6254.10.

3. The result of any Sacred Lands File (SLF) check conducted through the Native American Heritage Commission was positive. Please contact the tribes on the attached list for more information.

4. Any ethnographic studies conducted for any area including all or part of the APE; and

5. Any geotechnical reports regarding all or part of the APE.

Lead agencies should be aware that records maintained by the NAHC and CHRIS are not exhaustive and a negative response to these searches does not preclude the existence of a tribal cultural resource. A tribe may be the only source of information regarding the existence of a tribal cultural resource.

This information will aid tribes in determining whether to request formal consultation. In the event that they do, having the information beforehand will help to facilitate the consultation process.

If you receive notification of change of addresses and phone numbers from tribes, please notify the NAHC. With your assistance, we can assure that our consultation list remains current.

If you have any questions, please contact me at my email address: Cody.Campagne@nahc.ca.gov.

Sincerely,

Cody Campagne

Cody Campagne
Cultural Resources Analyst

Attachment

Native American Heritage Commission
Native American Contact List
Contra Costa County
8/24/2023

County	Tribe Name	Fed (F) Non-Fed (N)	Contact Person	Contact Address	Phone #	Fax #	Email Address	Cultural Affiliation	Counties	Last Updated
Contra Costa	Amah MutsunTribal Band of Mission San Juan Bautista	N	Irene Zwierlein, Chairperson	3030 Soda Bay Road Lakeport, CA, 95453	(650) 851-7489	(650) 332-1526	amahmutsuntribal@gmail.com	Costanoan	Alameda,Contra Costa,Monterey,San Benito,San Francisco,San Mateo,Santa Clara,Santa Cruz	
	Confederated Villages of Lisjan Nation	N	Corrina Gould, Chairperson	10926 Edes Avenue Oakland, CA, 94603	(510) 575-8408		cvltribe@gmail.com	Bay Miwok Ohlone Delta Yokut	Alameda,Contra Costa,Sacramento,San Joaquin,Santa Clara,Solano,Stanislaus	3/22/2023
	Confederated Villages of Lisjan Nation	N	Deja Gould, Language Program Manager	10926 Edes Ave Oakland, CA, 94603	(510) 575-8408		cvltribe@gmail.com	Bay Miwok Ohlone Delta Yokut	Alameda,Contra Costa,Sacramento,San Joaquin,Santa Clara,Solano,Stanislaus	3/22/2023
	Confederated Villages of Lisjan Nation	N	Cheyenne Gould, Tribal Cultural Resource Manager	10926 Edes Ave Oakland, CA, 94603	(510) 575-8408		cvltribe@gmail.com	Bay Miwok Ohlone Delta Yokut	Alameda,Contra Costa,Sacramento,San Joaquin,Santa Clara,Solano,Stanislaus	3/22/2023
	Guidiville Rancheria of California	F	Bunny Tarin, Tribal Administrator	PO Box 339 Talmage, CA, 95481	(707) 462-3682		admin@guidiville.net	Pomo	Alameda,Contra Costa,Lake,Marin,Mendocino,Napa,Sacramento,San Joaquin,Solano,Sonoma	6/21/2023
	Guidiville Rancheria of California	F	Michael Derry, Historian	PO Box 339 Talmage, CA, 95481	(707) 391-1665		historian@guidiville.net	Pomo	Alameda,Contra Costa,Lake,Marin,Mendocino,Napa,Sacramento,San Joaquin,Solano,Sonoma	6/21/2023
	Indian Canyon Mutsun Band of Costanoan	N	Ann Marie Sayers, Chairperson	P.O. Box 28 Hollister, CA, 95024	(831) 637-4238		ams@indiancanyon.org	Costanoan	Alameda,Contra Costa,Monterey,San Benito,San Francisco,San Mateo,Santa Clara,Santa Cruz	
	Indian Canyon Mutsun Band of Costanoan	N	Kanyon Sayers-Roods, MLD Contact	1615 Pearson Court San Jose, CA, 95122	(408) 673-0626		kanyon@kanyonkonsulting.com	Costanoan	Alameda,Contra Costa,Monterey,San Benito,San Francisco,San Mateo,Santa Clara,Santa Cruz	4/17/2018
	Muwekma Ohlone Indian Tribe of the SF Bay Area	N	Charlene Nijmeh, Chairperson	20885 Redwood Road, Suite 232 Castro Valley, CA, 94546	(408) 464-2892		cnijmeh@muwekma.org	Costanoan	Alameda,Contra Costa,Marin,Merced,Napa,Sacramento,San Francisco,San Joaquin,San Mateo,Santa Clara,Santa Cruz,Solano,Sonoma,Stanislaus	
	Muwekma Ohlone Indian Tribe of the SF Bay Area	N	Monica Arellano, Vice Chairwoman	20885 Redwood Road, Suite 232 Castro Valley, CA, 94546	(408) 205-9714		monicavarellano@gmail.com	Costanoan	Alameda,Contra Costa,Marin,Merced,Napa,Sacramento,San Francisco,San Joaquin,San Mateo,Santa Clara,Santa Cruz,Solano,Sonoma,Stanislaus	7/12/2019
	The Ohlone Indian Tribe	N	Vincent Medina, Tribal Consultant	17365 Via Del Rey San Lorenzo, CA, 94580	(510) 610-7587		vincent.d.medina@gmail.com	Bay Miwok Ohlone Patwin Plains Miwok	Alameda,Contra Costa,San Francisco,San Mateo,Santa Clara	7/24/2023
	The Ohlone Indian Tribe	N	Andrew Galvan, Chairperson	P.O. Box 3388 Fremont, CA, 94539	Phone: (510) 882-0527	(510) 687-9393	chochenyo@AOL.com	Bay Miwok Ohlone Patwin Plains Miwok	Alameda,Contra Costa,San Francisco,San Mateo,Santa Clara	7/24/2023
	The Ohlone Indian Tribe	N	Desiree Vigil, THPO	1775 Marco Polo Way, Apt. 21 Burlingame, CA, 94010	(650) 290-0245		dirwin0368@yahoo.com	Bay Miwok Ohlone Patwin Plains Miwok	Alameda,Contra Costa,San Francisco,San Mateo,Santa Clara	7/24/2023

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and section 5097.98 of the Public Resources Code.

This list is only applicable for consultation with Native American tribes under Public Resources Code Sections 21080.3.1 for the proposed Hillside Natural Area Fire Resilience and Forest Conservation Management Plan Project, Contra Costa County.

Record: PROJ-2023-004249
Report Type: AB52 GIS
Counties: Contra Costa
NAHC Group: All

P.O. Box 367
Elmira, CA 95625

707-718-1416 ▲ Fax 707-451-4775
www.solanoarchaeology.com

August 30th, 2023

The Ohlone Indian Tribe
Andrew Galvan
P.O. Box 3388
Fremont, CA 94539

Re: Hillside Natural Area Fire Resilience and Forest Conservation Management Plan Project, City of El Cerrito, Alameda County, California

Dear Mr. Galvan:

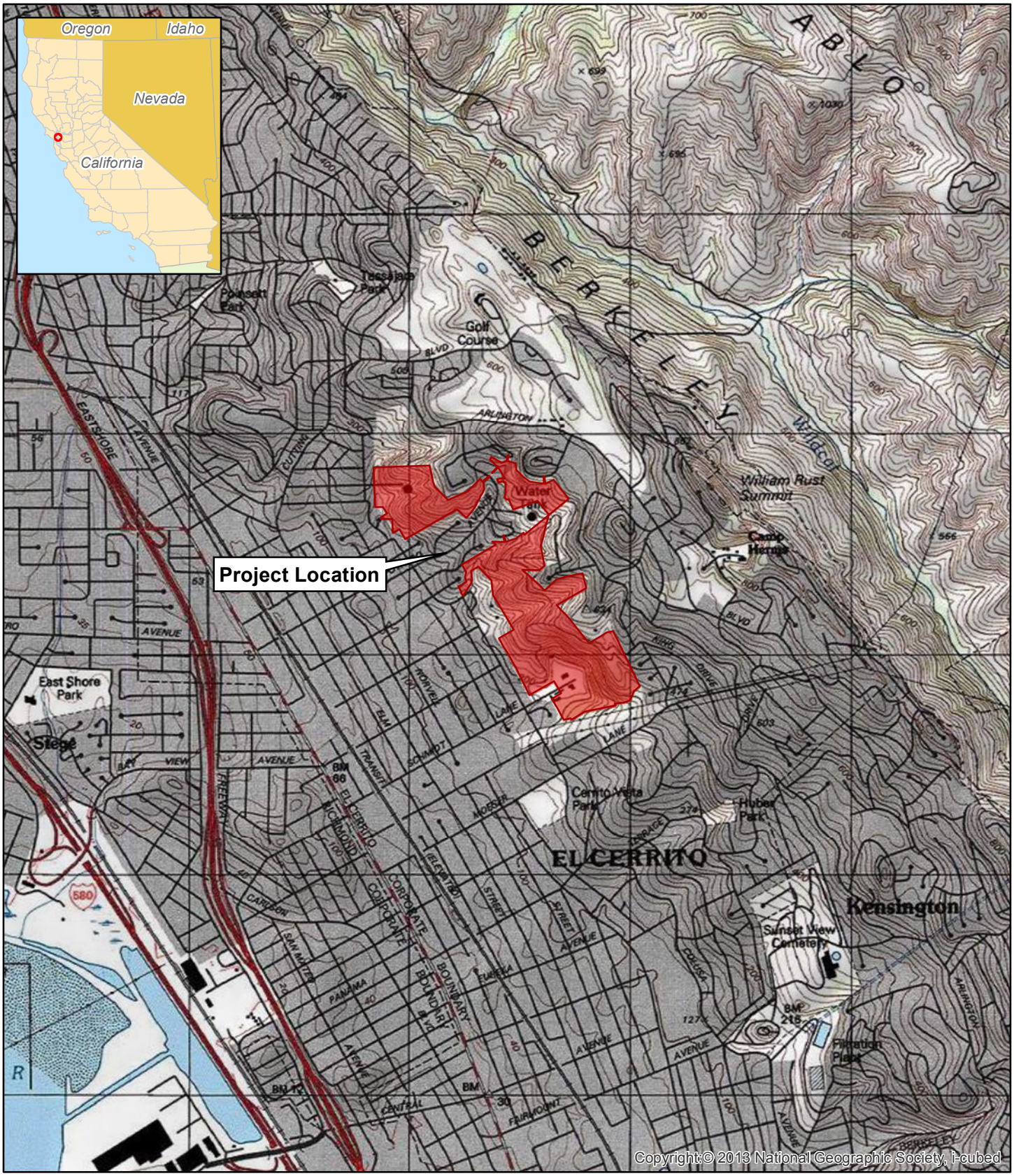
LSA Associates has retained Solano Archaeological Services (SAS) to conduct a cultural resources inventory of an approximately 107-acre project area located near Potrero Avenue in the City of El Cerrito (the City) in Alameda County, California. The City was awarded a State Coastal Conservancy grant with which to conduct forest revitalization activities, and as such the Project is subject to California Environmental Quality Act requirements. The project area is situated in the San Pablo Land Grant in projected Township 1 North, Range 4 East, as depicted on the attached *Richmond, California* USGS 7.5' topographic quadrangle map.

The cultural investigation will include an intensive field survey and we would like to know if you have any knowledge of cultural resources in the vicinity. For your information, the Native American Heritage Commission conducted a search of the Sacred Lands File and identified a previously documented culturally sensitive site or property within or near the project area. If you have any concerns with the proposed Project or know of any potentially significant properties in the area, I would appreciate hearing from you.

If you have any questions, feel free to contact me by email at brian@solanoarchaeology, or via phone at 530-417-7007.

Regards,

Brian Ludwig, Ph.D.
Principal Investigator



Project Location Map.

Hillside Conservation Management Plan Project Area

San Pablo Land Grant (Presumed T01N, R04W, Secs 15, 16, 21 and 22).
Richmond 7.5' Series Quadrangle, USGS, 1980.

1:24,000

0.5 Miles

1 Kilometers

SAS ARCHAEOLOGICAL SERVICES

P.O. Box 367
Elmira, CA 95625

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www.solanoarchaeology.com

August 30th, 2023

Indian Canyon Mutsun Band of Costanoan
Ann Marie Sayers, Chair
P.O. Box 28
Hollister, CA 95024

Re: Hillside Natural Area Fire Resilience and Forest Conservation Management Plan Project, City of El Cerrito, Alameda County, California

Dear Ms. Sayers:

LSA Associates has retained Solano Archaeological Services (SAS) to conduct a cultural resources inventory of an approximately 107-acre project area located near Potrero Avenue in the City of El Cerrito (the City) in Alameda County, California. The City was awarded a State Coastal Conservancy grant with which to conduct forest revitalization activities, and as such the Project is subject to California Environmental Quality Act requirements. The project area is situated in the San Pablo Land Grant in projected Township 1 North, Range 4 East, as depicted on the attached *Richmond, California* USGS 7.5' topographic quadrangle map.

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Regards,

Brian Ludwig, Ph.D.
Principal Investigator

P.O. Box 367
Elmira, CA 95625

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www.solanoarchaeology.com

August 30th, 2023

Guidiville Rancheria
Bunny Tarin, Tribal Administrator
P.O. Box 339
Talmage, CA 95481

Re: Hillside Natural Area Fire Resilience and Forest Conservation Management Plan Project, City of El Cerrito, Alameda County, California

Dear Ms. Tarin:

LSA Associates has retained Solano Archaeological Services (SAS) to conduct a cultural resources inventory of an approximately 107-acre project area located near Potrero Avenue in the City of El Cerrito (the City) in Alameda County, California. The City was awarded a State Coastal Conservancy grant with which to conduct forest revitalization activities, and as such the Project is subject to California Environmental Quality Act requirements. The project area is situated in the San Pablo Land Grant in projected Township 1 North, Range 4 East, as depicted on the attached *Richmond, California* USGS 7.5' topographic quadrangle map.

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Regards,

Brian Ludwig, Ph.D.
Principal Investigator

P.O. Box 367
Elmira, CA 95625

707-718-1416 ▲ Fax 707-451-4775
www.solanoarchaeology.com

August 30th, 2023

Muwekma Ohlone Indian Tribe of the San Francisco Bay Area
Charlene Nijmeh, Chair
20885 Redwood Rd.
Suite 232
Castro Valley, CA 94546

Re: Hillside Natural Area Fire Resilience and Forest Conservation Management Plan Project, City of El Cerrito, Alameda County, California

Dear Ms. Nijmeh:

LSA Associates has retained Solano Archaeological Services (SAS) to conduct a cultural resources inventory of an approximately 107-acre project area located near Potrero Avenue in the City of El Cerrito (the City) in Alameda County, California. The City was awarded a State Coastal Conservancy grant with which to conduct forest revitalization activities, and as such the Project is subject to California Environmental Quality Act requirements. The project area is situated in the San Pablo Land Grant in projected Township 1 North, Range 4 East, as depicted on the attached *Richmond, California* USGS 7.5' topographic quadrangle map.

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Regards,

Brian Ludwig, Ph.D.
Principal Investigator

P.O. Box 367
Elmira, CA 95625

707-718-1416 ▲ Fax 707-451-4775
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August 30th, 2023

Confederated Villages of Lisjan Nation
Cheyenne Gould
10926 Edes Ave.
Oakland, CA 94603

Re: Hillside Natural Area Fire Resilience and Forest Conservation Management Plan Project, City of El Cerrito, Alameda County, California

Dear Ms. Gould:

LSA Associates has retained Solano Archaeological Services (SAS) to conduct a cultural resources inventory of an approximately 107-acre project area located near Potrero Avenue in the City of El Cerrito (the City) in Alameda County, California. The City was awarded a State Coastal Conservancy grant with which to conduct forest revitalization activities, and as such the Project is subject to California Environmental Quality Act requirements. The project area is situated in the San Pablo Land Grant in projected Township 1 North, Range 4 East, as depicted on the attached *Richmond, California* USGS 7.5' topographic quadrangle map.

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Principal Investigator

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August 30th, 2023

Confederated Villages of Lisjan Nation
Corrina Gould, Chair
10926 Edes Ave.
Oakland, CA 94603

Re: Hillside Natural Area Fire Resilience and Forest Conservation Management Plan Project, City of El Cerrito, Alameda County, California

Dear Ms. Gould:

LSA Associates has retained Solano Archaeological Services (SAS) to conduct a cultural resources inventory of an approximately 107-acre project area located near Potrero Avenue in the City of El Cerrito (the City) in Alameda County, California. The City was awarded a State Coastal Conservancy grant with which to conduct forest revitalization activities, and as such the Project is subject to California Environmental Quality Act requirements. The project area is situated in the San Pablo Land Grant in projected Township 1 North, Range 4 East, as depicted on the attached *Richmond, California* USGS 7.5' topographic quadrangle map.

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Principal Investigator

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August 30th, 2023

Confederated Villages of Lisjan Nation
Deja Gould
10926 Edes Ave.
Oakland, CA 94603

Re: Hillside Natural Area Fire Resilience and Forest Conservation Management Plan Project, City of El Cerrito, Alameda County, California

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Regards,

Brian Ludwig, Ph.D.
Principal Investigator

P.O. Box 367
Elmira, CA 95625

707-718-1416 ▲ Fax 707-451-4775
www.solanoarchaeology.com

August 30th, 2023

The Ohlone Indian Tribe
Desiree Vigil
1775 Marco Polo Way, Apt. 21
Burlingame, CA 94010

Re: Hillside Natural Area Fire Resilience and Forest Conservation Management Plan Project, City of El Cerrito, Alameda County, California

Dear Ms. Vigil:

LSA Associates has retained Solano Archaeological Services (SAS) to conduct a cultural resources inventory of an approximately 107-acre project area located near Potrero Avenue in the City of El Cerrito (the City) in Alameda County, California. The City was awarded a State Coastal Conservancy grant with which to conduct forest revitalization activities, and as such the Project is subject to California Environmental Quality Act requirements. The project area is situated in the San Pablo Land Grant in projected Township 1 North, Range 4 East, as depicted on the attached *Richmond, California* USGS 7.5' topographic quadrangle map.

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Regards,

Brian Ludwig, Ph.D.
Principal Investigator

P.O. Box 367
Elmira, CA 95625

707-718-1416 ▲ Fax 707-451-4775
www.solanoarchaeology.com

August 30th, 2023

Amah Mutsun Tribal Band of Mission San Juan Bautista
Irene Zwierlein, Chair
3030 Soda Bay Rd.
Lakeport, CA 95453

Re: Hillside Natural Area Fire Resilience and Forest Conservation Management Plan Project, City of El Cerrito, Alameda County, California

Dear Ms. Zwierlein:

LSA Associates has retained Solano Archaeological Services (SAS) to conduct a cultural resources inventory of an approximately 107-acre project area located near Potrero Avenue in the City of El Cerrito (the City) in Alameda County, California. The City was awarded a State Coastal Conservancy grant with which to conduct forest revitalization activities, and as such the Project is subject to California Environmental Quality Act requirements. The project area is situated in the San Pablo Land Grant in projected Township 1 North, Range 4 East, as depicted on the attached *Richmond, California* USGS 7.5' topographic quadrangle map.

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Regards,

Brian Ludwig, Ph.D.
Principal Investigator

P.O. Box 367
Elmira, CA 95625

707-718-1416 ▲ Fax 707-451-4775
www.solanoarchaeology.com

August 30th, 2023

Indian Canyon Mutsun Band of Costanoan
Kanyon Sayers-Roods
P.O. Box 28
Hollister, CA 95024

Re: Hillside Natural Area Fire Resilience and Forest Conservation Management Plan Project, City of El Cerrito, Alameda County, California

Dear Ms. Sayers-Roods:

LSA Associates has retained Solano Archaeological Services (SAS) to conduct a cultural resources inventory of an approximately 107-acre project area located near Potrero Avenue in the City of El Cerrito (the City) in Alameda County, California. The City was awarded a State Coastal Conservancy grant with which to conduct forest revitalization activities, and as such the Project is subject to California Environmental Quality Act requirements. The project area is situated in the San Pablo Land Grant in projected Township 1 North, Range 4 East, as depicted on the attached *Richmond, California* USGS 7.5' topographic quadrangle map.

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Regards,

Brian Ludwig, Ph.D.
Principal Investigator

P.O. Box 367
Elmira, CA 95625

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www.solanoarchaeology.com

August 30th, 2023

Guidiville Rancheria
Michael Derry, Historian
P.O. Box 339
Talmage, CA 95481

Re: Hillside Natural Area Fire Resilience and Forest Conservation Management Plan Project, City of El Cerrito, Alameda County, California

Dear Mr. Derry:

LSA Associates has retained Solano Archaeological Services (SAS) to conduct a cultural resources inventory of an approximately 107-acre project area located near Potrero Avenue in the City of El Cerrito (the City) in Alameda County, California. The City was awarded a State Coastal Conservancy grant with which to conduct forest revitalization activities, and as such the Project is subject to California Environmental Quality Act requirements. The project area is situated in the San Pablo Land Grant in projected Township 1 North, Range 4 East, as depicted on the attached *Richmond, California* USGS 7.5' topographic quadrangle map.

The cultural investigation will include an intensive field survey and we would like to know if you have any knowledge of cultural resources in the vicinity. For your information, the Native American Heritage Commission conducted a search of the Sacred Lands File and identified a previously documented culturally sensitive site or property within or near the project area. If you have any concerns with the proposed Project or know of any potentially significant properties in the area, I would appreciate hearing from you.

If you have any questions, feel free to contact me by email at brian@solanoarchaeology, or via phone at 530-417-7007.

Regards,

Brian Ludwig, Ph.D.
Principal Investigator

P.O. Box 367
Elmira, CA 95625

707-718-1416 ▲ Fax 707-451-4775
www.solanoarchaeology.com

August 30th, 2023

Muwekma Ohlone Indian Tribe of the San Francisco Bay Area
Monica Arellano
20885 Redwood Rd.
Suite 232
Castro Valley, CA 94546

Re: Hillside Natural Area Fire Resilience and Forest Conservation Management Plan Project, City of El Cerrito, Alameda County, California

Dear Ms. Arellano:

LSA Associates has retained Solano Archaeological Services (SAS) to conduct a cultural resources inventory of an approximately 107-acre project area located near Potrero Avenue in the City of El Cerrito (the City) in Alameda County, California. The City was awarded a State Coastal Conservancy grant with which to conduct forest revitalization activities, and as such the Project is subject to California Environmental Quality Act requirements. The project area is situated in the San Pablo Land Grant in projected Township 1 North, Range 4 East, as depicted on the attached *Richmond, California* USGS 7.5' topographic quadrangle map.

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August 30th, 2023

The Ohlone Indian Tribe
Vincent Medina
17365 Via Del Rey
San Lorenzo, CA 94580

Re: Hillside Natural Area Fire Resilience and Forest Conservation Management Plan Project, City of El Cerrito, Alameda County, California

Dear Mr. Medina:

LSA Associates has retained Solano Archaeological Services (SAS) to conduct a cultural resources inventory of an approximately 107-acre project area located near Potrero Avenue in the City of El Cerrito (the City) in Alameda County, California. The City was awarded a State Coastal Conservancy grant with which to conduct forest revitalization activities, and as such the Project is subject to California Environmental Quality Act requirements. The project area is situated in the San Pablo Land Grant in projected Township 1 North, Range 4 East, as depicted on the attached *Richmond, California* USGS 7.5' topographic quadrangle map.

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If you have any questions, feel free to contact me by email at brian@solanoarchaeology, or via phone at 530-417-7007.

Regards,

Brian Ludwig, Ph.D.
Principal Investigator

ATTACHMENT C

Representative Project Area Photographs

Photo 0718. Project area overview, view to north

Photo 0913. Project area overview, view to west

Photo 2404. Representative photo, steep slope

Photo 0927. Enhanced drainage in project area, view to NE

Photo 5720. HNA nature trail, view to south

Photo 3822. 1332 Navellier St., view to northeast

APPENDIX D

FIRE ROAD AND TRAIL CONDITIONS REPORT

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DRAFT

FIRE ROAD AND TRAIL CONDITIONS

HILLSIDE NATURAL AREA FIRE RESILIENCE AND FOREST CONSERVATION MANAGEMENT PLAN

EL CERRITO, CALIFORNIA

LSA

December 2024

DRAFT

FIRE ROAD AND TRAIL CONDITIONS

HILLSIDE NATURAL AREA FIRE RESILIENCE AND FOREST CONSERVATION MANAGEMENT PLAN

EL CERRITO, CALIFORNIA

City of El Cerrito
10890 San Pablo Avenue
El Cerrito, California 94530

Prepared by:

LSA
157 Park Place
Pt. Richmond, California 94801
(510) 236-6810
Project No. 20231296

Funding provided by:

Coastal Conservancy
Project No. 20231296

TABLE OF CONTENTS

FIGURE

INTRODUCTION

LSA has prepared this report to describe the current fire road and trail conditions at the Hillside Natural Area in El Cerrito, California. The Hillside Natural Area includes approximately 3.46 miles of combined fire roads and trails, which are divided into three management units: the North Hillside Natural Area (or Motorcycle Hill), the Madera property, and the South Hillside Natural Area (see Figure 1).

Methods

LSA surveyed trails within the Hillside Natural Area to determine their condition for accessibility and mapped spots of erosion, steep trail segments, and other conditions, such as narrow trail segments and fenced off sections of the Hillside Natural Area. Prior to the survey, LSA reviewed trail maps on the AllTrails App[1] and measured each in approximate length and elevation gain.

RESULTS

Based on mapped trail features and information provided by the El Cerrito Trail Trekkers, the AllTrails App, and Friends of 5 Creeks, a brief description including the length and location of each trail is included below. Trail names were collected from El Cerrito Trail Trekkers and the AllTrails App. Figure 1 exhibits all fire roads and trails.

Existing and Potential Fire Roads

North Hillside Natural Area

Motorcycle Hill Trail. The length of the trail is 0.57 mile, one way. The trail starts at Blake Street and ends at Potrero Avenue and includes steep switchbacks.

Lower Snowdon Trail. The length of the trail is 0.14 mile, one way, and approximately 2 feet wide. The trail starts at Snowdon Avenue and connects to the Motorcycle Hill Trail. It is possible to expand the trail for full fire apparatus access.

Madera Property

No current fire road.

South Hillside Natural Area

Ridge Fire Road. The length of the road is 0.75 mile, one way. The road starts at King Court and ends at Regency Court.

Navellier Fire Road. The length of the road is 0.35 mile, one way. The road connects Navellier Street to Regency Court and overlaps with Ridge Fire Road. The trailhead is a paved road between 1432 and 1440 Navellier Street, turning into a fire road. It crosses Ridge Fire Road and Live Oak Trail and ends near the mouth of Regency Court.

[1] AllTrails. 2019. AllTrails: Hike, bike, and run (10.4.2). Mobile app.

Ken Smith Trail. The length of the trail is 0.19 mile, one way. The trail is approximately 10–15 feet wide at the start, near Ridge Fire Road, but dissipates into a dead end towards the south. It could be expanded to provide fire apparatus access, but it needs terminal turnaround.

Forest Brown Fire Road. The length of the road is 0.34 mile, one way. The entrance is on Schmidt Lane and climbs to Ridge Fire Road.

Trails

North Hillside Natural Area

Motorcycle Hill Trail. The length of the trail is 0.57 mile, one way. The trail starts at Blake Street and ends at Potrero Avenue. It includes steep switchbacks.

Peralta Trail. The length of the trail is 0.10 mile, one way, and is relatively unmaintained. The trail starts at the former East Bay Municipal Utility District tank site at the end of a 15-foot-wide paved fire road and connects to the Motorcycle Hill Trail.

Madera Property

Madera-Julian Trail. The length of the trail is 0.21 mile, one way. The trail starts at the concrete steps at 1625 Julian Drive and ends at Ridge Fire Road below Madera Circle. It is also accessible by a 0.1-mile trail starting at 1556 Madera Circle.

South Hillside Natural Area

Wildwood Creek Trail. The length of the trail is 0.05 mile, one way. The trail branches off from Navellier Fire Road alongside the partially channelized Wildwood Creek trailhead from Navellier Fire Road right after the first big turn going uphill.

Ken Smith Trail. The length of the trail is 0.19 mile, one way. The trail is approximately 10–15 feet wide at the start near Ridge Fire Road but dissipates into a dead end towards the south. It could be converted into a fire road. The trail follows the creek uphill, then connects to the Douglas Entry of the Live Oak Trail.

The Lower Trail. The length of the trail is 0.16 mile. This trail connects Forest Brown Fire Road to Live Oak Trail and to Little Hill Trail. The northern section past Little Hill Trail splits the trail into one well-maintained segment and another segment, not maintained as a public trail, which ends at a fenced-off area.

The Little Hill Trail. The length of the trail is 0.05 mile, one way. The trail connects The Lower Trail to Live Oak Trail.

Church Trail. The length of the trail is 0.14 mile, one way. The trail connects Navellier Fire Road to Live Oak Trail. Segments of this trail are as narrow as 1–2 feet wide, with an eroded segment near Live Oak Trail.

Live Oak Trail. The length of the trail is 0.41 mile, one way. The trail connects Douglas Drive to Forest Brown Fire Road. The trailhead is at 1524 Douglas Drive. The trail crosses Navellier Fire Road and runs south, roughly parallel to Ridge Fire Road, to Forest Brown Fire Road. A portion of the trail includes the sign-posted Rotary Interpretive Trail. The trail is incorporated within the Memorial Grove Trail. Erosion of the trail occurs towards Douglas Circle.

RECOMMENDATIONS

Based on the variable conditions of each trail, recommended uses are described below.

Trail Conditions and Use

North Hillside Natural Area

- The top of Motorcycle Hill, also accessible from Potrero Avenue using a relatively flat trail, provides scenic views of the East Bay cities and coast. This space may be appropriate to establish a landing and staging area for vegetation treatments and later as a picnic area. The trail from Potrero Avenue to this space could be maintained for use as a fire road. Ice plant may also be removed from this upper area. A large eucalyptus grove is located south of Motorcycle Hill Trail.

- Motorcycle Hill Trail is very steep and likely challenging for the average hiker. Eucalyptus trees to be removed can also be found along this trail. The upper portion of Motorcycle Hill trail up to the overlook should be developed as a fire road.

- The Lower Snowdon (aka Castro) Trail connects from Snowdon Avenue Fire Road to the Motorcycle Hill Trail switchbacks. If widened and developed, a fire apparatus access road could be developed here. The turnaround at the end of Snowdon Avenue (an old East Bay Municipal Utility District Reservoir site) may provide accessible parking to hikers who want to access Motorcycle Hill, though this area may need to be gated off at night to prevent extended overnight use.

- The Peralta Trail is not well maintained but could provide a desirable shortcut from Snowdon Avenue Fire Road to the lower section of Motorcycle Hill Trail. Once eucalyptus in this area have been removed, the trail should be maintained for foot traffic.

Madera Property

- Madera-Julian Trail has a history of being invaded by French broom and other invasive species. Intermittent treatment of non-native species is necessary.

South Hillside Natural Area

- Wildwood Creek Trail has an improvised stream crossing (planks) that should be evaluated for safety and durability.

- The segment of Lower Trail that connects to Live Oak Trail is steep and might be challenging for average hikers. The north segment of this trail ending in a dead end may best be abandoned/fenced off as a conservation area because the trail segment is not well maintained.

- Eroded segments occur on Live Oak Trail, and maintenance is recommended.
- Forest Brown Fire Road, Navellier Fire Road, and Ridge Fire Road require maintenance to ensure continued vehicular use.
- The segment of Ridge Fire Road below King Court is another flat area where a landing site and log processing area may be located, which later could be converted into a picnic area.
- Ken Smith Trail at the top of Quarry Hill should be developed as a fire road with a turnaround at the southern terminus.

Sensitive Areas to be Avoided

Drainages, Streams, and Wetlands

Drainages and creeks are regulated under Regional Water Quality Control Board jurisdiction and riparian areas are regulated under California Department of Fish and Wildlife (CDFW) jurisdiction. Waters and riparian areas within the South Hillside Natural Area include the following features:

- The Motorcycle Hill Trail has purple needle grass along the trail and will need to be maintained to protect this sensitive species.
- San Francisco dusky-footed woodrat houses were observed to the north of the end of Snowdon Avenue and will need to be protected because the species is a California Species of Special Concern.

Madera Property

- Purple needle grass along the Madera-Julian Trail will need to be avoided.
- Woodrat houses were observed just north of Regency Court.

South Hillside Natural Area

- Wildwood Creek flows through a 3-foot to 6-foot concrete V-ditch starting near Ridge Fire Road, intersecting Live Oak Trail near Douglas Drive, and flowing southeastward along Wildwood Creek Trail and Navellier Fire Road. The riparian corridor should be avoided.
- An unnamed drainage starts south of Kent Circle and intersects Ridge Fire Road and Live Oak Trail. The riparian corridor should be avoided.
- An unnamed drainage starts between King Drive and Buckingham Drive, intersects with Ridge Fire Road, and flows downhill to the El Cerrito Recycling Center on Schmidt Lane. The riparian corridor should be avoided.
- Purple needle grass along Ridge Fire Road, Live Oak Trail, and Lower Trail should be avoided.

LSA

LEGEND

- Project Site
- Vehicle AccessibleTrail
- Foot+Bike or Foot-only Trail
- Recommended to be Modified for Improved Vehicular Access

N

0 300 600
FEET

FIGURE 1

Hillside Natural Area Fire Resilience and Forest Conservation Management Plan
El Cerrito, Contra Costa County, California

Trail Map

SOURCE: LSA (2024); Contra Costa County (05/2024); USGS The National Map (04/2023).

I:\2023\20231296\GIS\MXD\Bio Report\Figure 10_Hillside Natural Area Trails and Fire Roads.mxd (7/6/2024)

APPENDIX E

PLANT LIST

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El Cerrito Hillside Natural Area Plants

Scientific name	Common name	Growth form	Native/Not
Acaena pinnatifida var. *Californica*	California sheep-burr	perennial	native
Achillea millefolium	yarrow	perennial	native
Acmispon americanus	Spanish lotus	annual	native
Acmispon glaber	deerweed	shrub	native
Acmispon wrangelianus	birdsfoot treefoil or short-podded lotus	annual	native
Adiantum jordanii	California maidenhair fern	fern	native
Aesculus californica	California buckeye	tree	native
Agoseris hirsuta	Coast Range agoseris	perennial	native
Agrostis pallens	thingrass	grass	native
Allium spp.	wild onion	perennial	native
Amsinckia intermedia	common fiddleneck	annual	native
Arctostaphylos sp.	manzanita	shrub	native
Artemisia california	California sage	shrub	native
Artemisia douglasiana	mugwort	perennial	native
Aster chilensis	California aster	perennial	native
Athyrium filix-femina	lady fern	fern	native
Baccharis pilularis	coyote bush, coyote brush	shrub	native
Bromus carinatus	California brome	grass	native
Calandrinia ciliata	red maids	perennial	native
Calochortus umbellatus	Oakland star tulip	perennial	native
Calystegia purpurata	Pacific false bindweed	vine	native
Calystegia subacaulis	stemless morning glory	perennial	native
Camissonia sp.	sun cup	perennial	native
Cardamine oligosperma	milkmaids	perennial	native
Carex sp.	sedge	perennial	native
Ceanothus gloriosus v. *exaltatus*	Pt. Reyes ceanothus	shrub	native
Ceanothus thyrsiflorus	California lilac	shrub	native
Chlorogalum pomeridianum	soaproot	perennial	native
Claytonia perfoliata	miners lettuce	annual	native
Clinopodium douglasii	yerba buena	perennial	native
Conyza canadensis	Canadian horseweed	annual	native
Corallorhiza maculata maculata	summer coral root	perennial	native
Corylus cornuta	wild hazelnut	shrub	native
Crassula connata	sand pygmy weed	perennial	native
Cryptantha spiculifera	white forget me not	annual	native
Cyperus eragrostis	tall flatsedge	perennial	native
Danthonia californica	California oatgrass	grass	native

El Cerrito Hillside Natural Area Plants

Scientific name	Common name	Growth form	Native/Not
Dichelostemma capitatum	blue dicks	perennial	native
Diplacus aurantiacus	orange bush monkey flower	shrub	native
Drymocallis glandulosa	sticky cinquefoil	perennial	native
Dryopteris arguta	wood fern	fern	native
Elymus multisetus	big squirrel tail	grass	native
Elymus triticoides	creeping wild rye	grass	native
Epilobium brachycarpum	fireweed, willow herb	annual	native
Epilobium canum	Zauschneria, California fuchsia	subshrub	native
Equisetum arvense	horsetail	fern	native
Equisetum telmateia ssp braunii	giant horsetail	fern	native
Erigeron canadensis	Canadian horseweed	annual	native
Eriogonum nudum	naked-stem buckwheat	perennial	native
Eschscholzia californica	California poppy	annual	native
Eurybia radulina	roughleaf aster	perennial	native
Frageria vesca	wood strawberry	perennial	native
Frangula californica	California coffeeberry	shrub	native
Fremontodendron californicum	Fremontia	shrub	native
Galium aparine	common bedstraw	annual	native
Galium porringens v. *porringens*	bedstraw	annual	native
Gamochaeta ustulata	purple cudweed	perennial	native
Gnaphalium sp.	pearly everlasting	perennial	native
Grindelia hirsutula	San Francisco gumplant	perennial	native
Hemizonia congesta luzulifolia	hayfield tarweed	annual	native
Heracleum maximum	cow parsnip	perennial	native
Heteromeles arbutifolia	toyon	shrub	native
Holodiscus discolor	ocean spray	shrub	native
Iris douglasiana	wild iris	perennial	native
Juncus xiphioides	iris-leaved rush	rush	native
Koeleria micrantha	junegrass	grass	native
Lathyrus vestitus	peavine	perennial	native
Layia platyglossa	coastal tidytips	perennial	native
Lonicera hispidula	honeysuckle	vine, shrub	native
Lupinus albifrons	silver lupine	shrub	native
Lupinus arboreus	yellow bush lupine	shrub	native
Lupinus succulentus	hollowleaf lupine	annual	native
Madia sativa	coast tarweed	annual	native
Maianthemium stellatum	star-flowered Solomon's seal	perennial	native

El Cerrito Hillside Natural Area Plants

Scientific name	Common name	Growth form	Native/Not
Marah fabaceus	manroot	perennial	native
Mimulus aurantiacus	sticky monkeyflower, golden monkeyflower	shrub	native
Navarretia squarrosa	skunkweed, skunkweed	annual	native
Pellaea andromedifolia	coffee fern	fern	native
Pellaea mucronata	birdsfoot fern	fern	native
Perideridia kelloggii	yampah	perennial	native
Phacelia californica	phacelia	perennial	native
Physocarpos capitatus	ninebark	shrub	native
Pinus coulteri	Coulter pine	tree	native
Pinus radiata var. *idem*	Monterey pine	tree	native
Pityrogramma triangularis	gold-back fern	fern	native
Plagiobothrys sp.	popcorn flower	perennial	native
Plantago erecta	foothill plantain	perennial	native
Platanus racemosa	sycamore	tree	native
Platystemon californicus	California creamcups	perennial	native
Polypodium californica	California polypody	fern	native
Polystichum munitum	western sword fem	fern	native
Pseudognaphalium beneolens	pearly everlasting	perennial	native
Pseudognaphalium californicum	ladies tobacco	perennial	native
Pteridium aquilinum v. *pubescens*	bracken fern	fern	native
Quercus agrifolia	coast live oak	tree	native
Ranunculus californicus	California buttercup	perennial	native
Ribes californicum	hillside or California gooseberry	shrub	native
Ribes menziesii	canyon gooseberry	shrub	native
Rosa californica	California rose	shrub	native
Rosa spithamea	ground rose	shrub	native
Rubus ursinus	native blackberry	sub-shrub	native
Salix lasiolepis	arroyo willow	tree	native
Salix lucida v. *lasiandra*	willow	tree	native
Sambucus mexicana	blue elderberry	tree	native
Sanicula bipinnatifida	purple sanicle	perennial	native
Sanicula crassicaulis	snakeroot, Pacific sanicle	perennial	native
Satureja (clinopodium) douglasii	yerba buena	perennial	native
Scrophularia californica	bee plant	perennial	native
Sequoia sempervirens	coast redwood	tree	native
Sidalcea malvaflora	dwarf checkerbloom	perennial	native
Sisyrinchium bellum	blue-eyed grass	perennial	native

El Cerrito Hillside Natural Area Plants

Scientific name	Common name	Growth form	Native/Not
Solanum americanum	American nightshade	shrub	native
Solanum umbelliferum	blue witch	shrub	native
Solanum umbelliferum	blue witch	shrub	native
Solidago velutina	California goldenrod	perennial	native
Stachys bullata	California hedge nettle	perennial	native
Stachys rigida	hedge-nettle, wood mint	perennial	native
Stipa lepida	foothill needlegrass	grass	native
Stipa pulchra	purple needlegrass	grass	native
Streptanthus glandulosus	jewelflower	annual	native
Symphoricarpos albus	snowberry	shrub	native
Symphoricarpos mollis	creeping snowberry	shrub	native
Symphotrichum chilensis	Pacific aster, Chilean aster	perennial	native
Taraxia ovata	sun cup	perennial	native
Toxicodendron diversilobum	poison oak	vine, shrub	native
Toxicoscordion fremontii	death camas	perennial	native
Triphysaria pusilla	butter and eggs	perennial	native
Triteleia laxa	Ithuriel's spear	perennial	native
Umbellularia californica	California bay	tree	native
Vicia americana v. *americana*	vetch	perennial	native
Vicia gigantean	giant vetch	perennial	native
Viola pedunculata	Johnny Jump-Up	perennial	native
Woodwardia fimbriata	chain fern	fern	native
Woodwardia fimbriata	western chain fern	fern	native
Wyethia angustifolia	narrow-leaved sunflower	perennial	native
Avena fatua	wild oats	grass	nonnative
Acacia baileyana	Bailey acacia	tree	non-native
Acacia dealbata	acacia	tree	non-native
Acacia melanoxylon	blackwood acacia	tree	non-native
Acacia verticillata	prickly moses	shrub	non-native
Bellardia trixago	Mediterranean lineseed	perennial	non-native
Briza minor	rattlesnake grass	grass	non-native
Bromus diandrus	ripgut brome	annual grass	non-native
Bromus mollis	soft chess	annual grass	non-native
Budeleia davidii	butterflybush	shrub	non-native
Calendula arvensis	calendula	annual	non-native
Carduus pycnocephalus	Italian thistle	annual	non-native
Conium maculatum	poison hemlock	perennial	non-native

El Cerrito Hillside Natural Area Plants

Scientific name	Common name	Growth form	Native/Not
Cortaderia jubata	jubata grass, pampas grass	grass	non-native
Cortaderia selloana	pampas grass	perennial	non-native
Cotoneaster franchetii	cotoneaster	shrub	non-native
Cotoneaster pannosus	cotoneaster	shrub	non-native
Crocosmia	Montbretia	perennial	non-native
Cynara cardunculus	cardoon	perennial	non-native
Delaira odorata	cape ivy	vine	non-native
Dipsacus sp.	fullers teasel	perennial	non-native
Ehrharta erecta	panic veldtgrass	grass	non-native
Erodium cicutarium	storksbill, red storksbill	annual	non-native
Eucalyptus globulus	blue gum	tree	non-native
Eucalyptus sideroxylon	red ironbark	tree	non-native
Eucalyptus viminalis	yellow gum	tree	non-native
Euphorbia characias	Albanian spurge	perennial	non-native
Festuca arundinacea	reed fescue, tall fescue	grass	non-native
Festuca rubra	red fescue	grass	non-native
Foeniculum vulgare	fennel	perennial	non-native
Genista monspessulana	French broom	shrub	non-native
Geranium molle	crane's bill geranium	annual	non-native
Hedera canariensis	English ivy	perennial	non-native
Helminthotheca echioide	bristly ox-tongue	annual	non-native
Hirschfeldia incana	wild mustard	perennial	non-native
Hordeum leporinum	foxtail barley	annual grass	non-native
Hypochaeris radicata	hairy cat's ear	perennial	non-native
Lactuca saligna	willow leaf lettuce	annual	non-native
Lactuca virosa	prickly lettuce	perennial	non-native
Lolium multiflorum	Italian rye	grass	non-native
Lotus corniculatus	birdsfoot trefoil, deervetch	perennial	non-native
Lythrum hyssopifolium	hyssop loosestrife	annual	non-native
Malva sp.	cheeseweed	perennial	non-native
Oxalis pes-caprae	sourgrass	perennial	non-native
Pennisetum clandestine	kikuyu grass	grass	non-native
Picris echiodes	bristly ox-tongue	perennial	non-native
Pittosporum undulatum	cheesewood	tree	non-native
Plantago lanceolata	narrow-leaved plaintain, Englishman's foot	perennial	non-native
Polypogon monspeliensis	rabbits-foot grass	grass	non-native
Pyracantha coccinea	pyracantha	shrub	non-native

El Cerrito Hillside Natural Area Plants

Scientific name	Common name	Growth form	Native/Not
Ricinus communis	castor bean	shrub	non-native
Rorippa nasturtium-aquaticum	nasturtium	perennial	non-native
Rubus armeniacus	Himalayan blackberry	shrub	non-native
Rumex pulcher	fiddle dock	perennial	non-native
Senecio mikanioides	German ivy	perennial	non-native
Stellaria media	common chickweed	annual	non-native
Torilis arvensis	field hedge parsley	perennial	non-native
Trifolium spp.	clover	perennial	non-native
Ulmus astrachilens	elm	tree	non-native
Urtica dioica	stinging nettle	perennial	non-native
Urtica urens	dwarf nettle	annual	non-native
Vicia villosa	hairy vetch	annual	non-native
Vinca major	periwinkle	annual	non-native

Sources:
LSA Associates, Inc. (1987, 2023)
Friends of Five Creeks (2014), Native Plants of the El Cerrito Hillside Natural Area, Website: https://www.fivecreeks.org/projects/hillside_natural_area/HNANativesforWebMay2014.pdf.

APPENDIX F

VEGETATION TREATMENT STANDARDS

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STANDARDS FOR VEGETATION TREATMENTS FOR DEFENSIBLE SPACE

This set of maintenance standards will be used to certify compliance with defensible space regulations and to direct maintenance activities in the Hillside Natural Area zone within 100 feet of a dwelling structure:

1. Remove all dead plants and dry vegetation. The following actions will provide the same level of fire safety as removing all combustible material, per local and state fire codes.

    a. Cut grass and weeds to no more than four inches in height.

    b. Clear leaves, bark, and fallen branches under trees and shrubs (including vines and semi-woody species). At no time should a buildup of leaves exceed 1 inch in depth. However, do not expose bare earth in over 50 percent of the area. Humus is not necessary to be removed.

    c. Remove dead material that drapes over ground cover (including leaves, bark, and branches).

    d. Remove all dead branches from within live ground covers, vines, shrubs (including semi-woody species), and immature trees.

2. Cut and chip trees with a high fuel volume that are at risk of falling on buildings, structurally unsound, or are unhealthy. Large, "legacy trees" that are structurally sound, and with branches that are 8-10 feet above ground will be retained.

    a. Prune trees and large tree-form shrubs (e.g., oaks, manzanitas) that are being retained to provide clearance of three times the height of the understory plant material, or 8 feet, whichever is higher.

    b. Prune limbs that are smaller than 3 inches in diameter up to 8 feet above the ground; in young trees, prune these branches on the lower one-third of the height of the tree. (Thus, if a tree is 10 feet tall, prune the lower 3–4 feet and keep the understory plant material to less than 1 foot in height. Then as it grows to 24 feet in height, it can be pruned to achieve the 8-foot distance from the ground, and the understory plant material can reach 2.5 feet in height.)

        OR

        All lower tree branches, under three inches in diameter, will be removed to provide vertical clearance of three times the height of the understory plants, or eight feet above understory plants, whichever is greater. Retention of short understory shrubs provides aesthetic benefits and wildlife habitat without sacrificing fire safety; alternatively, trees may be pruned higher in order to allow for better spacing from the understory shrubs.

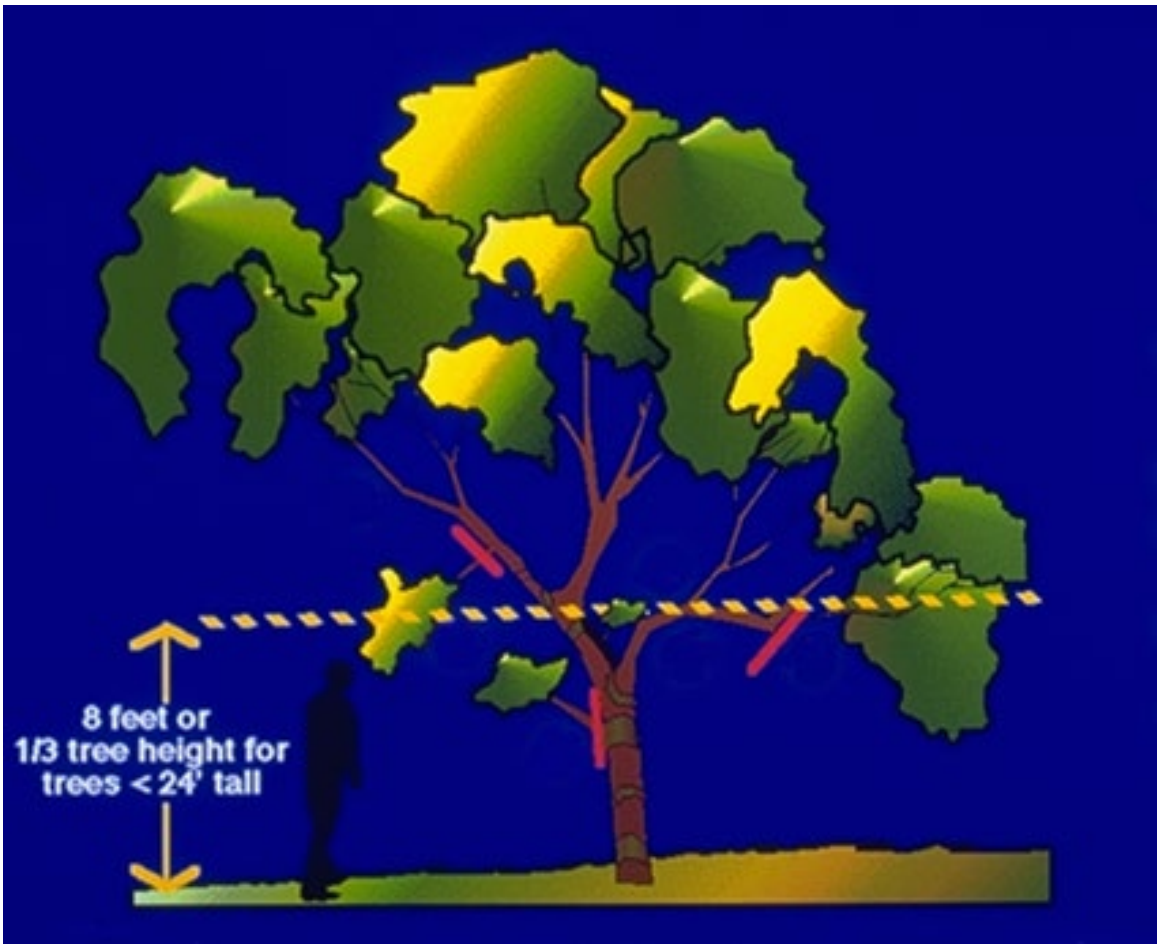

Figure F-1: Prune Branches to a Height of 8 Feet Above the Ground.

3. Manage individual plants or shrub masses to maintain adequate horizontal spacing. Design distinct groupings of shrubs (including landscaping or native vines, semi-woody species, and all types of brush) to dampen the spread of fire.

4. Make sure that the plant groupings are small enough to provide adequate horizontal separation between groupings and to allow proper maintenance; groupings should measure no wider than two times the grouping height, or 120 square feet.

5. The space between islands should be greater than three times the height of the shrubs, or 12 feet at a minimum. On emerging trees, clear a spacing of 12 feet from the edge of the canopy.

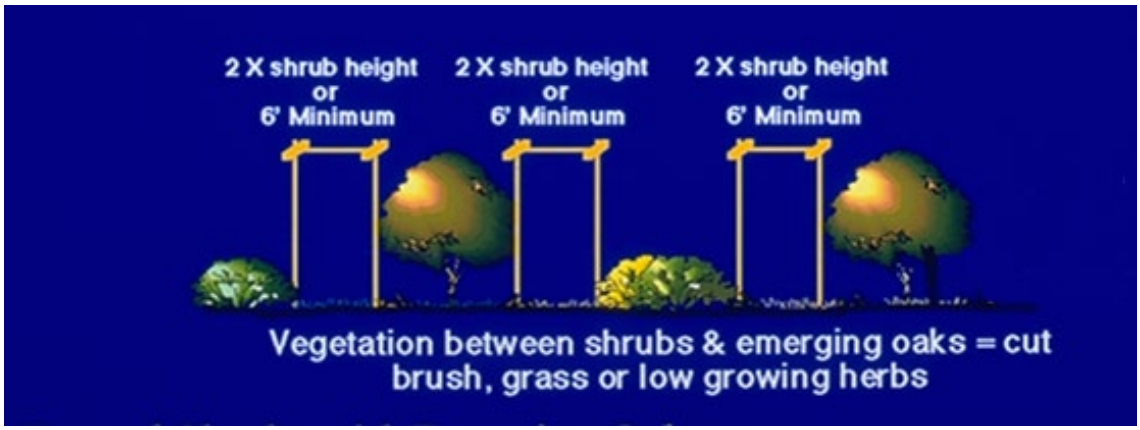

Figure F-2: Shrub Island Spacing.

6. Each shrub or group of plants should measure no wider than two times its height, or less than 120 sq. feet. (or 6 feet x 20 feet). The space between groups should be greater than three times the height of the shrubs, or at least a 12 feet. distance.

    a. Remove and safely dispose of all cut vegetation and hazardous refuse.

    b. Allow chipped materials to remain on the site, provided the mulch layer is no greater than 2 inches in depth.

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