CITY OF PALO ALTO

Community Wildfire Protection Plan / Foothills Fire Management Plan Update

2023 Santa Clara County Community Wildfire Protection Plan

Annex 3: City of Palo Alto

April 2025

Prepared for:
City of Palo Alto

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City of Palo Alto Transmittal for
Community Wildfire Protection Plan / Foothills Fire Management Plan Update 2025

1. The City of Palo Alto has updated the pre-existing Community Wildfire Protection Plan (CWPP) dated 2017 and the Foothills Fire Management Plan (FFMP) dated 2016. This new 2025 update replaces both pre-exiting plans and now serves as the current version of the CWPP/FFMP.

2. The Healthy Forest Restoration Act of 2003 recommends the implementation of wildfire protection plans for communities that have a wildfire threat. In compliance with this Act, three signatures are required from applicable local government - the City Manager, the local fire department – PAFD Chief, and the state entity responsible for forestry – CalFire CSU Chief. Additional signatories can be added, OES Chief.

3. The undersigned herewith approves the City of Palo Alto Community Wildfire Protection Plan / Foothills Fire Management Plan Update 2025.

Signed effective (date): 6/18/2025

Signed by:
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City Manager, Ed Shikada

Signed effective (date): 6/9/2025

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ANNEX 3 CITY OF PALO ALTO

1. Organization and Jurisdiction

Palo Alto is in the northwest corner of Santa Clara County and shares its border with East Palo Alto, Mountain View, Los Altos Hills, Stanford, Portola Valley and Menlo Park.

Figure 1. Planning area location.

As of the 2020 Census, the City total resident population was 68,572 with a population density of 2,845.8 people per square mile.

The City of Palo Alto developed a Foothills Fire Management Plan (FFMP) in 1982 that provides the planning framework for fire control activities for the City and the Palo Alto Foothills Area which comprises the predominant wildland urban interface (WUI) area for the community. The FFMP addresses a broad range of integrated activities and planning documents to address and mitigate the impacts of fire hazards in the area west of Foothills Expressway to the city limits of Palo Alto. Fire mitigation project areas include Foothills Nature Preserve (formerly Foothills Park) and Pearson-Arastradero Preserve. The FFMP goal is "to reduce government costs and citizen losses from wildland fire by increasing initial attack success and/or protecting assets at risk through focused pre-fire management activities."

A 2009 update[1] carried forward the framework and objectives from 1997 and addressed changes to the fire hazard assessment, reviewed regional evacuation routes, reviewed municipal ordinances, examined staffing of Station 8 (Foothills Fire Station), provided wildland fire management recommendations and mitigations, incorporated updates to open space plans, implemented CEQA documentation, and created an implementation plan.

In 2016, the City updated the FFMP, which modeled the current wildfire threat and provided the wildland fire management recommendations based on the updated threat. This update did not change the prescribed fire management techniques and thereby continued the use of the existing 2009 CEQA analysis.

Also in 2016, Santa Clara County developed a multi-jurisdictional Community Wildfire Protection Plan (CWPP) to establish strategic goals for these more detailed community level fire-planning efforts. This included a Palo Alto jurisdictional annex that accompanied this plan, but apart from the FFMP.

During the County's substantive 2023 CWPP update process, the City decided to integrate the FFMP with the CWPP to provide one wildfire management plan for the community. This update will maintain an integral connection to the 2009 FFMP to draw upon the environmental framework provided in that document.

The 2009 FFMP and its 2016[2] update addressed a broad range of integrated activities and produced planning documents to address and mitigate the impacts of fire hazards in the Palo Alto Foothills Area. The area of interest includes the areas west of Foothills Expressway to the city limits of Palo Alto.

The 2009 Plan and its 2016 update addressed fire hazard assessment and regional evacuation routes, wildland fire management recommendations and mitigations. The FFMP also reviewed non-project related topics such as Municipal ordinances related to wildland fire and recommended staffing levels for Station 8 in Foothills Nature Preserve. It proposed an

[1] https://www.cityofpaloalto.org/files/assets/public/v/2/oes/plans/palo_alto_ffmp_final.pdf

[2] https://www.sccfd.org/santa-clara-county-community-wildfire-protection-plan/

implementation plan and identified potential funding and included CEQA documentation for the proposed projects. Last, it recommended updates to the Pearson-Arastradero Trails Master Plan and Foothills Trail Maintenance Plan[3][4]. The 2016 Update provided a new hazard assessment, and identified areas that have been treated, areas where treatments may be modified, and a few areas where planned treatments were no longer planned. Treatment costs and listing of responsible entities were updated.

This 2024 update focuses on topics directly related to fire hazard mitigation, emphasizing project-related improvements. This program is also documented in the 2023 City of Palo Alto Local Hazard Mitigation Plan (LHMP)[5] and demonstrates how the City mitigates wildfire risk through the implementation of projects in the CWPP/FFMP. The City of Palo Alto contracted with Wildland Res Mgt, who also completed the 2009 FFMP effort and the 2016 update, to assist in this update. Staff members from Community Services, Fire, Utilities, and Public Works Departments and the Office of Emergency Services formed the planning team to work with Wildland Res Mgt. While the program originated with the Fire Department, Public Works, Office of Emergency Services, Utilities, and Community Services Departments are all key to the success and beneficiaries of the projects.

2. Planning Team Participation

In advance of the 2016 update, a novel organizational strategy was adopted which recognizes that planning and implementation of the CWPP/FFMP involves and requires support from many City Departments; this organizational strategy continues to guide City efforts. While the program originated in the Fire Department, the Public Works Department, Office of Emergency Services, Utilities, Department, and Community Services Department are all key to the success and beneficiaries of the projects. As such, representatives of each of these five departments meet regularly - generally quarterly, but sometimes more often - to strategize effective actions, such as identifying needs and collaborating on the timing and process of implementation. The Chair of this inter-departmental group (FFMP Coordinating Group or FFMPCG) rotates between the departments. The Office of Emergency Services currently leads the administration of the Foothill Fire Management Program. Funding is pooled from all departments based on the anticipated costs of performing fire hazard reduction work under their responsibility. For example, roadside treatments on public rights-of-way are funded by Public Works whereas evacuation treatments along roads inside parks are funded by the Community Services Department.

It is instructive to note that the City of Palo Alto Utilities Department, as an electric services provider, is required by State regulation to maintain a Utility Wildfire Mitigation Plan to document and describe how they maintain a safe electric utility and mitigate the chance of ignitions in the WUI.[6]

The 2016 CWPP/FFMP was completed at a time when the Santa Clara Fire Safe Council first conducted both vegetation management and public outreach under contract by the City. Due to administrative requirements not compatible with the SCCFSC, the contract was suspended. The

3 https://www.cityofpaloalto.org/files/assets/public/v/1/community-services/parks-and-open-space/pearson-arastradero-preserve/arastradero-trails-management-plan.pdf
4 Pearson-Arastradero Trails Master Plan and Foothills Trail Maintenance Plan.
5 https://www.cityofpaloalto.org/lhmp
6 https://www.cityofpaloalto.org/Departments/Utilities/Utilities-Services-Safety/Safety/Utilities-Wildfire-Safety

City Departments then performed the services needed to implement the plan. For example. Public Works used City equipment to conduct roadside treatments within its easement and the Utility Department performed clearances along powerlines.

The City is in the process of finalizing another contract with the SCCFSC to conduct the projects identified in this CWPP/FFMP. This is beneficial because the SCCFSC has more and better suited equipment available and crews with additional expertise and experience. They also contract services with other local and neighboring jurisdictions whereby economies of scale may be achievable in future work efforts.

The City Fire Department also participates in the SCCFSC monthly meetings, demonstrating collaboration on a regional scale.

The community is moderately engaged, with a few residents that amplify fire prevention messages in neighborhoods. Since the 2020 CZU Complex there has been higher awareness and support of wildland fire issues. City firefighters have been successful in providing annual residential defensible space inspections; this inspection process has the added benefit of higher visibility of the fire department in the neighborhoods. Outreach and education regarding fire hazards in the Foothills has been expanded in concert with the SCCFSC. For example, in 2024 the SCCFSC participated in the City's WUI Public Safety Education Webinar (see insert). Additionally, both the SCCFSC and the City Fire Department maintain extensive digital outreach efforts with public-facing resources on evacuation, defensible space, and other elements of wildfire preparation and hazard reduction.

Santa Clara County FireSafe COUNCIL

Fire Adapted Santa Clara County

All the Wildfire News You Can Use!

July 2024

From Seth Schalet, Santa Clara County FireSafe Council CEO

The last week or so, I can't help humming a few of my favorite tunes: the great Ethel Waters 1933 classic Heat Wave and some thirty years later, Martha Reeves & The Vandellas song of the same name Heat Wave. With this early summer blast comes elevated wildfire risks and California has led the nation thus far. As I write this introduction for our July newsletter, California has had at least 14 fires larger than 300 acres. Now might be a good time to look at your own defensible space. If not now, when?

I want to thank our partners at the City of Palo Alto, in particular the Office of Emergency Services and the Palo Alto Fire Department for inviting Santa Clara County FireSafe Council to participate in their WUI Public Safety Education Webinar on June 25th. Shout-out to those that made this event possible and participated in the webinar including OES Chief Kenneth Dueker, Emergency Manager Nathaniel W. Rainey, Fire Marshal Tamara Jasso, CWPP Consultant, Carol Rice and Amanda Brenner Cannon, Program Director, Santa Clara County FireSafe Council. You can **see the slide deck here** and **watch the webinar here.**

3. Accomplishments

Since the Foothills Fire Management Plan was updated in January 2016, significant progress has been made through the City's 20-year continuous commitment to innovative and responsive best fire management practices.

Since the 2016 update, the City has finalized the additional step – planned as of the 2016 update – of adopting the FFMP as a Community Wildfire Protection Plan (CWPP). With a CWPP/FFMP, the City is in a better position to receive grants from Federal or State funding sources. Because the FFMP satisfied the requirements of a CWPP, the City was able to simply obtain an approval

signature from the local CAL FIRE representative and send it to the California Fire Alliance where it became official.

Further, the City has continued to strengthen its ongoing relationship with the Santa Clara County Fire Safe Council (SCCFSC). In advance of the 2016 update, the City developed a 5-year Stewardship Agreement with the SCCFSC to help implement the CWPP/FFMP. An annual work plan was mutually agreed-upon, based on availability of City funding and capacity of the SCCFSC. The SCCFSC typically supervised and paid for CAL FIRE hand crews to reduce fuels along roads and in say Foothills Nature Preserve and Pearson-Arastradero Preserve while providing community outreach and education programs in the City regarding wildland fire. This implementation partnership – in the form of a contract between the SCCFSC and the City was pioneering at the time of its adoption and has since become an increasingly common best practice in communities across California.

In 2022-2023 the Parks and Recreation Department sponsored a CAL FIRE hand crew to maintain the fuel break along Page Mill Rd. In 2023, the CAL FIRE fuels crew reduced understory fuels and created a trail in what was a dense area behind Bandera and Alexis Drives on the northeast corner of Foothills Nature Preserve. In this same location access and emergency egress was improved through removal of a roadside obstruction.

Shaded fuel break behind Bandera and Alexis Drives

In addition to projects proposed in the 2016 CWPP/FFMP, the City removed 36 eucalyptus trees and created a trail in Esther Clark Park, in the northwest portion of the FFMP planning area, in the fall of 2024. A few trees remain; a planting plan is forthcoming[7]. This work reduced hazardous fuels adjacent to homes in the Palo Alto / Los Altos Hills Wildland Urban Interface. In June 2023 Park Rangers from Foothills Nature Preserve installed approximately 30 "No Parking / No

[7] https://www.cityofpaloalto.org/News-Articles/City-Manager/Open-Space-and-Adobe-Creek-Short-Term-Projects-Underway

Stopping Signs" on Page Mill Road adjacent to Foothills Nature Preserve. These signs were located at popular areas where vehicles would frequently park on vegetation or vehicle owners would partake in activities that could cause a fire. Some examples of these illicit activities included igniting fireworks, campfires, and smoking.

Discing and mowing at Esther Clark Park.

The Foothills Park Rangers complete annual fuel reduction and fire prevention work totaling approximately 420 acres within the Foothills and Arastradero Nature Preserves and Esther Clark Park. This work includes using hand labor and heavy equipment to mow grass and light brush, creating disc lines, and removing invasive plant species (e.g., French broom, yellow star thistle, and stinkwort).

The City has adopted the most recent California Fire and Building Codes.

While not part of the 2016 CWPP/FFMP, the Utilities Department undergrounded the powerlines through the entirety of the extent of the CWPP/FFMP, which lowers the ignition risk. In addition, the department is undergoing a pipe replacement project, replacing corrugated with HDVE (highly dense plastic) in the ground.

In 2024 the Fire Department, Santa Clara County Fire Safe Council, & Community Services Department installed N5 Sensors that were strategically placed in the wildland urban interface to help detect wildfires. The sensors support a safer community by providing first responders a critical advantage when wildfires ignite.

The devices are designed to detect wildfires at the earliest stage possible using advanced ground-based sensors and cloud-based AI technologies day or night and often before wildfires become visible. If detected, the sensor automatically alerts the fire agency, providing situational awareness and enabling a quick response by fire personnel and park rangers.

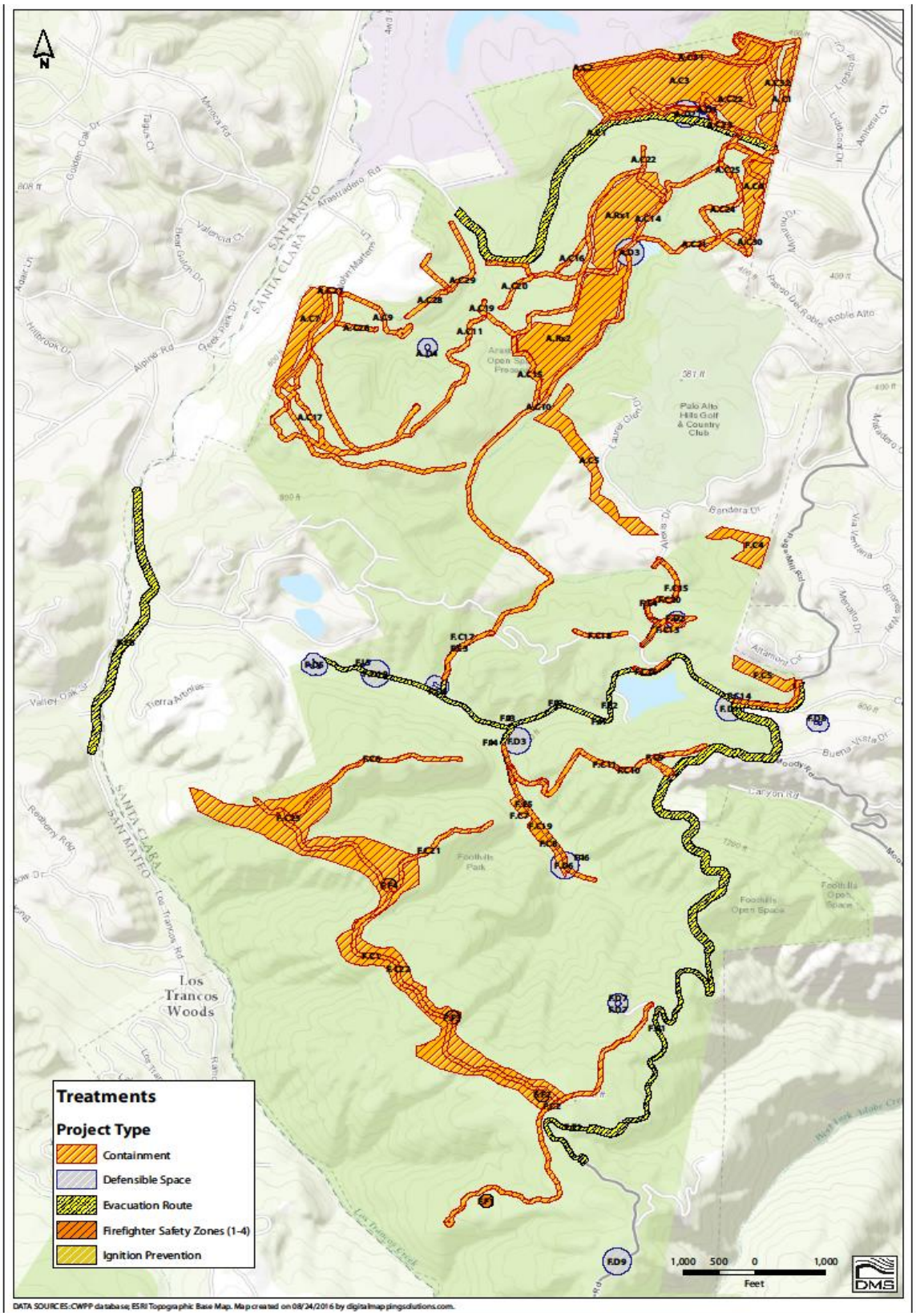

Figure 2. Projects included in the 2016 CWPP/FFMP Update.

Through efforts and funding of the City and with support of the SCCFSC, many on-the-ground projects have been completed, resulting in reduced risk of damage from wildfire and safer evacuation routes and emergency access. While the relationship with the SCCFSC has been a major benefit to the program, the Community Services Department staff support has also been essential and effective. Coordination of equipment use and storage, as well as assistance in observing conditions on the ground has greatly bolstered the effectiveness of the SCCFSC efforts.

Spatial information, encompassing the planning and monitoring of work location, costs, and schedule, continue to be aided by the collection of project boundaries and associated data using a geographic information system (GIS). Both Google Earth and ESRI-based software compatible with the City of Palo Alto GIS were used. Planning, analysis, and project organization is currently done with digital spatial files.

Treatment of vegetation during the previous eight years in the Foothills has been ambitious. In addition to the annual mowing and discing, and periodic treatments of Trappers Trail, many areas that had not been treated in several years were tackled. In some locations, treatment areas were widened or otherwise expanded.

Annual roadside mowing within Foothills Nature Preserve

Currently fuel treatments are being carried out with a variety of methods, spanning mechanical treatments with a variety of types of equipment, and with hand crews, taking advantage of CAL FIRE's fuel crews instead of the CDCR crews used previously.

Details of the program's fuel treatment accomplishments appear in Tables 1 and 2, but a synopsis follows:

- Treatment of evacuation routes within City boundaries on public roads
  - Arastradero Rd.
  - Page Mill Rd.
  - Los Trancos Rd.
- Treatment of evacuation routes within City parks
  - Wild Horse Valley leading to Towle Campground
  - Foothill Park from Maintenance Yard to Gate
  - Foothill Park to Hewlett Property
- Defensible Space of critical infrastructure and facilities in Foothills and Arastradero Nature Preserves
- Residential boundary treatments (mowing, discing)
  - West and East of Pearson-Arastradero
  - South of residents on Foothill Park (NE of gate)

4. Post Treatment Fire Behavior.

One of the most effective ways to change fire behavior - and thus reduce potential damage to structures and the environment - is to manage fuels. As described in this update, this includes treatments to vegetation to minimize ignition of structures. In general, projects recommended in this update and in previous iterations of the City of Palo Alto CWPP/FFMP are intended to reduce ignition likelihood while achieving a two- to four-foot predicted flame length in the event of a wildfire in the project area immediately after implementation of recommended fuel treatments.

As a result of the implementation of the CWPP/FFMP over the past two decades, fire behavior in the project area has changed, with several concrete benefits. The most important benefit has been an increased ease of evacuation and emergency access through the expansion of managed roadside vegetation along evacuation routes and other roadways. The roadsides along Arastradero Road, Los Trancos Road, and Page Mill Road are all safer for access and egress through increased line of sight, reduced fuel volumes, and reduction of ladder fuels due to the continued implementation of fuel management projects described in the 2016 update. The probability of ignitions has been reduced through a reduction of fuels near barbeques and structures, and along roadsides. The potential for containment of a wildfire (both within the parks and between City property and neighbors) has been enhanced through the creation, maintenance, and enhancement of reduced fuel zones. As described in detail in this document, these treatment areas are strategically placed along property perimeters and ridgelines.

5. New Recommendations.

As with most vegetation management projects, the initial treatments require the most substantial effort; maintenance tends to require less of an effort. Initial treatments have been done in most locations and are now in "maintenance mode". While Tables 1 and 2 describe the areas successfully treated (many which require annual treatments), it also lists areas not treated and recommends new areas to be treated or treatments to be expanded. Since vegetative growth is cyclical and highly dependent on environmental factors, the planning team will conduct annual

assessments to determine the areas to be treated and the level of effort that provides the highest benefit for the current costs of treatment.

WRM conducted a site visit on May 2 and conducted interviews with City staff on April 11 and 12. These efforts were aimed at determining how the program might be improved, and specifically what projects might be added or abandoned and learning recommended changes to operations. Questions revolved around the following topics:

1. Vegetation Management
   a. What has worked? What has not?
   b. How is the City getting the vegetation treatments done?
2. Community Engagement
   a. What are the community engagements with residents
   b. What non-profit partners help CWPP/FFMP implementation
   c. What agency/ institution partners help with implementation
3. Critical Assets
   a. Are there additional critical assets that have been identified since the last CWPP/FFMP?

These questions were used to aid the development of the recommendations in this update.

Because of the success in treating areas identified in the CWPP/FFMP, new and additional areas have been identified for treatment, based on current hazardous conditions as demonstrated in a fire behavior analysis and on potential benefit to the City and region as observed by staff. Details of new, additional recommended projects appear in Table 2. The most significant additional new treatment area is within Esther Clark Park, where a mowing and discing project has been and is continuing to be implemented.

This update recommends that the current mowing – not included in the 2016 update – should be maintained. Additional attention could be pointed to restoration of native perennial grasses (and other types of plants), and removal of exotic grasses (and other types of plants) with higher fuel volumes and flammability.

Current treatments should be expanded to include the removal of eucalyptus trees and other flammable exotics. The goal of the Eucalyptus Tree Removal CIP project is to minimize the risk of catastrophic wildfire along the wildland-urban interface while ensuring the protection and enhancement of ecological resources within the Open Space areas. The project will focus on reducing risks of damage from wildfire by identifying and removing hazardous eucalyptus trees in the City's open space preserves in the foothills (Foothills Nature Preserve, Pearson-Arastradero Preserve, and Esther Clark Park). Approximately 110 trees have been identified for future removal. An estimated 30 trees are in the Foothills Nature Preserve, 60 trees in the Pearson-Arastradero Preserve, and 20 trees in Esther Clark Park. The project will be phased over three to four years depending on funding, environmental assessment, and site conditions. The method of removal will be determined based on site conditions, access, and contractor ability. At present, funding is proposed in CIP PG-25002 for $100,000 in Fiscal Year 2025 with additional funding to be sought in future years such as through grant applications.

The most significant project aimed at residents will be an endeavor to designate the Foothills of Palo Alto as a NFPA Firewise USA Community. This effort was proposed in the 2016 update but has not yet been implemented.

While communication between the City and Los Altos Hills has been satisfactory, there is a desire to collaborate more closely. For example, because Page Mill Road spans both the City and Town, roadside treatments along the road could be done at the same time, possibly by the same vendor. Similarly, community outreach could be done jointly.

Similarly, there is interest in closer collaboration with Stanford University's wildfire management efforts, the Mid-Peninsula Regional Open Space District (MROSD), and the County of Santa Clara. As part of the Santa Clara County Fire Department Highway 35 Hazardous Fuels Reduction Wildfire Mitigation Project, hazardous trees will be removed, and hazardous vegetation will be reduced along the 16-mile roadway near Page Mill Road and Skyline Blvd. using federal funding from Hazard Mitigation Grant Program (HMGP).[8]

Within the City, the Utilities Department is interested installing hardscape and firescape around their buildings and near the reservoirs. More significantly, the Department produces a collaborative Utilities Wildfire Mitigation Plan that guides additional programs and projects to minimize the risk of wildfire ignitions from city provided electrical utilities. Mentioned earlier, a major project is the undergrounding of overhead electrical lines in the Palo Alto foothills which is currently underway and estimated to be complete in late 2024. The Water, Gas, Wastewater division of the Utilities Department is also developing wildfire mitigation projects to reduce structural damage to water system components and features. Several of these projects are included in the City of Palo Alto Local Hazard Mitigation Plan (LHMP).

A few locations have been removed from the list of projects recommended for treatment, or the areas have been reduced in size, due to changing landownership, staffing duties, and fuel conditions. These generally occur within Foothills Nature Preserve, and do not result in a significant decrease in hazard because the areas to be treated were to surround BBQs which have since been removed.

6. Risk-Hazard Summary

The Foothill Area of Palo Alto faces a significant level of both hazard and risk, but both are decreasing due to ongoing efforts. The hazards are the result of steep topography, abundant fuels, lack of access and periods of weather conducive to ignition and fire spread. This is the case in the open spaces and in the residential areas, where structures are generally constructed in an ignition-resistant manner, but with exposures from vegetation and building details such as vents, and decks.

[8] https://www.paloaltoonline.com/santa-clara-county/2024/04/28/county-approves-plan-for-wildfire-prevention-project-along-skyline-boulevard/

The terrain and location of the abundant fuels in relation to the city limits possible losses. While any structure loss is significant, winds that generally are associated with catastrophic loss would blow fires away from concentrations of structures in the city.

This report describes in detail the hazard and risk ratings from CAL FIRE, county-wide efforts and from the SCCFSC CWPP.

7. WUI Area Description

7.1. WUI Area Defined

The Palo Alto Fire Code defines the Wildland Urban Interface Fire Area as "[a] geographical area identified by the State of California as a 'Fire Hazard Severity Zone' in accordance with Public Resources Code Sections 4201 through 4204 and Government Code Sections 51175 through 51189, or other areas designated by the enforcing agency to be at a significant risk from wildfires. Within the city limits of the City of Palo Alto, 'Wildland-Urban Interface Fire Area' shall also include all areas west of Interstate 280, and all other areas recommended as a 'Very High Fire Hazard Severity Zone by the Director of the California Department of Forestry" (Section 15.04.410).[9] The WUI consists of a mix of urban, semi-urban, and open space lands on the eastern slope of the Santa Cruz Mountains. The Palo Alto Foothills Area includes two city-managed areas: the Foothills Nature Preserve and the Pearson-Arastradero Nature Preserve.

7.2. Access

Regional access to the Foothills Area is provided by Highway 280, Foothill Expressway and Skyline Boulevard. Page Mill Road serves as a major north-south connector from Highway 280 to Skyline Boulevard. Los Trancos Road provides access along the western boundary of the Palo Alto Foothills Area from Alpine Road south to Los Trancos Woods. Page Mill Road and Los Trancos Road have several long sections that are steep, windy and narrow. Circulation is limited within the Foothills Area. Arastradero Road links the western and eastern portions. Alpine Road and Los Trancos Road provide access to portions of the western part of the city. Moody Road and Altamont Road are other important circulation routes in Los Altos Hills.

8. Fire History

The fire history in this WUI area is relatively free of major events in recent decades. The last major fire in the vicinity of the upper foothills that was recorded by CAL FIRE's database was in 1912. Local records indicate, however fires in the Foothills Nature Preserve burned approximately 4000 acres between 1908 to September 11, 1916, and then approximately 250 acres in 1832. Fires also visited the park in 1950, 1964, 1965, and 1973.

Significant fires in the lower foothills (primarily light fuels) occurred in 1985, 1992, 2000, and 2007. The 1985 Liddicoat fire spread in grasslands and was also carried by eucalyptus trees that

[9] Palo Alto Fire Code. https://www.cityofpaloalto.org/files/assets/public/v/1/city-clerk/ordinances/ordinances-1909-to-present/2022/ord-5563.pdf

resulted in damage and destruction to 13 homes on the Palo Alto border. Major wildfires occurred in nearby WUI areas in 2020 in Santa Cruz, San Mateo, and Santa Clara Counties.

While the Palo Alto project area has not burned in decades, three fires have burned in the immediate vicinity since 1960: the 1962 Leib Fire, which burned approximately 1300 acres northwest of the project area near Sky Londa; the small 2007 Stevens Fire, which burned 151 acres in Cupertino near Stevens Canyon Reservoir, southeast of the project area; and the enormous 2020 CZU Lightning Complex Fires, which destroyed 1490 structures and burned 86,509 acres of the Santa Cruz Mountains to the project area's southwest.

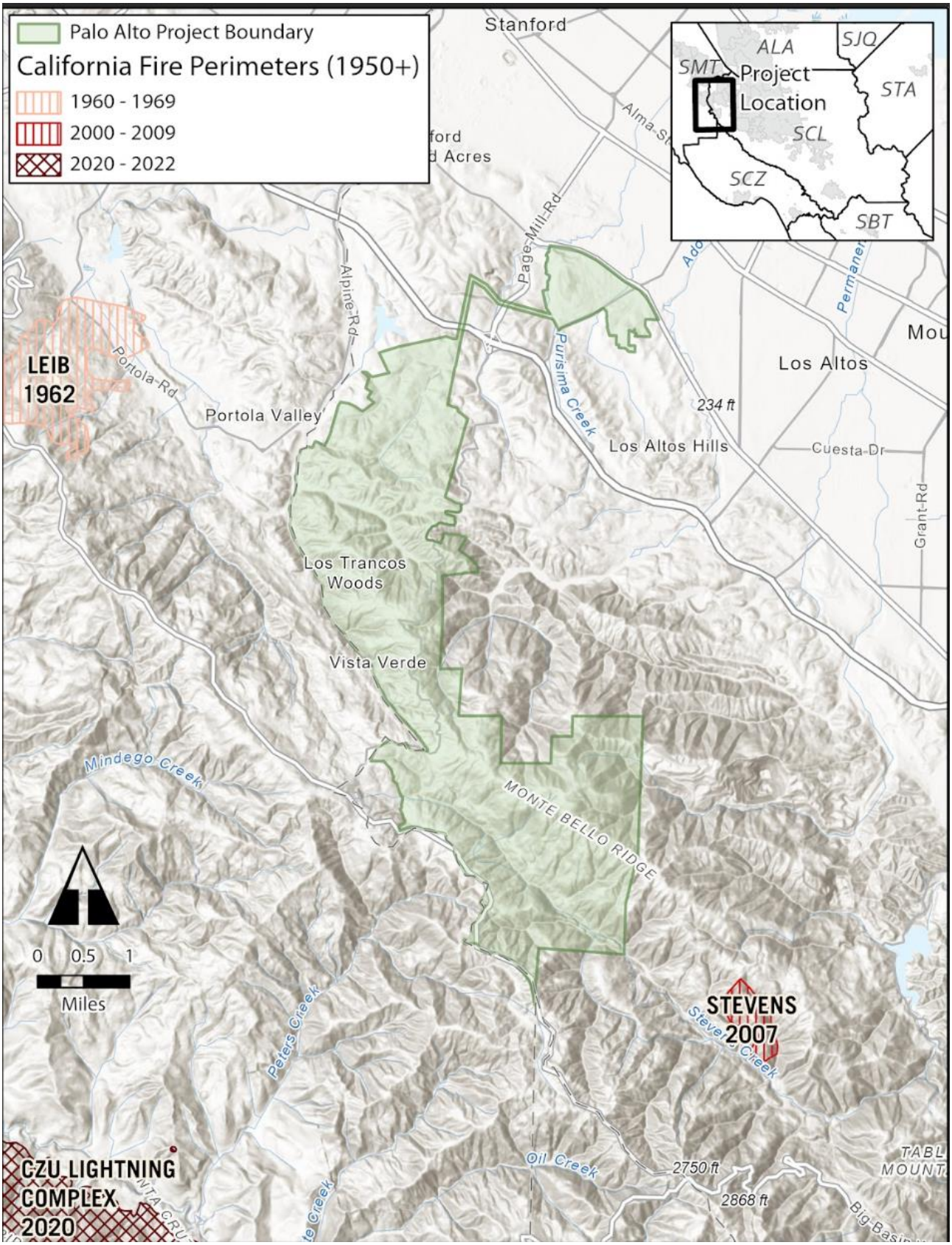

Figure 3. Fire history.

9. Terrain

The Foothills of Palo Alto rise from the near sea level elevations at its northern end to higher than 2300 feet at its southernmost extreme along Skyline Blvd. There are several distinct canyons that run north-south, most notably in Arastradero Preserve and in Steven Creek, located southwest of Monte Belle Ridge. In addition to Monte Belle Ridge, prominent ridgelines are formed by Trappers Trail on Foothills, and the ridgeline near Station 8. These ridges can partially block northerly winds that spread wildfire under hot dry, conditions.

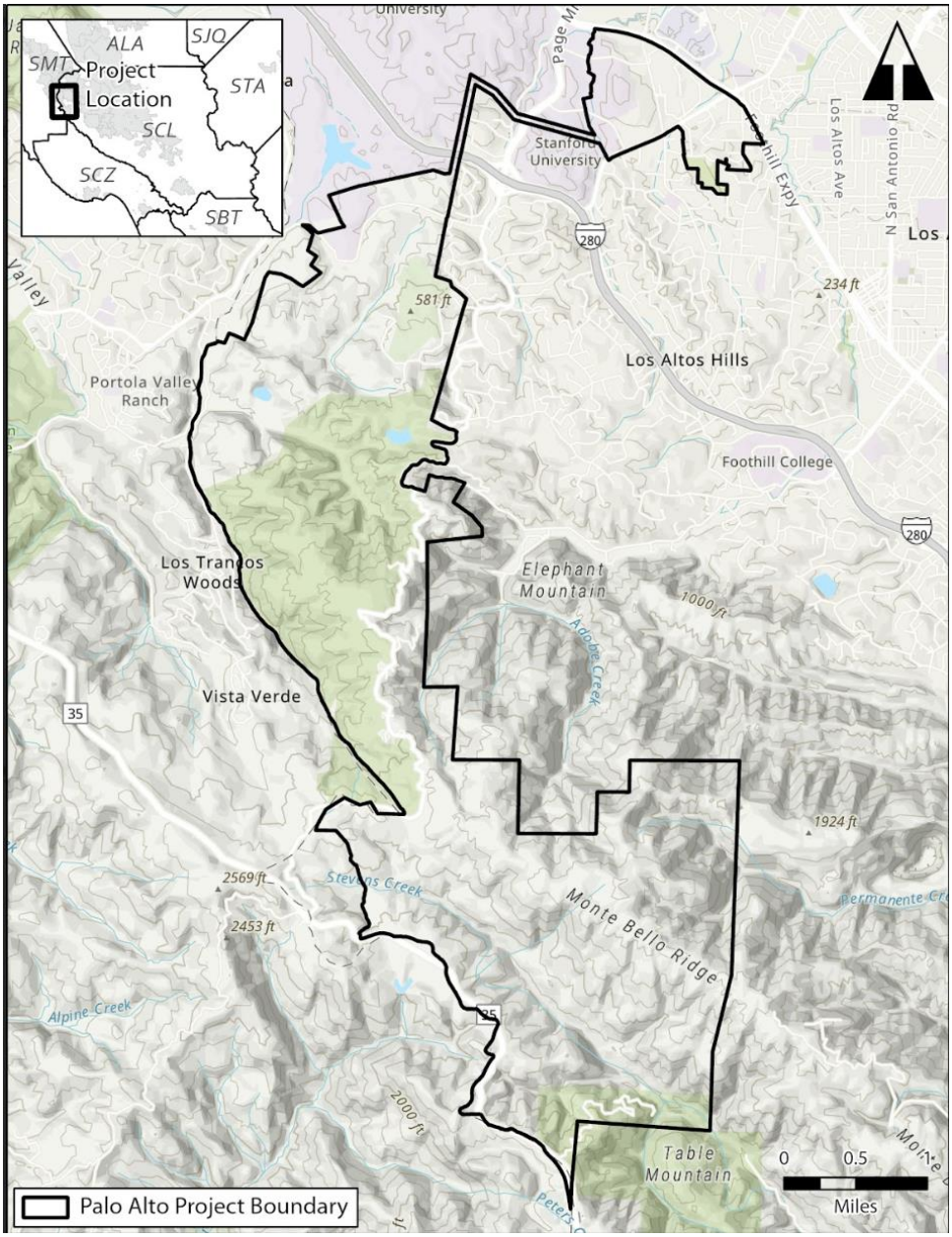

Figure 4. Topographic map of the project area.

10. Hazardous Fuel Characteristics

The 7240-acre Palo Alto project area is home to a diverse array of vegetation types, most notably evergreen hardwoods (3026.6 total acres), herbaceous (grassland) (1269.8 total acres), shrub (1223.1 total acres), redwood and Douglas fir (conifer) (715.6 total acres), developed (377.8 total acres), deciduous hardwood (266.8 total acres), and non-native forest (184.6 total acres). Riparian forest (34.1 total acres), forest (28.2 total acres), eucalyptus (27.7 total acres), water (22.3 total acres), riparian shrub (22.2 total acres), row crop (19.3 total acres), major road (8.8 total acres), vineyard (6.0 total acres), non-native herbaceous (grassland) (3.6 total acres), freshwater herbaceous wetland (1.6 total acres), orchard or grove (1.1 total acres), nursery or ornamental horticulture (0.5 total acres), and barren and sparsely vegetated (0.3 total acres) land covers are also present on the project area.

The most dominant single vegetative enhanced lifeform, Californian annual and perennial grassland (1269.8 acres), is present in swathes throughout the project area, notably in the lower elevations near developed areas along Junipero Serra Boulevard, Page Mill Road, and Arastradero Road; the slopes of the Palo Alto Hills and in Pearson-Arastradero Preserve; and in the southern ridgelines of the project area along Skyline Boulevard and Monte Bello Ridge. These low-volume fuels are generally associated with lower wildfire hazard and risk values because of the low flame lengths they tend to produce; however, they are also easy to ignite, especially during fire season when fuel moistures are at their lowest, so their concentration along Skyline Boulevard and Page Mill Road is associated with higher wildfire hazard and risk values due to the statewide preponderance of roadside grassy fuel ignitions.

The next most dominant vegetative enhanced lifeforms – the evergreen hardwoods *Quercus agrifolia* (cost live oak) alliance (1213.6 acres), *Umbellularia californica* (California bay) mapping unit (985.2 acres), and *Quercus chrysolepis* (canyon live oak) alliance (801.6 acres) – dominate the mountainous southern three-quarters of the project area, from the slopes of Elephant Mountain to Los Trancos Woods and Vista Verde. These are classified as high-volume timber-shrub fuels and are associated with extremely high wildfire hazard and risk values due to their location on steep slopes and intermix with high-volume shrub fuel models.

Shrubs, including chamise, ceanothus, sage, coyote bush and poison oak, (1223.1 total acres) are also prominent on the ridgelines and slopes below Alpine Road and on Elephant Mountain, and are generally intermixed with the abovementioned evergreen hardwood vegetation types on the steep slopes that dominate the southern two thirds of the project area. These shrub fuels are disproportionately high-volume and are associated with extremely high wildfire hazard and risk volumes due to their location on steep slopes and ability to produce extreme fire behavior (very high flame lengths and rates of spread).

Pseudotsuga menziesii (Douglas fir) etc. association (698.2 acres) dominates ridgelines in the southern third of the project area from Stevens Creek to Table Mountain. These fuels are mapped as a mix of light load and very high load dry climate timber-shrubs and are associated with high to extreme wildfire hazard and risk values due largely to their location on steep slopes and ridgelines and the large amounts of litter produced.

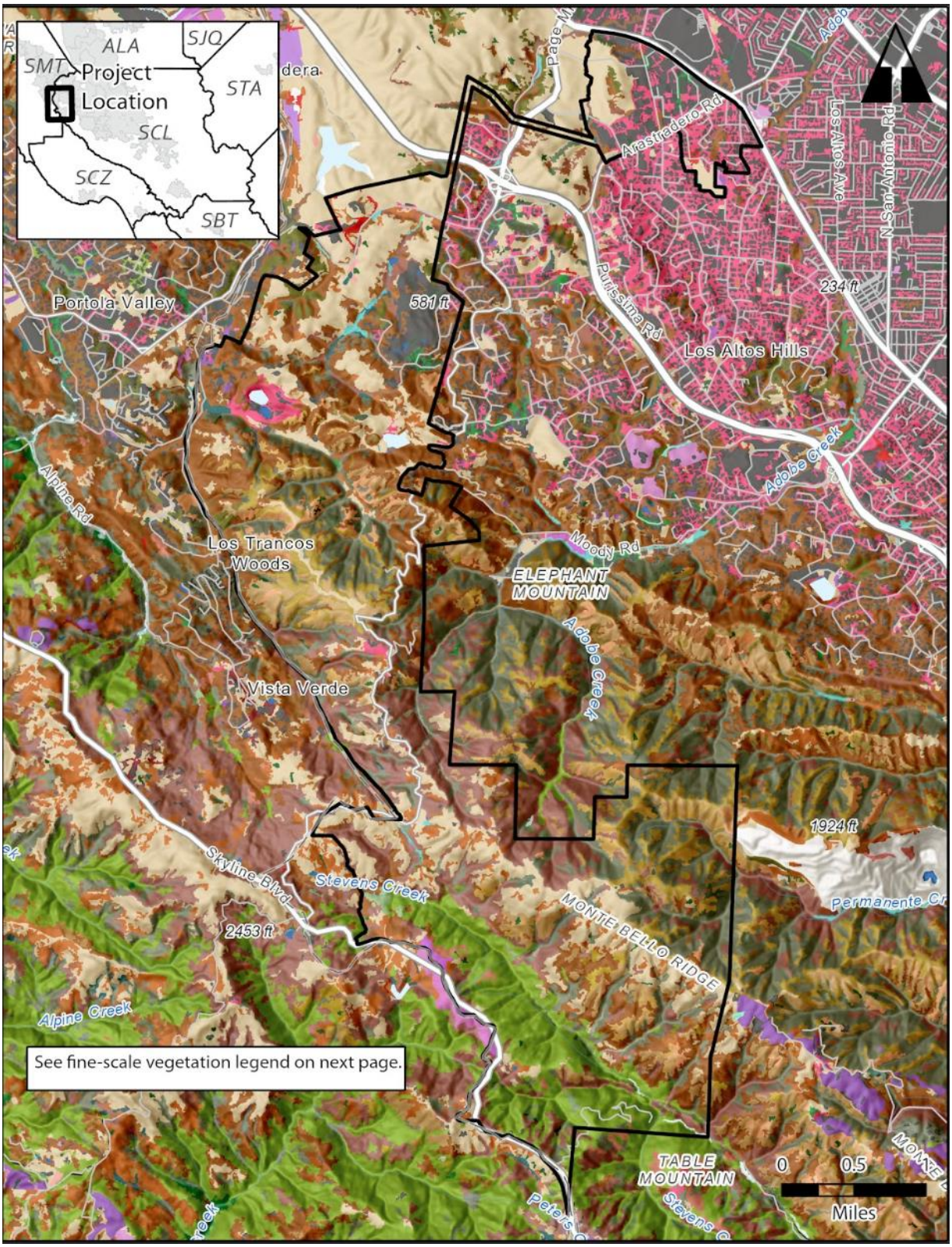

Figure 5. Map of vegetation types.

Figure 6. Vegetation types.

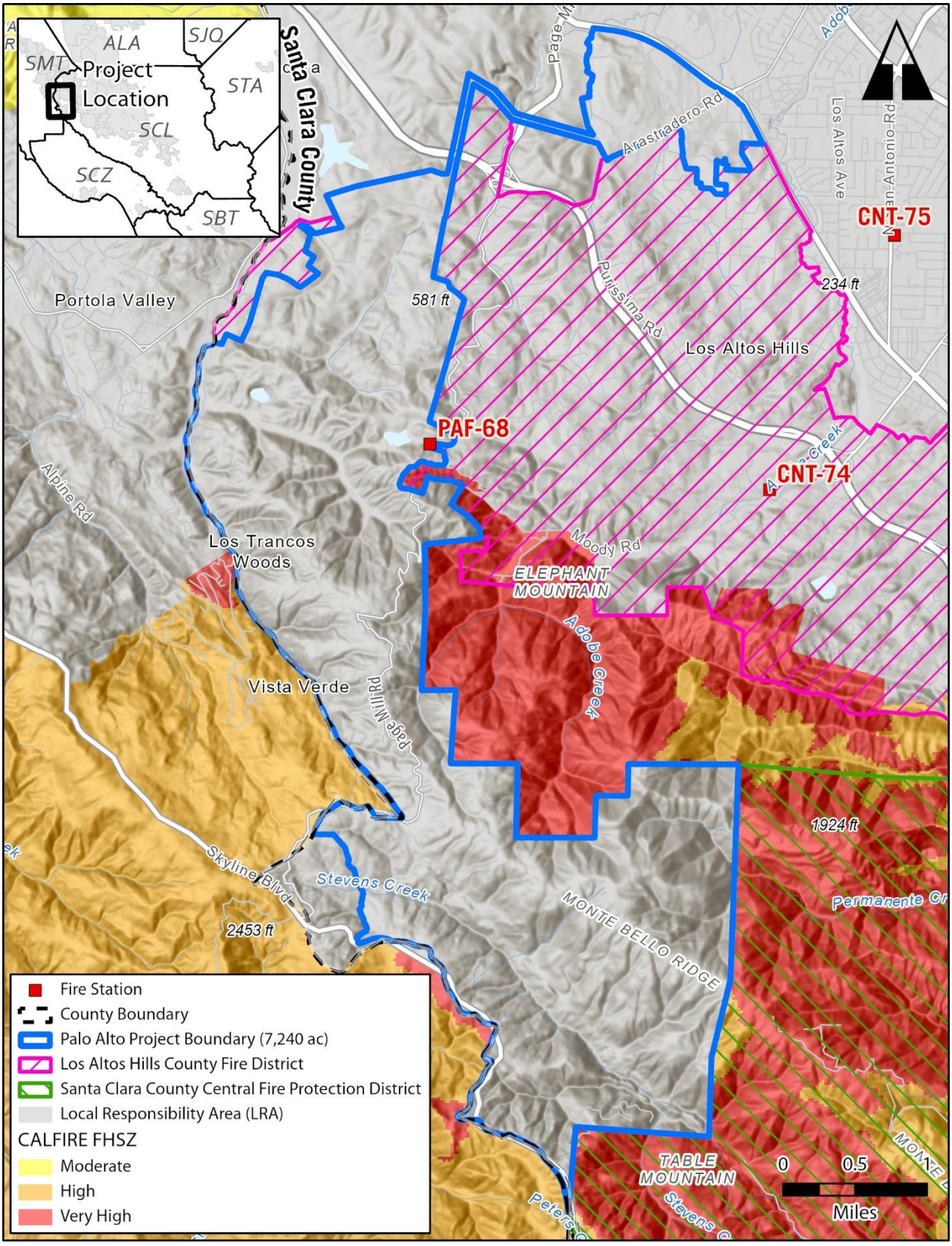

Figure 7. City of Palo Alto community planning area.

11. Neighborhood and Structural Characteristics

The Palo Alto community is made up of a mixture of homes with both old and new construction. Many homes are compliant with Building Code Chapter 7A, having been built since the WUI ordinance went into effect; some older homes, however, are non-compliant with guidance regarding windows and roofs. Siding is a mixture of stucco and wood. Most homes have Class A roofs; however, there are enough with wood-shake roofs to endanger an entire neighborhood. Additionally, a number of homes have dense coniferous landscaping fuels near structures. Aboveground powerlines also extend across much of the WUI area. Most roads are surfaced and have adequate width and turnaround for emergency apparatus. Roads are not very steep in most locations, but short stretches may be 10% grade.

Home lot size is large enough to separate homes enough to limit ignition from radiant heat (if the vegetation is managed between and surrounding the homes). Adjacent wildlands to the west and north are grass and are managed every year by the City of Palo Alto; however, much of the wildlands to the south are covered with heavy untreated brush fuels.

Water supply for the WUI areas is adequate and provided via hydrants connected to the city water supply.

There is an organized homeowner association (HOA) for much of the Foothills area that is active in fire prevention and can deliver a strong fire safety message and take action.

Figure 8. Page Mill Road: Dense roadside fuels.

Figure 9. Alexis Drive: Home with newer construction features, irrigated landscaping, large lot size, and clear compliance with Zone 0 defensible space.

Figure 12. Laurel Glen Drive: Accessible power box.

Figure 13. Laurel Glen Drive: Large lot size and new construction features, but large-volume landscaping fuels in close proximity.

Figure 14. Bandera Drive: Thick landscaping coniferous fuels in close proximity to home that otherwise boasts newer construction features.

Figure 15. Heavy untreated wildland brush fuels southwest of Black Mountain.

12. Emergency Response Capacity

The Palo Alto Fire Department's (PAFD) response area in the WUI Fire Area covers nearly 10 square miles, from Skyline Boulevard in the Palo Alto foothills to Foothill Blvd and from Page Mill Road to Los Trancos Road. Approximately 200 residences and large business

complexes (some of them exceeding a million square feet in area) exist in Palo Alto's WUI fire area.

PAFD has 111 personnel organized in three work divisions: Emergency Response (Operations), Fire Prevention, and Support Services.

PAFD staffs five full-time stations located strategically throughout the city. Additionally, PAFD staffs one station on Stanford University under contract with the University. To provide coverage in the sparsely developed hillside areas, an additional fire station in Palo Alto's Foothills Nature Preserve is operated seven days a week for 12 hours a day during June to October.[10]

Palo Alto Fire Department facilities are located as follows:

Fire Administration
250 Hamilton Avenue, City Hall

Fire Station 1
301 Alma Street

Fire Station 2
2675 Hanover

Fire Station 3
799 Embarcadero Road

Fire Station 4
3600 Middlefield Road

Fire Station 5
600 Arastradero Road

Fire Station 6
711 Serra Street, Stanford

Fire Station 8
Foothills Nature Preserve

Open Space Rangers from the Community Services Department, Open Spaces Division can initiate small fire suppression efforts using specially equipped pickup trucks designed to meet federal standards as a Type 6 Fire Engine.

Pickup trucks that meet federal standards as a Type 6 Fire Engine

[10] Fire and Emergency Medical Services Agreement. https://www.lahcfd.org/download/may-18-2021-fire-district-commission-meeting/?ind=1621066024164&filename=05182021_LAHCFD_06A_Station-8-Agreement.pdf&wpdmdl=3523&refresh=60c3b1eeef9eb1623437806

Rangers perform a vital service aiding fire suppression, providing detection, notification and initial size-up of fires, along with evacuation or reconnaissance. The Rangers offer detailed local knowledge and support the Station 8 firefighters. Currently ten staff are fully trained and equipped for first response and meet or exceed the federal minimum Fire Fighter Type 2 training standard. There are four trucks with 150-300 gallons of water.

The City of Palo Alto Utilities owns and maintains water distribution systems and services throughout Palo Alto, including the preserve and park land south of highway 280, the Palo Alto Hills Golf & Country club, Palo Alto University, and residential services to houses located along Alexis Drive, Los Trancos, and other residences, businesses, and outdoor uses adjacent to the City's park land. Hydrants are located on residential streets and intermittently on pumping lines. Purissima Hills Water District owns and maintains hydrants and water service along Page Mill Road from Foothill Expressway to the neighborhood located on Moody Road. The City of Palo Alto owns and maintains hydrants and water services intermittently within the Purissima Hills Water District's water service area along Old Page Mill Road; at Arastradero Road and at Moody Road on Page Mill; and from the Pony Tracks Fire Road intersection on Page Mill to Montebello Road. Residences and park areas in Monte Bello Preserve and within Palo Alto along Skyline Boulevard are serviced by private wells and private fire water protection systems.

Palo Alto Public Safety Departments participate in regional fire protection efforts and include mutual and automatic aid from neighboring jurisdictions and agencies such as: Mid-Peninsula Open Space District, Santa Clara County Fire Department, and CAL-FIRE.

Fire Response

Federal Responsibility Area (FRA): A term designating areas where the federal government is responsible for fire response efforts. These areas include land under federal ownership (CA GOPR 2020).

Local Responsibility Area (LRA): A term designating areas where the local government is responsible for wildfire protection. The LRA includes incorporated cities, cultivated agricultural land, and portions of the desert. LRA fire protection is typically provided by city fire departments, fire protection districts, counties, and by CAL FIRE under contract to local government (CA GOPR 2020).

As shown in Figure 16 below, the entirety of the planning area falls within a Local Responsibility Area (LRA) under jurisdiction of the City of Palo Alto, meaning that the City of Palo Alto is responsible for fire response and evaluating relative fire hazard.

State Responsibility Area (SRA): A term designating areas where the state has financial responsibility for wildland fire protection. Incorporated cities and land under federal ownership are not included in the SRA. Land under federal ownership is in the federal responsibility area (CA GOPR 2020).

The wildland urban interface (WUI) areas in the unincorporated portions of Santa Clara County are protected by SCCFD are also designated by state law as State Responsibility

Areas (SRAs) for wildland fire purposes. Therefore, the California Department of Forestry and Fire Protection (CAL FIRE) shares jurisdictional responsibility for fire protection in the SRA areas with the SCCFD. CAL FIRE evaluates SRA areas for wildfire potential and designates them as Moderate, High, and Very High Fire Hazard Severity Zones (FHSZs). The majority of WUI in the SCCFD district is High and Very High FHSZ.

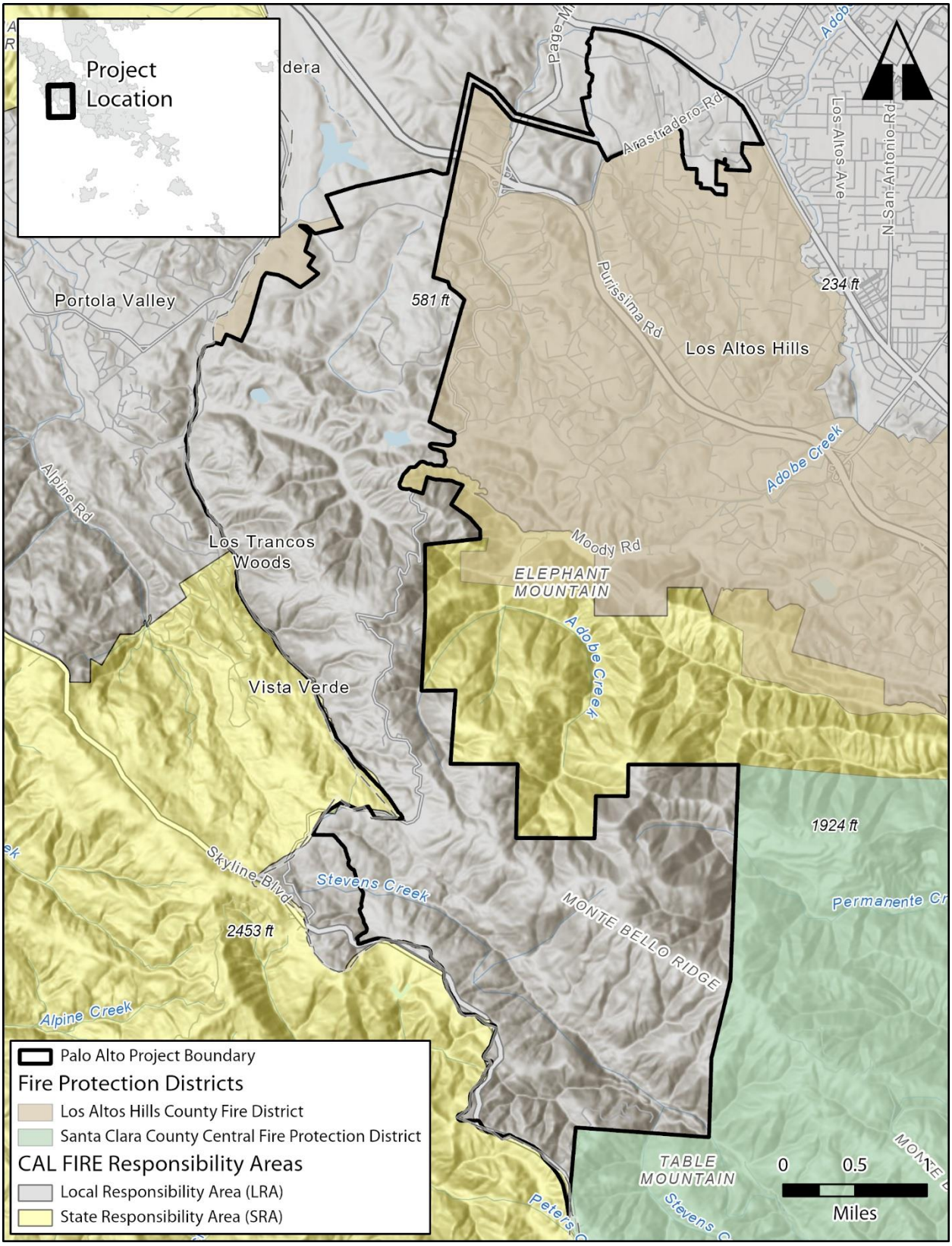

Figure 16. Jurisdictional responsibility areas.

13. Public Education and Outreach Programs

The City has a strong online presence where city fire prevention messages inform their residents, with a particular webpage that address Threats and Hazards. This is found at www.cityofpaloalto.org/thira (in addition to the Local Hazard Mitigation Plan referenced earlier). Moreover, the Palo Alto Fire Department website hosts a robust public-facing resource page, Prepare for Wildfire: Ready, Set, GO!, with video, interactive mapping, and textual resources covering defensible space guidelines, household wildfire plans, and evacuation routes and procedures. The webpage also includes links to and descriptions of external resources allowing members of the public to sign up for emergency alerts via AlertSCC.org, determine evacuation zones (a section accompanied by a handy how-to video), and view wildfire cameras from the ALERTWildfire consortium.

One of the core offerings of the Prepare for Wildfire page is its resources on Palo Alto's evacuation protocols and preparation in a section called Know Your Zone. Evacuation zones within the City are managed through the Genasys Protect.**11** As shown in the figure below, the Foothills project area is covered by 11 evacuation zones, 8 of which (PA-050, PA-051, PA-040, PA-041, PA-042, PA-043, PA-044, and PA-045) are within the jurisdiction of the City of Palo Alto, with the remaining 3 falling under the jurisdictions of San Jose (SJ-014) and Santa Clara County (SCC-004 and SCC-006).

[11] https://protect.genasys.com/

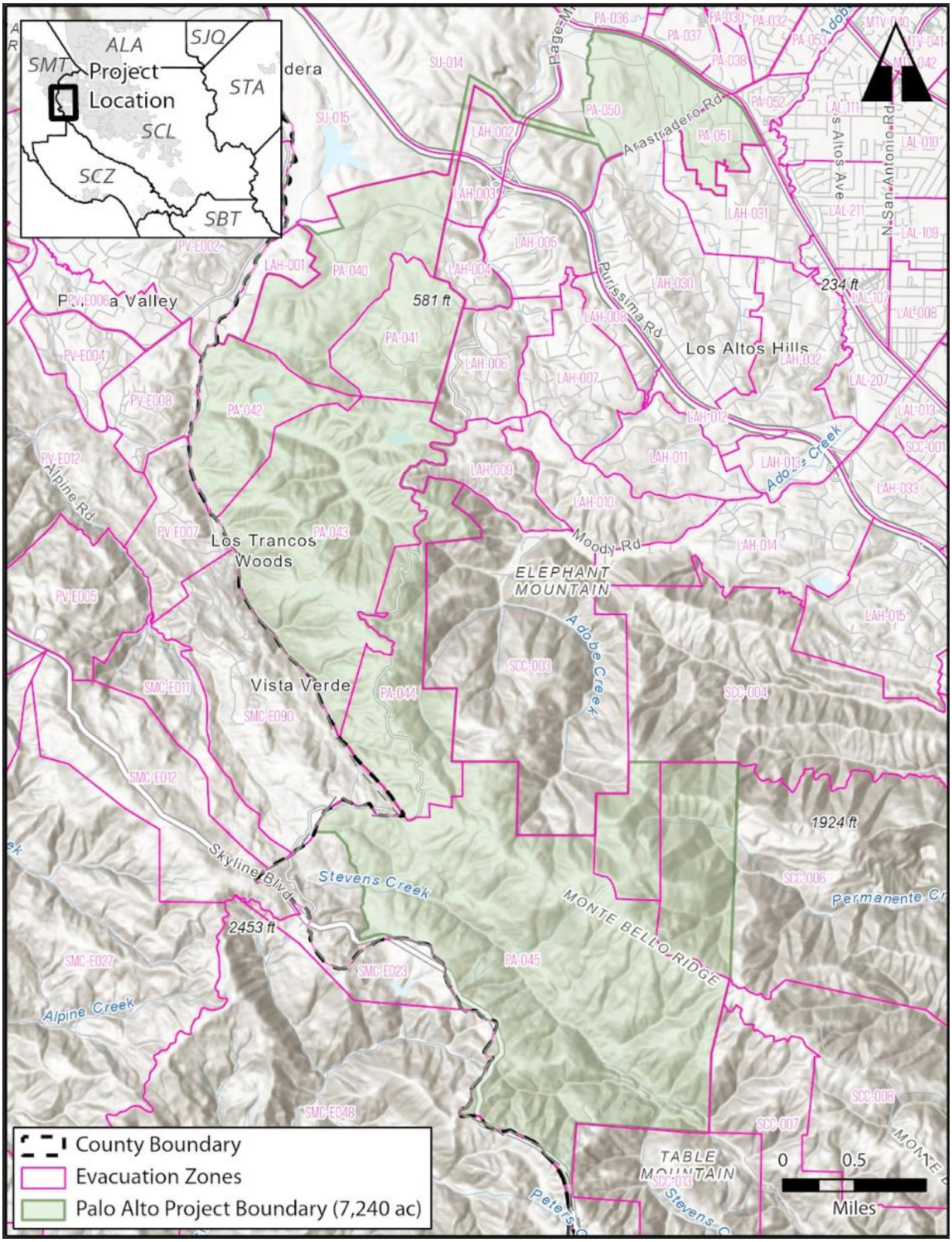

Figure 17. Evacuation zones from Genasys.[12]

12

The following section of the Prepare for Wildfire site, When to Evacuate, covers evacuation protocols and invites residents to download the evacuation route map below.

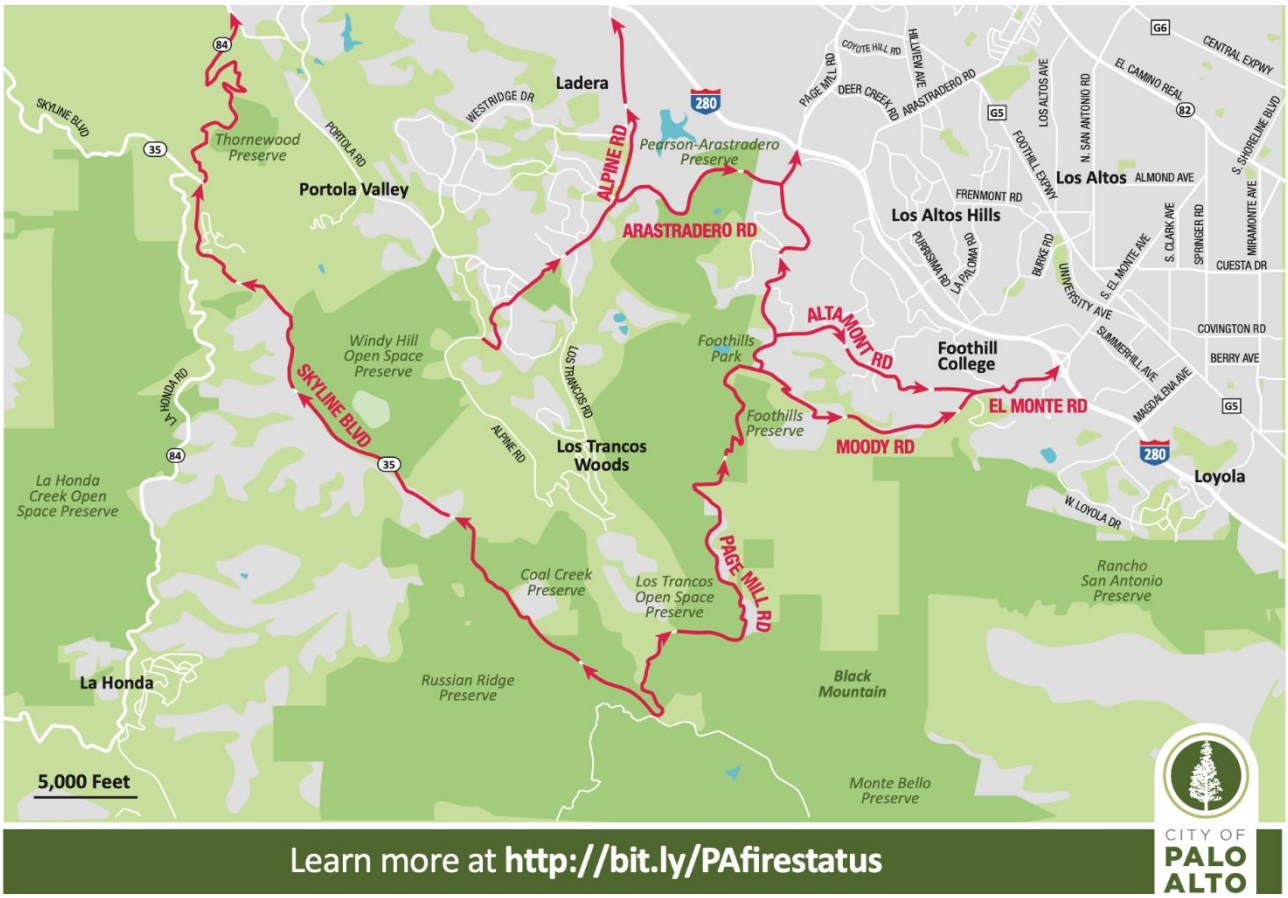

Figure 18. Public-facing map of City of Palo Alto evacuation routes.

There is also an annual community outreach by the Palo Alto Fire Department in conjunction with inspection of parcels. Additionally, representatives from the Santa Clara FireSafe Council and the City Office of Emergency Services annually host a disaster preparedness workshop for the WUI area that includes wildland fire risk preparation and response.

The City works collaboratively with its partners and neighbors. Foremost among these efforts is the City's contract with the Santa Clara Fire Safe Council to assist with community outreach and education, as well as hazardous fuel reduction projects in the WUI, including fuel reduction projects described later in this document such as fuels reduction on the Arastradero Road/Page Mill Road evacuation route. This implementation partnership is an approach that the City and County adopted long before most WUI jurisdiction, having been maintained to great effect for nearly two decades. The Santa Clara County Fire Safe Council additionally augments public education material and often makes direct contact with homeowners. The Fire Safe Council's own robust online presence can be found on its

website[13] which contains numerous public-facing resources on wildfire education and preparation.

14. Social Vulnerabilities

Social vulnerability refers to a community's capacity to prepare for and respond to the stress of hazardous events ranging from natural disasters,

Differential access to social, political, and economic resources affects the ability of individuals and communities to mitigate and adapt to fire (18, 24, 30). This includes resources to reduce the likelihood of home loss (e.g., by reducing flammable materials around structures and home hardening), ability to respond during a fire (e.g., by evacuating elderly and disabled people and by providing effective, accessible emergency messages), and ability to recover after a fire (e.g., insurance coverage and resources to rebuild a home.[14]

The CDC/ATSDR Social Vulnerability Index (CDC/ATSDR SVI 2022) Santa Clara County Map, shown below, depicts the social vulnerability of communities, at census tract level, within a specified county. CDC/ATSDR SVI 2022 groups sixteen census-derived factors into four themes that summarize the extent to which the area is socially vulnerable to disaster.

The factors include economic data as well as data regarding education, family characteristics, housing, language ability, ethnicity, and vehicle access. Overall Social Vulnerability combines all the variables to provide a comprehensive assessment.[15]

[13] https://sccfiresafe.org/
[14] Social Vulnerability of the People Exposed to Wildfires In U.S. West Coast States. https://www.science.org/doi/full/10.1126/sciadv.adh4615
[15] CDC/ATSDR Social Vulnerability Index 2022. https://svi.cdc.gov/Documents/CountyMaps/2022/California/California2022_Santa%20Clara%20County.pdf)

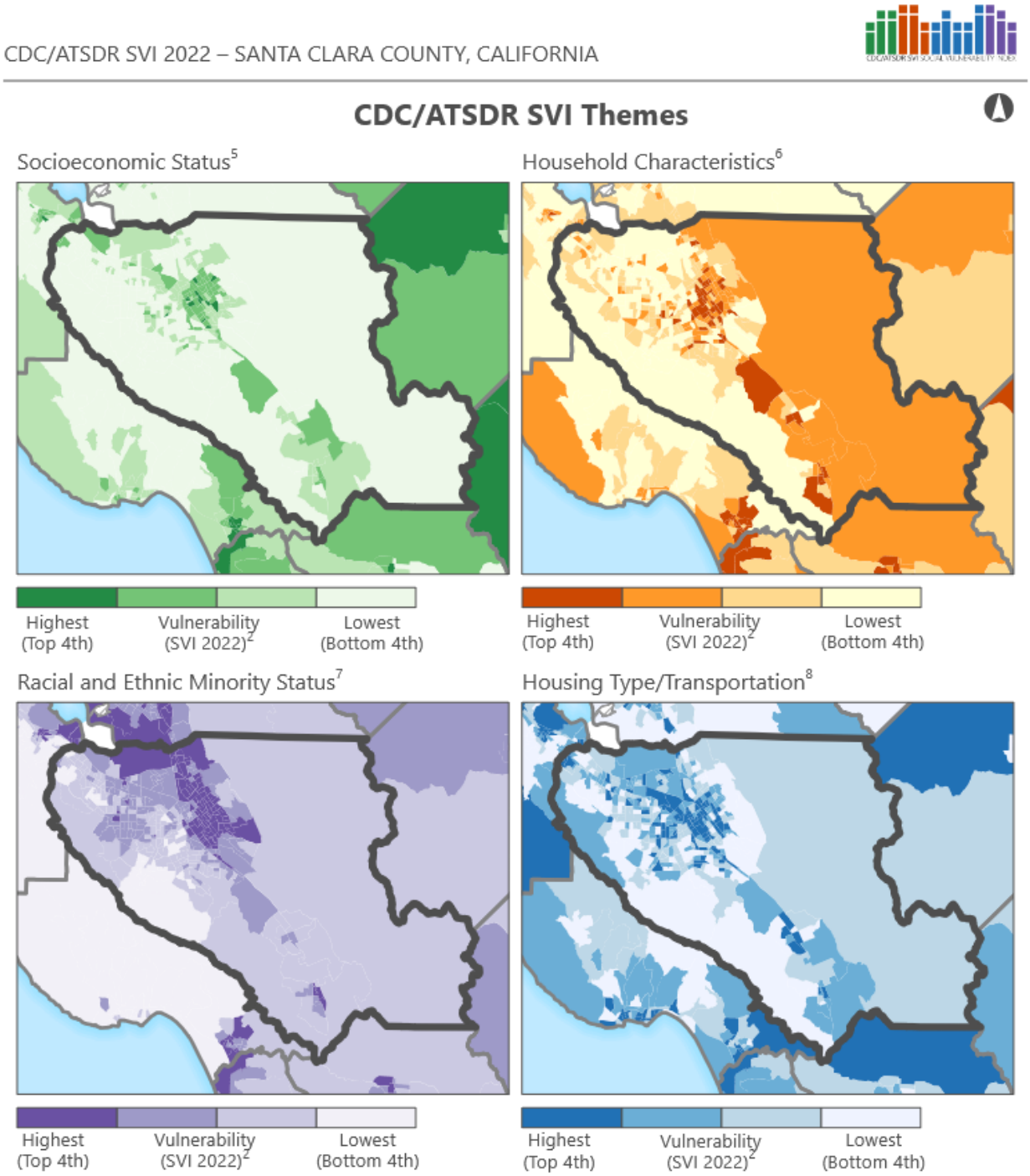

Figure 19. Maps of social vulnerabilities in Santa Clara County, from https://svi.cdc.gov/Documents/CountyMaps/2022/California/California2022_Santa%20Clara%20County.pdf

15. Policies, Regulations, Ordinances, and Codes

The CWPP/FFMP includes details of codes and ordinances, as well as the code documents to which they refer.

15.1. Fire Code

Title 15 of the Palo Alto Municipal Code adopted the California Fire Code, 2022 Edition, with local amendments which define the WUI and specify defensible space requirements.

In addition, Title 8 regulates water efficiency, which affects weed abatement policies that can be used for properties not in compliance with defensible space requirements.[16]

15.2. Building Code

Title 16 of the Palo Alto Municipal Code adopted the California Building Code, 2022 Edition. In general, these sections support the adopted Title 15 Fire Code. *The City has adopted the 2022 California Building Code, Title 24, Part 2, Volumes 1 & 2 adopted and amended.*

Chapter 7A of the California Building Code and Chapter R337 of the California Residential Code contain standards associated with the construction of buildings in wildfire prone areas.

Also, the Santa Clara County Multijurisdictional Hazard Mitigation Plan 2023 Update City of Palo Alto Annex notes that the City Code, Chapter 16.42, Chapter 16.52, and Chapter 15.04.420 specifically addresses Natural hazards. This plan also references the 2016 Palo Alto Emergency Operations Plan (EOP, which) identifies the City's emergency planning, organization, and response policies and procedures.[17]

16. Risk-Hazard Assessment

16.1. County Risk Assessment

The Tukman Hazard and Risk Assessment is a third-party risk assessment calculated from a combination of hazards. Predicted fire behavior, especially flame length, is the most heavily weighted element in calculating wildfire hazard. These fire behavior predictions – in contrast with the CAL FIRE VHFHSZ modeling, discussed further below – are derived from fuel mapping classified at a fine-scale 5m resolution following the collection of LiDAR data and high-resolution imagery. This hazard and risk assessment has been developed as part of a collaborative effort with multi-jurisdictional participation. The County CWPP presents data on the Wildfire Hazard and Wildfire Risk to Structures layers below.

16.1.1. Wildfire Hazard

Wildfire hazard is calculated as a combination of hazards from fire behavior, ignition sources, owner intervention, and suppression difficulty. Hazard combines fuel characteristics such as the volume, arrangement, moisture, and sizes of fuels, all of which contribute to how fire will burn. Information about the fuels is combined with physical

[16] http://www.cityofpaloalto.org/gov/depts/utl/residents/resrebate/landscape.asp
[17] https://www.cityofpaloalto.org/Departments/Emergency-Services/Plans-and-Information/Local-Hazard-Mitigation-Plan

landscape characteristics such as weather, topography, and the distribution of ignitions across the landscape.

Relative wildfire hazard values mapped within the project area range from 1.56 (very low relative fire hazard) to 6.00 (highest relative fire hazard). Roughly a third of the project area (2480.3 acres) is evaluated as presenting highest relative fire hazard (hazard index values from 5-6), with extremely high relative fire hazard values mapped on the timber-shrub and shrub-covered steep slopes between Monte Bello Ridge and Table Mountain, the slopes of Los Trancos Woods and Vista Verde, and the south-facing slopes leading to Elephant Mountain. Approximately half of the project area (3697.7 acres) is evaluated as presenting moderate relative fire hazard (hazard index values from 3-4.99), values that concentrate around lower-volume herbaceous fuels on the Monte Bello ridgeline and within Portola Valley and the lowlands of the Pearson-Arastradero Preserve. Lowest relative fire hazards (hazard index values from 1-2.99) are mapped on the remaining 1062.0 acres of the project area concentrated in the residential area along Arastradero Road and on the Palo Alto Hills Golf and Country Club.

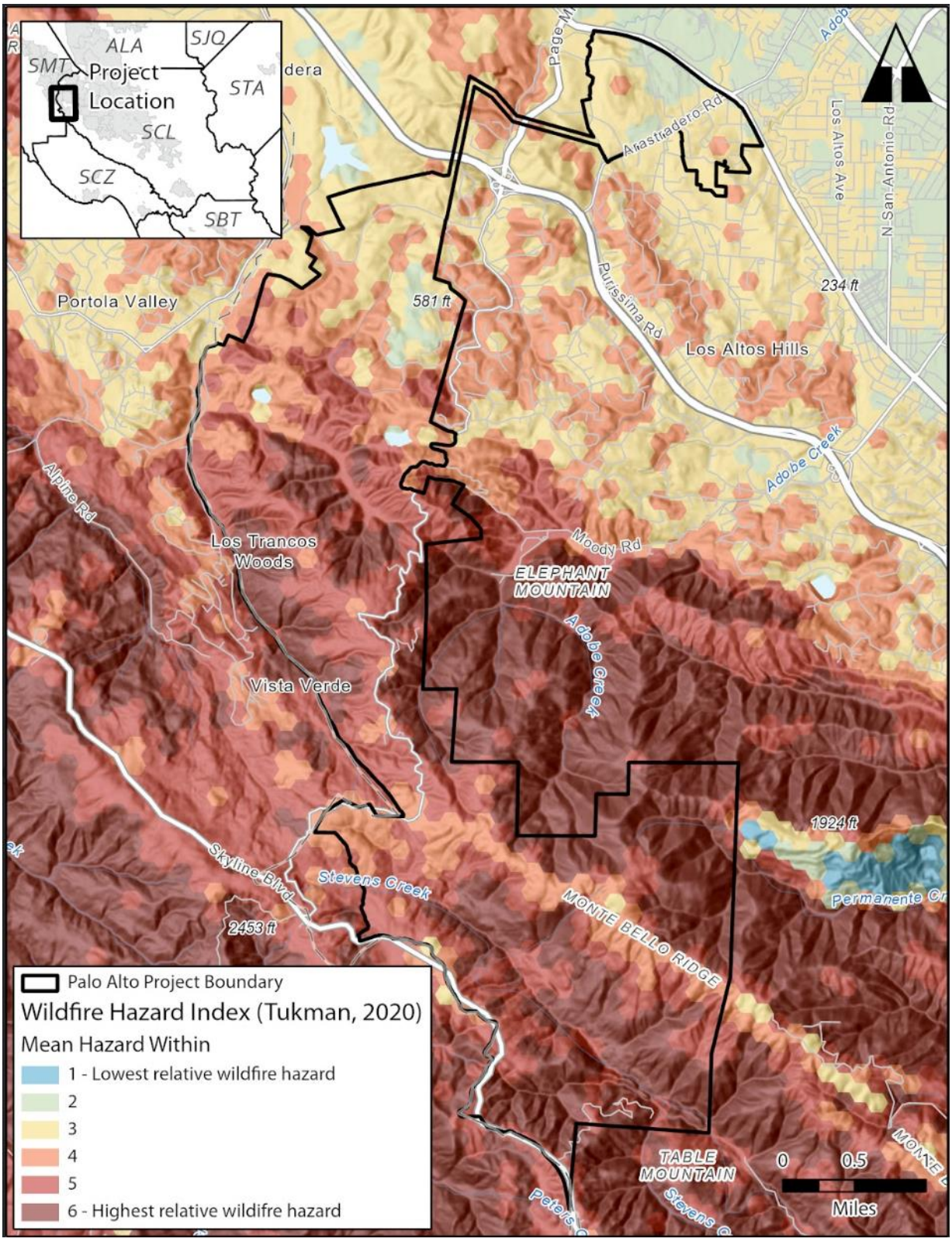

Figure 20. Wildfire Hazard map.

16.1.2. Wildfire Risk

Risk is the potential for realization of adverse consequences to valued resources or assets. Wildfire risk considers not only the potential for hazardous wildfire, but also the values exposed to hazard. Hence, wildfire hazard can be very high, but if no resources or assets are exposed to the hazard, there is no risk.

Some risk assessments consider all relevant types of values, including socioeconomic, along with ecological elements. However, this risk assessment is limited exclusively to wildfire risk to structures, not wildfire risk to other resources and assets.

Most of the Palo Alto project area is evaluated as presenting high wildfire risk to structures, particularly in the steep slopes of Elephant Mountain and Monte Bello Ridge. Patches of extreme wildfire risk to structures concentrate around Page Mill Road from the developed lowlands north and south of Junipero Serra Boulevard to near Monte Bello Open Space Preserve and Vista Verde; in the developed area along Arastradero Road in the northern portion of the project area; and along Skyline Boulevard at the farthest south of the project area. Moderate risk values concentrate on Monte Bello Ridge and in Foothills Nature Preserve, while the low-volume herbaceous fuels of the Pearson-Arastradero Preserve and north of Arastradero Road correspond with lower risk values.

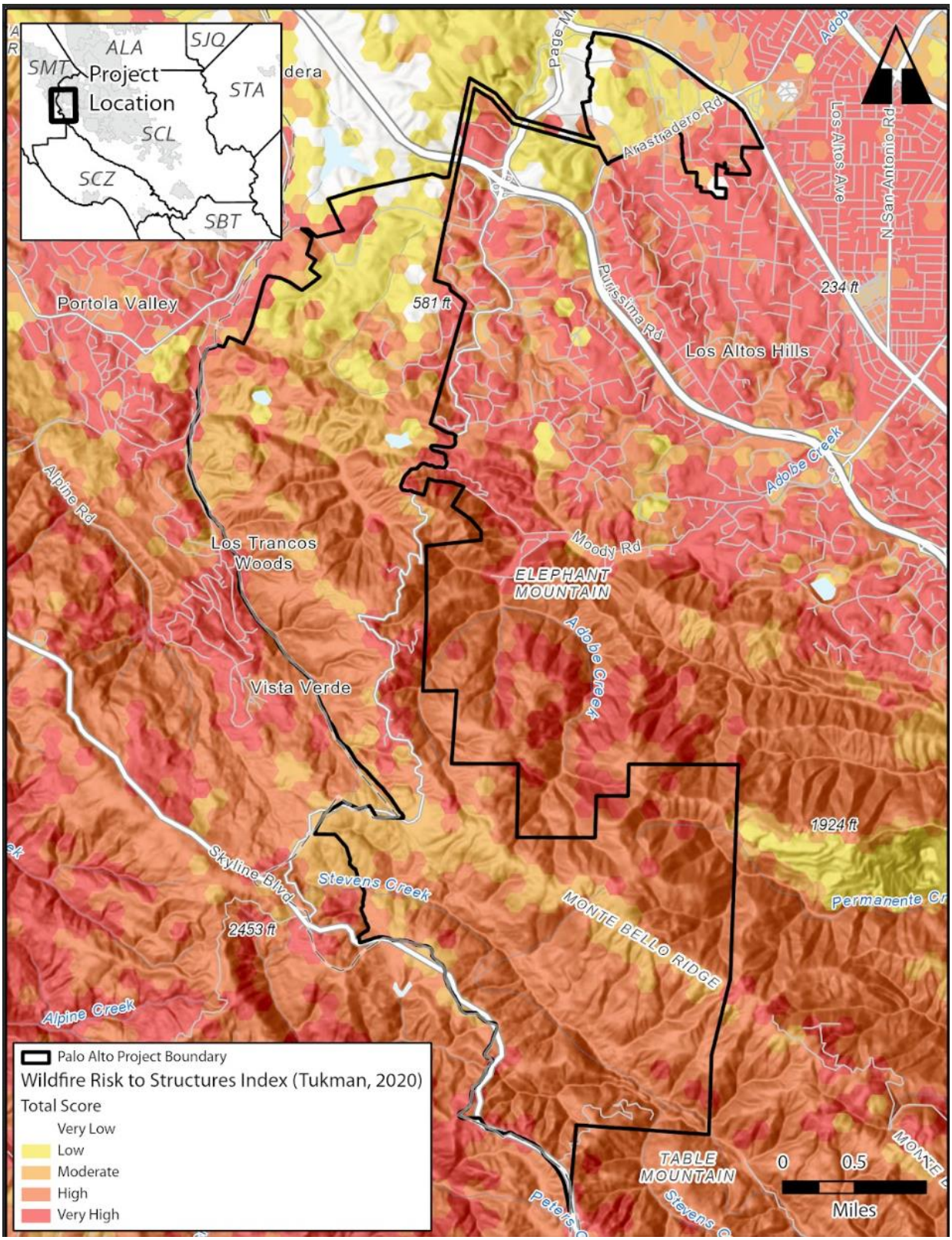

Figure 21. Wildfire Risk to Structures map

16.1.3. CALFIRE Fire Hazard Severity Zones

The CALFIRE FHSZ system is a science-based system where severity zones are defined based on vegetation, topography, and weather (temperature, humidity, and wind), and represent the likelihood of an area burning over a 30- to 50-year time period without considering modifications such as fuel reduction efforts. The CALFIRE FHSZ maps present wildfire hazard and not wildfire risk. In California, CAL FIRE maintains fire hazard severity zone (FHSZ) data for the entire state. There are three classes of fire hazard severity ratings within FHSZs: Moderate, High, and Very High (CA GOPR 2020).

In 2007, when the initial Hazard Severity Zone Mapping occurred, no area within the City of Palo Alto was classified as reaching Very High Fire Hazard Severity. However, most of the adjacent State Responsibility Areas to the project's east on the slopes of Elephant Mountain, Monte Bello Ridge, and Table Mountain are designated as Very High Fire Hazard Severity Zones. South of the project area, Highway 35 marks the boundary between these areas of Very High Fire Hazard Severity and the slopes of the Santa Cruz Mountains to the project's west, which – except for three small areas of Very High Fire Hazard Severity along the project area boundary – are entirely mapped as meriting High Fire Hazard Severity. An SRA outside Ladera to the project site's northwest is mapped as a Moderate Fire Hazard Severity Zone.

The Palo Alto project area falls within a Local Responsibility Area (LRA) under jurisdiction of the City of Palo Alto, meaning that the City of Palo Alto is responsible for both fire response and evaluating fire hazard severity. CAL FIRE maps the full scale of fire hazard severities in State Responsibility Areas (SRAs), as shown in the areas of the map below that fall outside city limits. Meanwhile, LRAs simply distinguish between areas with or without Very High Fire Hazard Severity.

The SRA was re-mapped in 2023 and the LRA re-mapped in 2025. The lower parts of the project area are mapped as Moderate Fire Hazard Severity. The most extreme northeastern section is not classified. The upper part of the Palo Alto project area is mapped as a High or Very High Fire Hazard Severity Zone. Roughly half of the area is classified as Very High; these locations are on the western side and the southernmost extent of the project area. The remaining area is classified as High Fire Hazard Severity Zone.

When the classifications are approved. by the City newly constructed homes must meet heightened fire-resistant building standards in High and Very High Fire Hazard Severity Zones, Additionally, those landowners with structures within the High and Very High Fire Hazard Severity Zone must disclose to would-be buyers of the elevated danger with a disclosure form. New subdivisions in the Very High Fire Hazard Severity Zone will also need to be carefully designed with multiple evacuation routes, adequate water supply infrastructure and built-in fuel breaks in place.

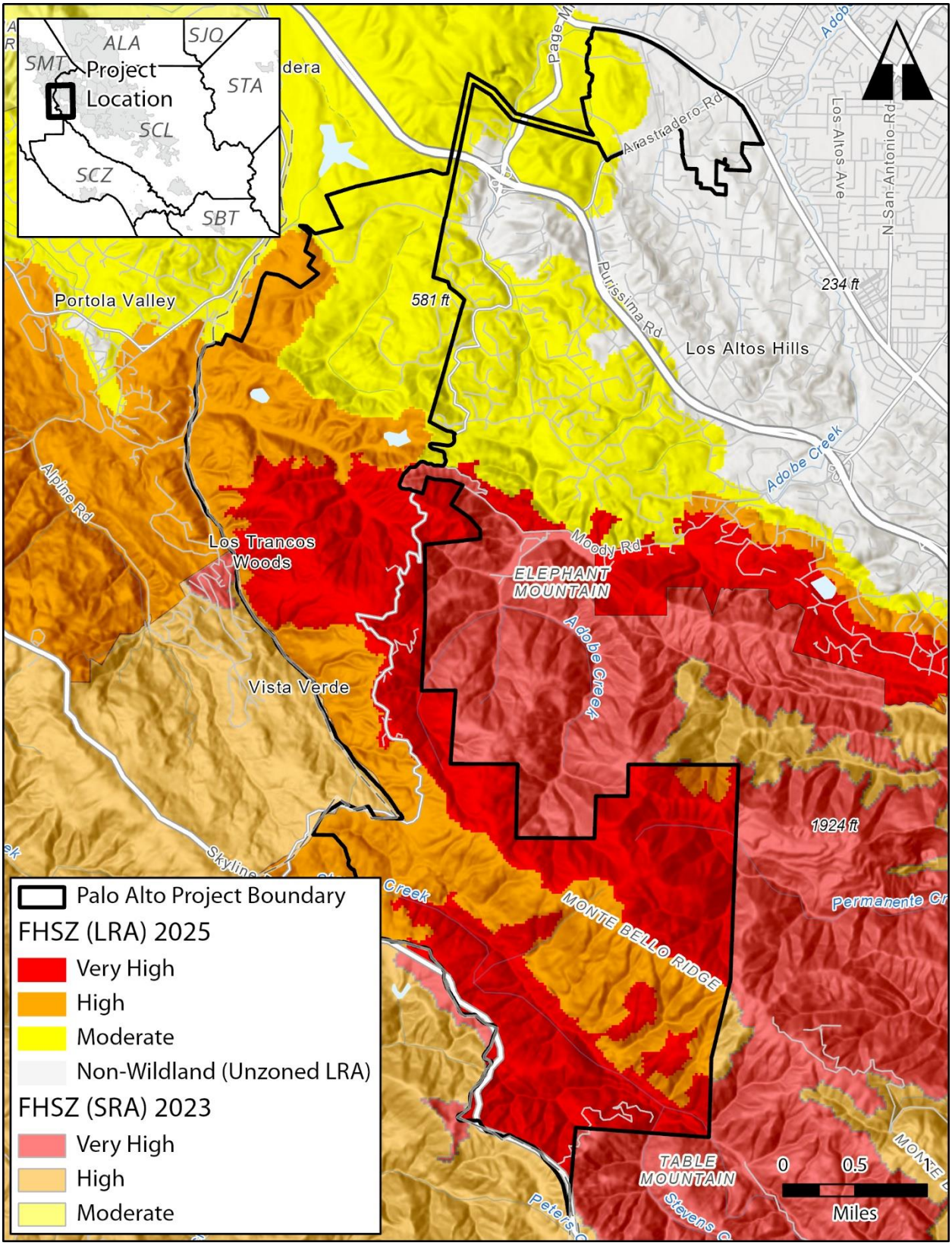

Figure 22. CALFIRE FHSZ map.

16.2. Palo Alto Community Area Risk Assessment

Community hazard assessments are designed to identify factors contributing to an increased ignition likelihood or wildfire severity. These community hazard assessments include ratings of community conditions compared to best practices for WUI fire mitigation, and include consideration of applicable state codes, local ordinances, and recognized best practices guidelines.

The National Fire Protection Association Standard 1144 (NFPA 1144) defines WUI hazards and risks at the community and parcel level. This plan utilizes components of NFPA 1144, California laws and local ordinances to evaluate neighborhood WUI hazard and risk. California Public Resources Code (PRC) 4290 and 4291 sections address WUI community design and defensible space standards.

As shown in Figure 23 below, the NFPA 1144 community risk assessment completed as part of this CWPP/FFMP for the Palo Alto Community assigned the WUI community a risk rating of **High** with a score of 95 (<40= low, >40 = moderate, >70 = High, >112 = Extreme).

Factors that contributed to the risk include hazardous landscaping patterns; high-volume brush fuels in Palo Alto's southern wildlands; aboveground powerlines; and hazardous construction patterns in older homes, including the lack of interior sprinklers and the use of single-pane windows and wood shake roofs. Averages are taken across the community for each of these parameters. While still designated High risk, the City of Palo Alto's 2023 assessment marks an eight-point reduction in overall risk from the 2016 evaluation, which assigned an overall risk rating of 103. This decrease in overall risk stands in contrast with the results of 2023 visits to other WUI communities within Santa Clara County, which generally observed higher risks than in Palo Alto.

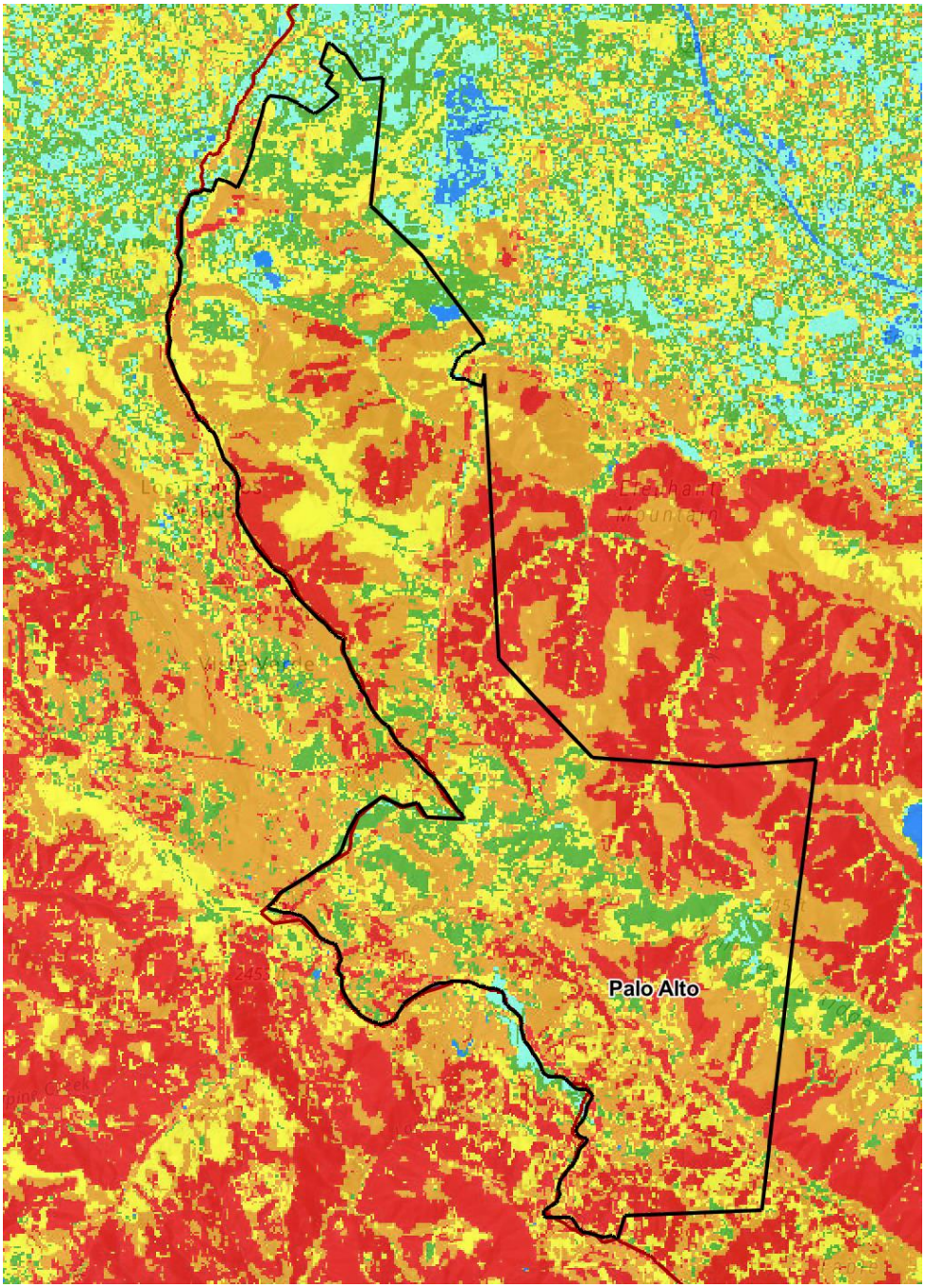

Figure 23. Community hazard assessment for the City of Palo Alto, per the Santa Clara County CWPP.

POSITIVE	NEGATIVE
✔ Surfaced roads and adequate width and turnaround	✘ Landscaping concerns due to density of thick junipers and pines in close proximity to homes
✔ Low slope in most areas, some steep sections	✘ Wildlands to the south are heavy untreated brush
✔ Adjacent wildland to west and north are grass and managed every year by the City of Palo Alto	✘ Power lines aboveground
✔ Mixed construction—stucco and wood	✘ Homes old enough that there is no requirement for interior sprinklers
✔ Large lot size reducing adjacency issues	✘ Older homes with single-pane windows prone to breaking in wildfire
✔ Adequate water supply via hydrants	✘ Presence of some wood shake roofs put homes and neighborhoods at risk
✔ Organized HOA to deliver strong safety message and take action	
✔ Good visible house markers	
✔ Well signposted	
✔ Irrigated lawns and landscaping	
✔ New construction, 7A compliant	
✔ Most homes have Class A roofs	
✔ Community that is active in Santa Clara County	
✔ Fire Safe Council	

Figure 24. Summary of the community hazard assessment for the City of Palo Alto.

Parameter	Condition	Rating
Access	One road in and out	-
	Good road width and minimal grade	+
	Surfaced road	+
	Good fire access and turnarounds	+
	Street signs are present, some are non-reflective	+/-
Vegetation	Adjacent fuels: Heavy	-
	Defensible space: Less than 30 feet around structure	-
Topography within 300 feet of structure	10% to 20%	+/-
Topographic features	Moderate concern	+/-
History of high fire occurrence	Low	+
Severe fire weather potential	Low	+
Separation of adjacent structures	Good separation	+
Roofing assembly*	Class C	-
Building construction	Non-combustible siding/combustible deck	+/-
	Building set back <30 feet to slope	-
Available fire protection	Water: hydrants present with good pressure	+
	Response: Station <5 miles from structure	+
	Internal sprinklers: none	-
Utilities	One above and one below ground	+/-
Risk Rating- High (95)		

*Roofing assembly: Class A: effective against severe fire test exposures; Class B: effective against moderate fire test exposures; Class C: effective against light fire test exposures; Unrated (wood shake roofs).

17. Critical Infrastructure and Community Values at Risk

According to the 2023 update to the City of Palo Alto Annex to the Santa Clara County Multijurisdictional Hazard Mitigation Plan, "[a] total of 1711 people (2.5% of the total population) [of the City of Palo Alto] reside within wildfire hazard areas… Not all structures in areas at risk to wildfire are constructed with fire resistant materials or have adequate defensible space or other forms of vegetation management to reduce fire risk. Wildfire risk is expected to increase by extended periods of drought or extreme heat caused by climate change."

The following maps – excerpted from the SCC CWPP – display a subset of the critical infrastructure and cultural and socioeconomic values at risk but are not entirely comprehensive.

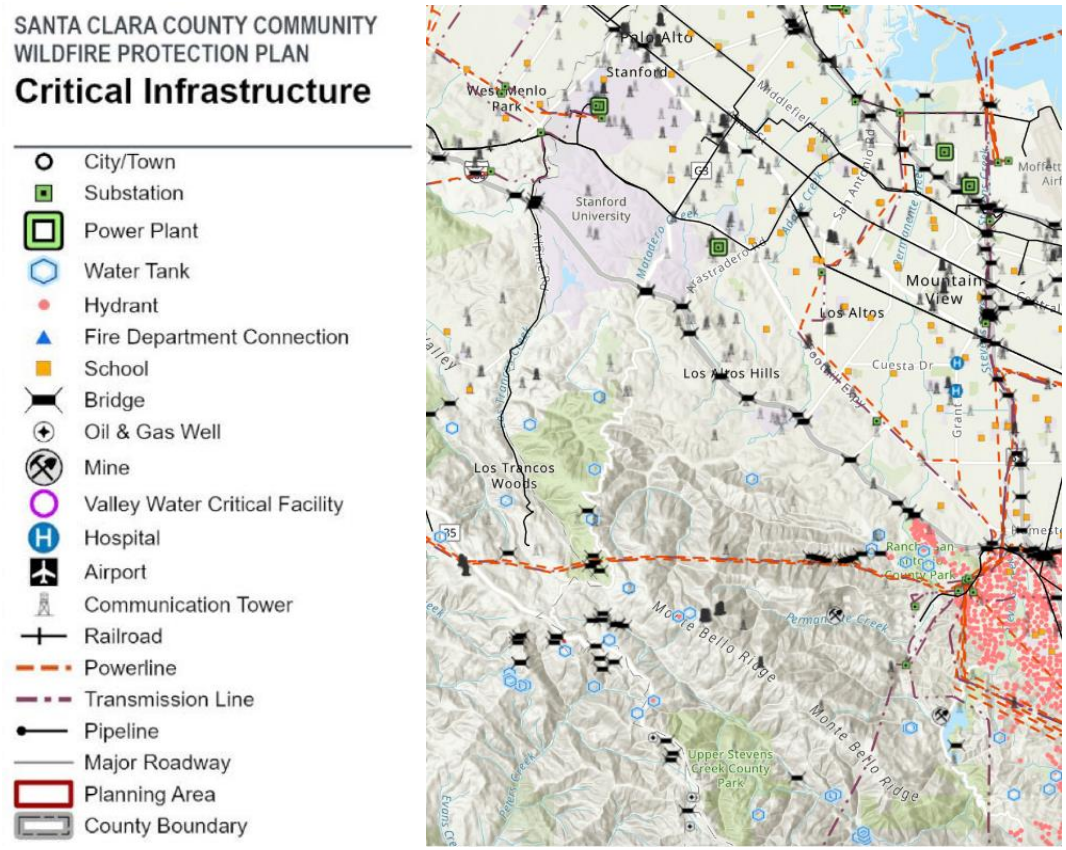

Figure 25. Critical Infrastructure at Risk from the SCC CWPP.

Water distribution systems are critical infrastructure for suppression of small fires, mitigation of conflagrations, containment of wildfire, and recovery from a wildfire event. Protection and recovery of water distribution systems from damage and contamination during a wildfire event will directly impact wildfire response. The City of Palo Alto owns and maintains five water storage reservoir tanks and five water distribution pumping systems within the City's jurisdictional boundary South of Highway 280.

These tanks and pumps are arranged in series where each water storage tank supplies pressure and storage to five water pressure zones. Each pressure zone can supply water to each adjacent

zone in series to either lower or higher pressure zones through pressure reducing valving and pumps.

Two additional sub-pressure zones, referred to as Foothill Entrance and the Los Trancos subzones or Subzone 7A and Subzone 7B, respectively, are located within and supplied by the Park Tank Pressure Zone 7, through pressure reducing stations located in underground vaults, in addition to a standby pump system, called the Blanco Pump, located at the Boronda Tank Site from the Boronda Tank Pressure Zone #6.

Four of the five water storage tanks are shown in the Critical Infrastructure at Risk Map above. The fifth water storage tank is located within the Arastradero Preserve near the Woodland Star Trail.

The City has also entered into emergency intertie agreements with neighboring water utilities to provide water into the Palo Alto system if needed. There are two interties currently constructed with Purissima Hills Water District: the first is near Highway 280 and the second is near Page Mill and Moody Road.

The City's water tanks, pumps, and piping are in areas of dense vegetation; wildfire hardening and vegetation management are critical to maintain defensible space and to mitigate ignition of combustible materials and heat damage within the water facility sites.

The water storage and distribution systems are designed for a singular structural fire; a wildfire with multiple structural fires will exceed the design demand and could cause depressurization of the water system. Burned services and private plumbing increases water loss, and water service curb stops (water service valve at the meter) may not be accessible to isolate water services in an individual pressure zone. There are 13 miles of city-owned roadway along Arastradero, Page Mill, and Los Trancos Roads. According to the Palo Alto Annex to the SCC MHMP, “power lines are occasionally de-energized in high wind events and similar conditions that may increase risk of wildfire. Although de-energizing lines reduces risk of igniting a wildfire, power interruptions can affect operations of other critical facilities, including water distribution facilities needed for fire response efforts.” The City of Palo Alto has undergrounded its above-ground electrical lines in the Foothills planning area, which significantly reduces the risk of ignition. However, the PG&E lines are still above ground. There are also additional underground electrical power and fiberoptic lines with supporting infrastructure along Page Mill Road, and as shown in the Critical Infrastructure at Risk map above and the Socioeconomic Values at Risk map below, a power plant/substation along Arastradero Road falls within the project area.

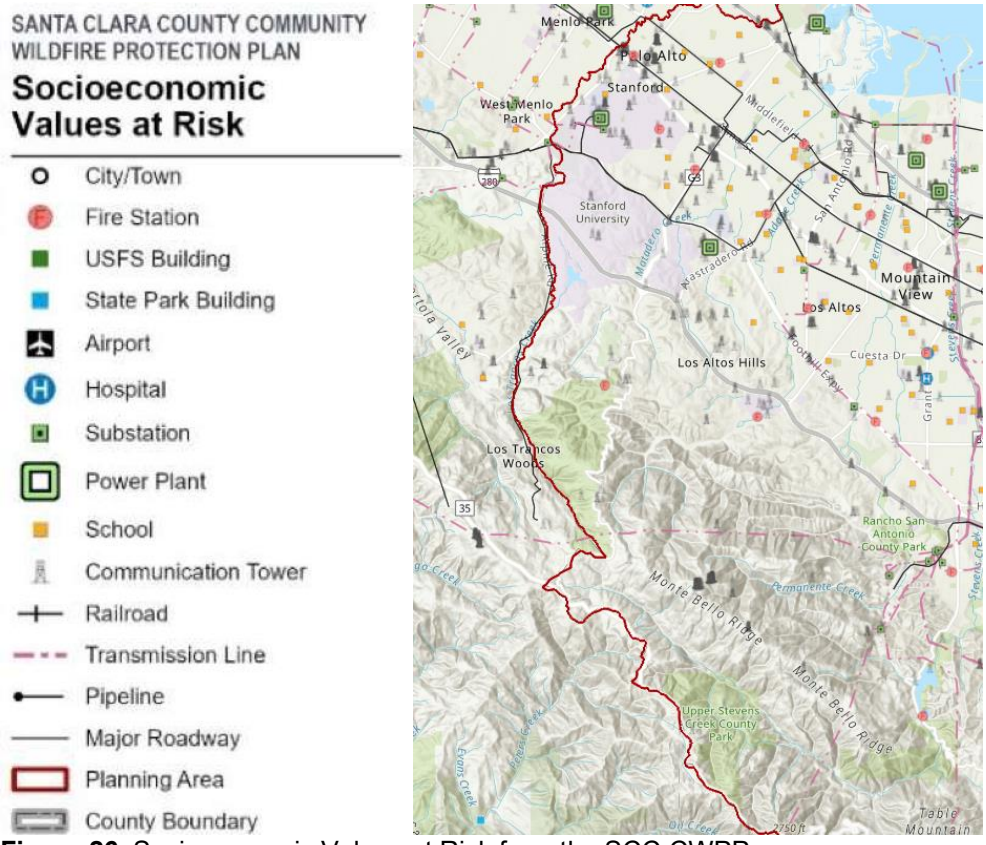

Figure 26. Socioeconomic Values at Risk from the SCC CWPP.

As shown in the Socioeconomic Values at Risk map above, Palo Alto Fire Station 8 is in the Foothills Nature Preserve, along with the Foothills Interpretive Center (which also functions as an operations hub for Palo Alto Open Space Rangers), Arastradero Gateway interpretive center, a maintenance complex, three public restrooms, campsites, and picnic sites. In this area are also private residences in the Town of Los Altos Hills, Town of Portola Valley, City of Palo Alto, Santa Clara County, and San Mateo County; as well as neighborhoods/associations such as Altamont, Los Trancos Woods, Vista Verde, Blue Oaks, Portola Valley Ranch, Palo Alto Hills, Montebello, South Skyline, and others.

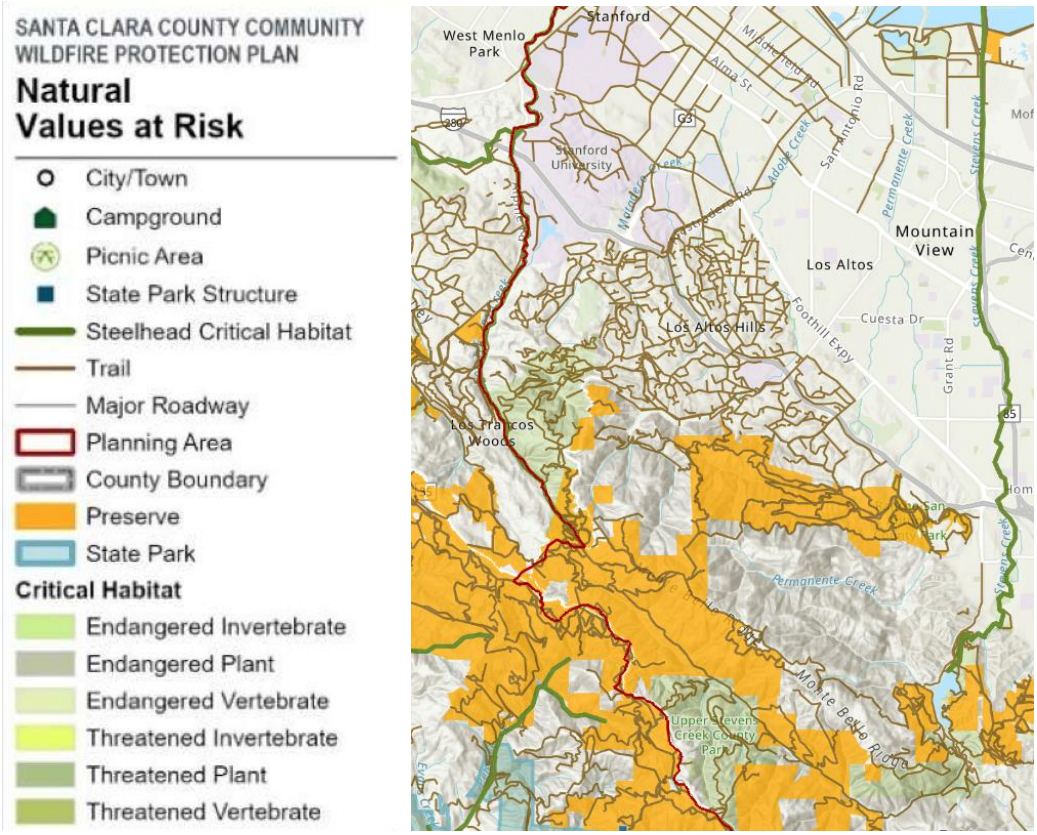

Figure 27. Natural Values at Risk from the SCC CWPP.

As shown in the Natural Values at Risk map above, community values at risk include natural values such as the Foothills Nature Preserve and Arastradero Nature Preserve, which both provide recreational and ecological benefits to the community. Privately held recreation facilities, such as equestrian centers and the Palo Alto Hills Golf and Country Club are also at risk. Portions of Stanford University are also at risk, including their Portola Pastures, the Stanford Dish and hiking area.

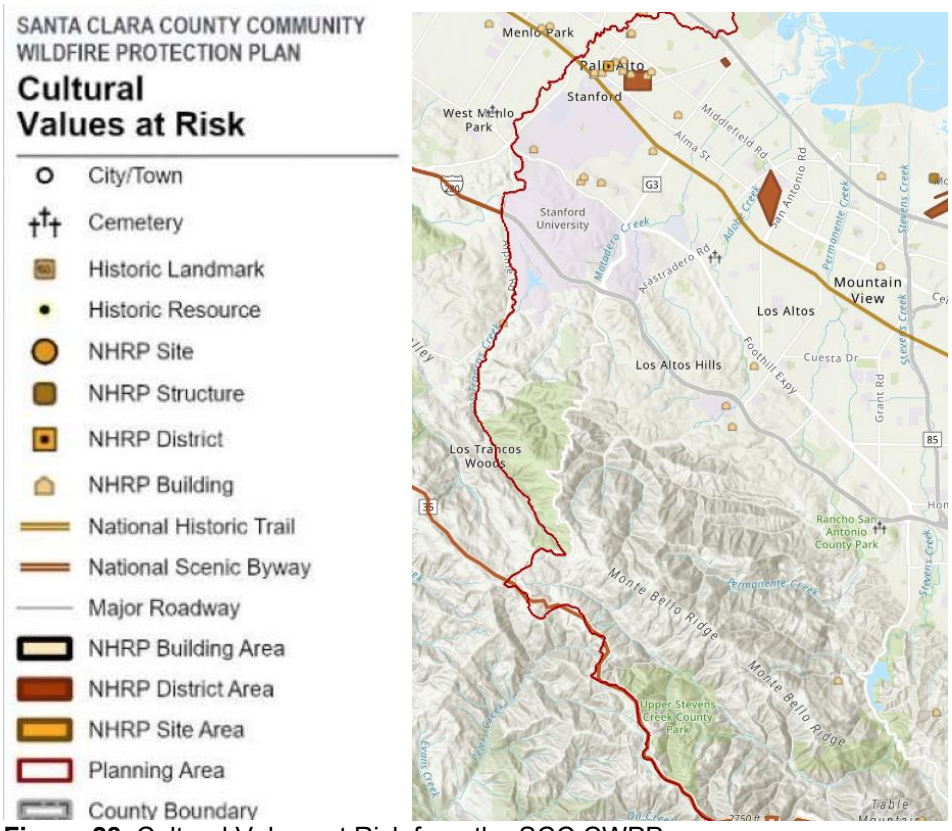

Figure 28. Cultural Values at Risk from the SCC CWPP.

Although no Cultural Values at Risk in the project area are mapped above, the Palo Alto University campus is an educational resource located in the WUI.

18. Environmental Framework

The City of Palo Alto adopted a California Environmental Quality Act (CEQA) Mitigated Negative Declaration on the 2009 update to the Foothills Fire Management Plan (FFMP). The FFMP incorporated multiple environmental protection measures to be implemented at two parks, Palo Alto Foothills Park (now known as Foothills Nature Preserve) and Pearson Arastradero Preserve at that time. Attachment A contains a list of these measures (Mitigation Measures). In 2016, the City updated the FFMP wildland fire management recommendations based on modeling of the current wildfire threat. This update did not change the prescribed fire management techniques and thereby continued the use of the existing 2009 CEQA analysis. The City has reviewed the proposed 2025 updates to the 2016 FFMP and the potential environmental effects of implementing the project, as described below. Based on this information, the project can be found exempt from further CEQA analysis under CEQA Guidelines Section 15304 Minor Alterations to Land.

19. Mitigation Projects and Prioritizations

The following project matrices have been developed by the community and Core Team to direct specific project implementation for communities in the Palo Alto WUI. The matrices below are tiered to the strategic goals presented in the body of the CWPP/FFMP through project IDs in the first column of each matrix.

Table 1.1 includes projects for creating fire adapted communities which includes public education, reducing structural ignitibility (the likelihood of structures catching fire), and hazardous fuels removal. Table 1.2 describes projects that encourage a safe and effective fire response.

Table 2 addresses projects for life safety, structure and infrastructure protection, ignition prevention, and containment. Life safety projects include firefighter safety zones and fuel treatments along evacuation routes. Meanwhile, structure and infrastructure protection projects concentrate on defensible space and hardening. Ignition prevention projects concentrate on picnic areas in Foothills Nature Preserve, while containment projects in both Foothills and Pearson-Arastradero Parks include prescribed fires and other fuel reduction treatments.

Table 1.1. Recommended Projects for Creating Fire Adapted Communities (Public Education and Outreach and Structural Ignitability Projects) in Palo Alto Planning area

Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/ Maintenance Requirements	Funding Sources
1.1.1	Ongoing	M	Per schedule	Improve and maintain existing fuel breaks and potential fire containment features as described by Table 2 of this plan.	Palo Alto Planning Area	Local	Fuels reduction and fuel breaks will help to limit the spread of wildland fire and increase access to difficult areas. Prescriptions should be site specific depending on the fuel type, topography, soils, adjacent land management practices and environmental regulations. Maintain existing fire breaks and buffers Look for opportunities to develop and/or increase fire breaks to double as access within the WUI. Encourage clearance of an additional width when possible.	Protect life and property by mitigating fuels, providing defensible space for firefighters protecting structures. Create a fuel arrangement unlikely to support crown fire Ensure the protection of vulnerable ecosystems and values at risk.	Regular maintenance needed to ensure the fuel break remains clear of vegetation. Monitor for invasive species. Continued management of fire breaks maintained by grazing, brush breaking, controlled by best means available.	General Funds Hazard Mitigation Grants CalFire Grants
1.1.2	Ongoing	M	Annually	Survey for dead and dying trees and conduct removal projects; remove dead and dying trees.	Palo Alto Planning Area	Local	Annual assessments during seasonal work to identify dead and dying vegetation.	Restore understory for forest health, reduce fuels		General Funds

Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/ Maintenance Requirements	Funding Sources
1.1.3	Ongoing	H	During each planning cycle	Continue to align the CWPP/FFMP, MJHMP, and General Plan Safety Element updates for hazardous fuel treatments.	Palo Alto Planning Area	Local	Planning team members are familiar with each of these plans to insure their integration and applicability.	Ensure consistency in the approach to risk mitigation, leverage funding opportunities.		General Funds
1.1.4	Ongoing	L	Through out planning period	Work with local Foothills community to attain and maintain Firewise USA recognition	Palo Alto Foothills Community	Local	Annual community preparedness presentations. Fire Safe Council resources and encouragement.	Reduce wildfire risks to this community and improve their preparedness		Self-funded but some costs offset with Fire Safe Council resources
1.1.5	Ongoing	M	Annually	Palo Alto Fire Department conduct annual inspections to encourage private landowners to reduce fuels around homes and communities	Palo Alto Planning Area	Local	Annual inspections by fire crews of residential properties in the planning area to provide recommendations to minimize hazards	Reduce likelihood of fire ignition on the residential property.		General Funds
1.1.6	Ongoing	L	Routine intervals	Educate citizens on wildfire preparedness topics: How to achieve contemporary WUI code compliance in retrofits/cost: benefits; programs available.	Palo Alto Foothills Community	Local	Maintain WUI building codes and enforce code compliance. Incorporate these topics into annual community preparedness efforts	Reduce likelihood of fire ignition on the residential property.		General Funds

Table 1.2. Recommended Projects for Safe and Effective Wildfire Response (Fire Fighting Capability Projects) in Palo Alto Planning area

Project ID	Status	Priority (H,M,L)	Timeline for Action	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/ Maintenance Requirements	Funding Sources
1.2.1	Ongoing	H	Routine	Maintain CaliforniaAlert Wildfire Cameras at Foothills Nature Preserve and Montebello Reservoir	Palo Alto Planning Area	Local	Video cameras maintain connection on the CaliforniaAlert Wildfire system. These cameras provide observation of smoke plumes, fire ignitions where resources can be directed.	Enable visual observation of fires, their precise location, and effective responses.	Routine review of system status during wildfire season.	• General Funds
1.2.2	Ongoing	H	Routine	Maintain N5 Shield Sensor network	Palo Alto Planning Area	Local	12 N5 sensors monitor for smoke and particulates in a mesh type network across the planning area. Sensors provide notification of concentrations of smoke or high particulates for evaluation by system operator to determine response requirements.	Triggers a team of users to a possible ignition where resources can be directed to determine cause and implement response if necessary.	Routine review of system performance during fire season.	• General Funds / Grant funds
1.2.3	Planned	L	2025	Maintain water sources in the WUI	Palo Alto Planning Area	Local	Assess reliability of existing water sources Determine locations for expanding water sources if necessary and feasible.	Ensure water is available for fire department operations in most risky areas.		• General Funds • Mitigation Funding • Capital Funding
1.2.4	Planned	M	2025	Implement Evacuation Planning	Palo Alto Planning Area	Local	Develop evacuation plans Synchronize evacuation planning with Alert & Warning systems Consider tests, drills, exercises to practice evacuation plans	Improve the preparedness of first responders and the community to perform an evacuation		• General Funds

Table 2. Project Description, Source of Work, Treatment Schedule, and Status, with Comments.

Designation	Project	Description	Source of Work	Treatment Schedule	Status	Date	Comments

Life Safety							
Foothills Nature Preserve							
F.F1	Firefighter Safety Zone 1	Trappers Ridge & Los Trancos Trail	Foothills Nature Preserve staff	Annually	Maintenance		Brushing, limbing, chipping not done annually (3 years)
Designation	**Project**	**Description**	**Source of Work**	**Treatment Schedule**	**Status**	**Date**	**Comments**
F.F2	Firefighter Safety Zone 2	Trappers Ridge & Madrone Fire Road	Foothills Nature Preserve staff	Annually	Maintenance		Brushing, limbing, chipping not done annually (3 years)
F.F3	Firefighter Safety Zone 3	Trappers Ridge high point	Foothills Nature Preserve staff	Annually	Maintenance		Brushing, limbing, chipping not done annually (3 years)
F.F4	Firefighter Safety Zone 4	Trapper Ridge south end	Foothills Nature Preserve staff	Annually	Maintenance		Brushing, limbing, chipping not done annually (3 years)
F.E1	Evacuation Route - Page Mill Road	Within PA City from Foothills Gate 1 to Foothills Gate 4 (not annual grass cutting)	Contract Required	Every 3 Years	Maintenance		Shaded fuel break off roadway inside park (roughly alongside road).
F.E2	Evacuation Route - Park Road	Entrance to Maintenance Yard to Las Trampas Valley	Foothills Nature Preserve staff	Every 3 Years	Maintenance		Grasses annually, by park staff

F.E3	Evacuation Route - Park Northwest	Interpretive Center to the 600-700 block of Los Trancos Road	Foothills Nature Preserve staff	Every 3 Years	Maintenance		Grasses annually, by park staff
F.E4	Evacuation Route - Park Northeast	Boronda Lake to Alexis Drive	Foothills Nature Preserve staff	Every 3 Years	Maintenance		Grasses annually, by park staff

Designation	Project	Description	Source of Work	Treatment Schedule	Status	Date	Comments
F.E5	Secondary Evacuation Route - Wildhorse Valley	Wildhorse Valley from Towle Campground to Las Trampas Valley	Foothills Nature Preserve staff	Every 3 Years	Maintenance		Grasses annually, by park staff
Pearson-Arastradero							
A.E1	Evacuation Route – Arastradero Road	Arastradero Road	SCCFSC Mowing Contract	Annually	Maintenance		
Off-site							
PA.1	Evacuation Route-Page Mill Road	Page Mill to County border near Monte Bello Open Space	Foothills Nature Preserve staff	Annually	Maintenance		

PA.2	Evacuation Route Arastradero Road	From Page Mill to Arastradero Pk, and from Arastradero Pk to Los Trancos	Foothills Nature Preserve staff	Annually	Maintenance		
PA.3	Evacuation on Los Trancos Road between Santa Clara County boundary and Oak Forest Court	Also noted as FE6	Foothills Nature Preserve staff	Annually	Maintenance		
Designation	**Project**	**Description**	**Source of Work**	**Treatment Schedule**	**Status**	**Date**	**Comments**
PA.4	Evacuation Route Skyline Blvd.	Skyline Blvd.	Hazardous tree and roadside vegetation removal, through Santa Clara County	Every 3 Years	Planned, One-time treatment by Santa Clara County		
Structure and Infrastructure Protection							
Foothills Nature Preserve							
F.D1	Defensible Space	Entry Gate and Restroom	Foothills Nature Preserve staff	annually	Maintenance		Done in conjunction with F.E1-E5

F.D2	Defensible Space	Station 8	Foothills Nature Preserve staff	annually	Maintenance		Done in conjunction with F.E1-E5
F.D3	Defensible Space	Restrooms at Orchard Glen	Foothills Nature Preserve staff	annually	Maintenance		Done in conjunction with F.E1-E5
F.D4	Defensible Space	Interpretive Center	Foothills Nature Preserve staff	annually	Maintenance		Done in conjunction with F.E1-E5
F.D5	Defensible Space	Maintenance Shop Complex	Foothills Nature Preserve staff	annually	Maintenance		Done in conjunction with F.E1-E5
Designation	**Project**	**Description**	**Source of Work**	**Treatment Schedule**	**Status**	**Date**	**Comments**
F.D6	Defensible Space	Boronda Pump Station at Campground	Utilities funded on CSD Trails contract	annually	Maintenance, planned expansion		Expand to 100-ft, where practical.
F.D7	Defensible Space	Park Tank	Utilities funded on CSD Trails contract	annually	Maintenance, planned expansion		Expand to 100-ft, where practical.
F.D8	Defensible Space	Borunda Water Tank	Utilities funded on CSD Trails contract	annually	Maintenance, planned expansion		Expand to 100-ft, where practical.
F.D9	Defensible Space	Dahl Water Tank	Utilities funded on CSD Trails contract	annually	Maintenance, planned expansion		Expand to 100-ft, where practical.

Pearson-Arastradero

A.D1	Defensible Space	Gateway Building and Restrooms	Grassroots / Parks Staff	annually	Maintenance		
A.D2	Defensible Space	Pump Station	Utilities funded on CSD Trails contract	annually	Maintenance, planned expansion		Expand to 100-ft, where practical.
A.D3	Defensible Space	Corte Madera Water Tank	Utilities funded on CSD Trails contract	annually	Maintenance, planned expansion		Defensible space to be expanded to 100-ft, constrained in treatment intensity by riparian corridor
A.D4	Defensible Space	Western Water Tank	Utilities funded on CSD Trails contract	annually	Maintenance, planned expansion		Expand to 100-ft, where practical.
Designation	**Project**	**Description**	**Source of Work**	**Treatment Schedule**	**Status**	**Date**	**Comments**
Ignition Prevention							
Foothills Nature Preserve							
~~F.I1~~	~~Ignition Prevention~~	~~Lakeside Picnic Area~~	~~Park Staff~~	~~annually~~	Removed from Project List		BBQs removed June 2021
~~F.I2~~	~~Ignition Prevention~~	~~Shady Cove Picnic Area~~	~~Park Staff~~	~~annually~~	Remove from Project List		BBQs removed June 2021
~~F.I3~~	~~Ignition Prevention~~	~~Encinal and Pine Gulch Picnic Areas~~	~~Park Staff~~	~~annually~~	Remove from Project List		BBQs removed June 2021
F.I4	Ignition Prevention	Orchard Glen Picnic Area	Foothills Nature Preserve staff	annually	Maintenance		Twice a year usually, as needed
F.I5	Ignition Prevention	Oak Grove Group Picnic Area	Foothills Nature	annually	Maintenance		Twice a year usually, as needed

			Preserve staff				
~~F.I6~~	~~Ignition Prevention~~	~~Towle Camp~~	~~Park Staff~~	~~annually~~	Remove from Project List		BBQs removed June 2021
Containment							
Foothills Park							
F.C1	Containment	Trappers Fire Road	Mowing Contract	annually	Maintenance		
F.C2	Containment	Pony Tracks south of Trappers Ridge	Foothills Nature Preserve staff or CSD Mowing Contract	annually	Maintenance, planned expansion		Expand to upper end of the meadow (ridge top mowing to the west)
F.C3	Containment	Pony Tracks north of Trappers Ridge	Mowing Contract	annually	Maintenance		
Designation	**Project**	**Description**	**Source of Work**	**Treatment Schedule**	**Status**	**Date**	**Comments**
F.C4	Containment	Bobcat Point	Not covered		Maintenance		
F.C5	Containment	North of Entry Gate	Foothills Nature Preserve staff	annually	Maintenance		
F.C6	Containment	Valley View Fire Road	Mowing contract	annually	Maintenance		Mowing
Pearson-Arastradero							
A.C1	Containment	Property boundary adjacent to Liddicoat	Park Staff	annually	Maintenance		Discing
A.C2	Containment	Property boundary adjacent to Stanford and	Park Staff	annually	Maintenance		Discing

		Portola Pastures					
A.C3	Containment	Redtail Loop Area	Park Staff, with guidance from Grassroots Ecology	annually	Maintenance		Mowing/discing along Redtail trail
A.C4	Containment	Property boundary adjacent to Paso del Robles	Park Staff	annually	Maintenance		Discing
A.C5	Containment	Property boundary Laurel Glen – north	Park Staff	annually	Maintenance		Challenging terrain, poor access; explore implementation options

Designation	Project	Description	Source of Work	Treatment Schedule	Status	Date	Comments
~~A.C6~~	~~Containment~~	~~Property boundary Laurel Glen – south~~	~~Park Staff~~	~~annually~~	Remove from Project List		Challenging terrain, poor access; explore implementation options
A.C7	Containment	Property boundary west of Meadow Lark Trail	Park Staff	annually	Maintenance		Discing
A.C8	Containment	Property boundary adjacent to former private research facility	Park Staff	annually	Maintenance		

A.C9	Containment	Property boundary adjacent to John Marthens Lane	Park Staff	annually	Maintenance		Discing, mowing
A.C10	Containment	Arastradero Creek (to Juan Bautista trail)	Park Staff	annually	Maintenance		
A.C11	Containment	Meadow Lark to Juan Bautista Trail	Park Staff	annually	Maintenance		mowing
A.C12	Containment	Meadow Lark south	Park Staff	annually	Maintenance		mowing
A.C13	Containment	Bowl Loop Trail	Park Staff	annually	Maintenance		mowing
~~A.C14~~	~~Containment~~	~~Arastradero to Rx fire area~~	~~Park Staff~~	Not scheduled	Maintenance		
Designation	**Project**	**Description**	**Source of Work**	**Treatment Schedule**	**Status**	**Date**	**Comments**
~~A.C15~~	~~Containment~~	~~Acorn Trail~~	~~Park Staff~~	Not scheduled	~~Not~~ Maintenance		Narrow trail, not scheduled
A.Rx1	Containment	Juan Bautista Prescribed fire north	Fire Department	Not scheduled	Maintenance		Prescribed Fire Burn Area, Consider use of BurnBot to create containment line
A.Rx1	Containment	Acorn Trail Prescribed fire south	Fire Department	Not scheduled	Maintenance		Prescribed Fire Burn Area, Consider use of BurnBot to create containment line
AP1, 2	Eucalyptus removal	Eucalyptus removal	Contractor City Staff	Not scheduled			
FNP1, 2	Eucalyptus removal	Eucalyptus removal		Scheduled 2025			

EC1	Eucalyptus removal	Eucalyptus removal		Completed			

19.1. Fuels Reduction Projects for Evacuation Routes

The most important goal for this set of projects is to reduce fire intensity near roads to allow firefighting vehicles to pass and ensure safe passage for staff and visitors to pre-determined safety zones, or safe locations out of the parks. In addition, the projects outside of the City parks/preserves are aimed at facilitating access and egress between different portions of Palo Alto's wildland urban interface.

There are currently nine fuels reduction projects being conducted on evacuation routes within the Palo Alto project area, shown on Figure 30.

Treatments on evacuation routes leading out of the Palo Alto project area are currently being implemented, listed as PA 1 through PA4. Along the major Page Mill Road evacuation route, fuels are being treated from Foothill Park south to two stretches along Skyline Boulevard. Fuels are also being treated on Los Trancos Road between Santa Clara County boundary and Oak Forest Court. Within the Pearson-Arastradero Preserve, mowing is conducted annually along the Arastradero Road evacuation route.

Within the Pearson-Arastradero Preserve, mowing is conducted annually along the Arastradero Road evacuation route.

Within Foothills Nature Preserve, park staff are implementing four separate fuels treatments on three-year cycles to grass fuels along evacuation routes: on the Los Trampas Valley Road from the park entrance to the maintenance yard to Las Trampas Valley; from the Foothills Interpretive Center to the 600-700 block of Los Trancos Road; from Boronda Lake to Alexis Drive; and on the secondary evacuation route along Wild Horse Fire Road in Wildhorse Valley from Towle Campground to Las Trampas Valley. Also, within Foothills Nature Preserve, a shaded fuel break roughly along the Page Mill Road evacuation route between Foothills Gate 1 and Gate 4, was completed in August of 2022 and is planned to be refreshed in 2025-26.

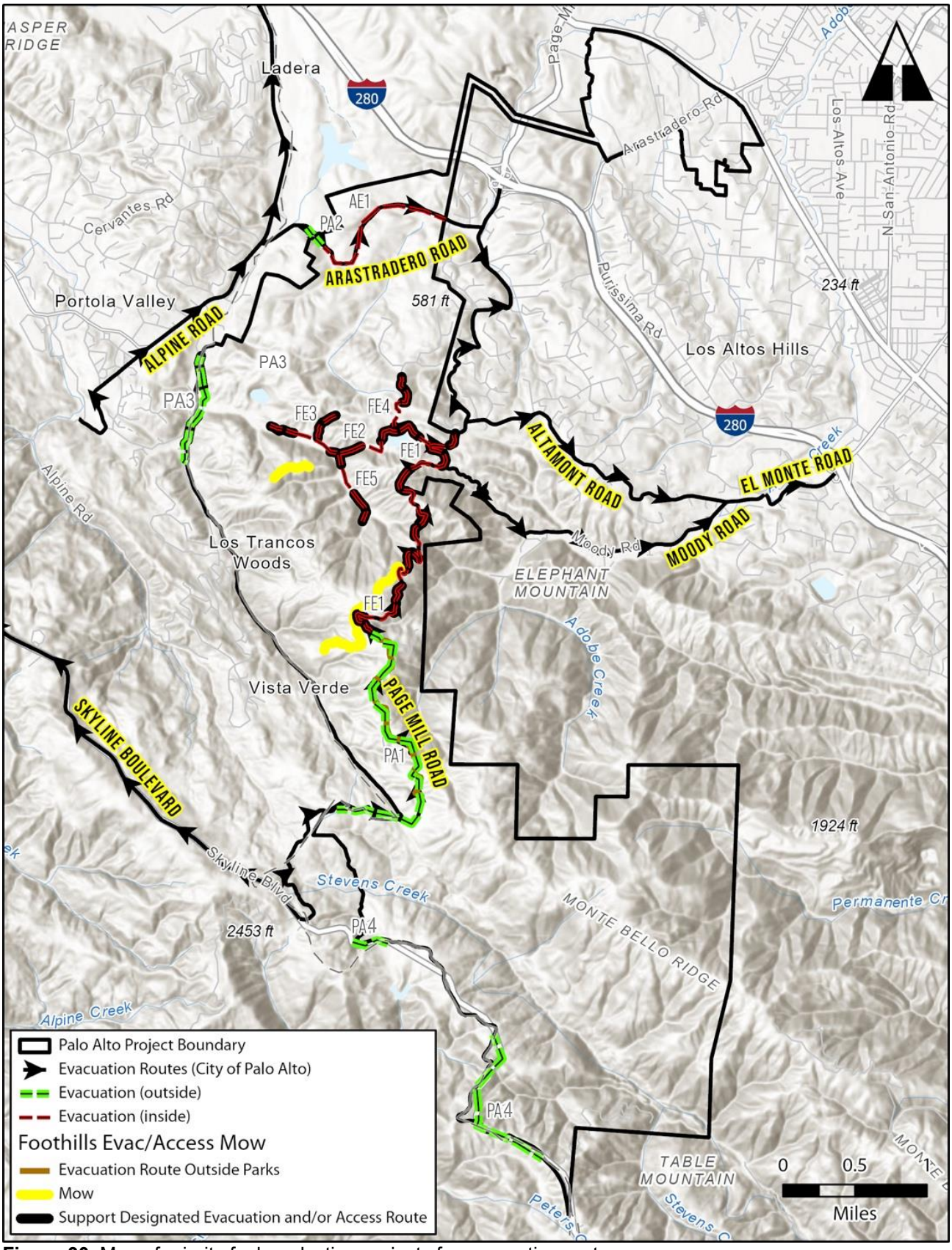

Figure 30. Map of priority fuels reduction projects for evacuation routes.

19.2. Vegetation Management Projects

Vegetation management projects within the project area are organized around five specific categories: fuel modification for firefighter/life safety; structure and infrastructure projects – defensible space; fuel modification for ignition prevention; fuel modification for containment ease; and fuel modification for ecosystem health.

The goal of fuel modification projects for firefighter safety is specific to the safety of firefighters during emergency response when safe refuge comprised of low fuels is vital.

Structure and infrastructure – defensible space projects are intended to:

1) Reduce damage to structures, developed areas and critical infrastructure from wildfire by reducing flame length to two feet within 30 feet of structures by managing fuels per Defensible Space Guidelines in Appendix A of the CWPP/FFMP. In some cases, treatment will need to extend to 100 feet to reduce flames to two feet within thirty feet of a structure;

2) Minimize negative effects of fuel manipulation on wildlands; and

3) Reduce damage to wildlands from wildfire.

Ignition prevention fuel management projects rely upon fuel management, coupled with education, signage, and enforcement of park rules regarding fire safety, since ignitions from barbeques may occur in Foothills Nature Preserve. Under extreme fire weather conditions, the parks may be closed to the public. The fuel management will consist of:

1) Following standards for defensible space for a 30-foot radius from the barbeque site; and

2) Removing vegetation to create a non-combustible zone for a 10-foot radius from the barbeque site.

Ignition prevention treatments around barbeque sites

Fuel modification projects for containment ease are designed to compartmentalize fuels to facilitate the containment and control of a fire. The treatment areas are positioned in strategic locations, usually on a ridgetop, with access, avoiding areas that would preclude the use of mechanical equipment such as steep slopes or riparian areas. Fuels are modified to reduce fire intensity and thus allow firefighters better access to the fire, making firefighting actions more effective. Fuel modification also creates more opportunities to backfire, which occurs during wildfires where fire suppression crews create large firebreaks in advance of the fire front. Fuel modification can also slow the spread of a fire, further enhancing fire control efforts. Where trees abut grasslands in the new fuel breaks, it is especially important to limb trees and remove shrubby understory from trees along the edge of the forest canopy to break vertical continuity between grass and tree canopy. This action will remove the “ladder fuels” that promote crown fires and hinder fire containment.

Fuel modification projects for ecosystem health are intended to reduce the invasion of coyote bush into grasslands and thus reduce expected heat output. The objectives are to maintain grasslands and restore the native pattern of vegetation on the landscape. Other fuel modification projects also enhance ecosystem health: Reducing the amount and height of understory shrubs creates a vegetative structure that is more open at the forest floor, with less biomass and is vertically discontinuous; this mimics the pre-fire-suppression era. This would be done either with goatherds or with hand labor forces.

Aside from evacuation route support treatments, four categories of vegetation management projects are ongoing within the project area: mowing; prescribed burns; firebreaks; and eucalyptus removal.

Within Foothills Nature Preserve, firebreaks are being implemented annually with a flail mower on a long stretch along Trappers Fire Road. Bobcat Point and Pony Tracks Fire Road via mowing contract, as well as by park staff in a small area along the project area boundary north of the park entry gate. Eucalyptus removal is also being planned for two locations within the park: northwest of the Interpretive Center south of the Arrillaga Property Lake, and in a very small cluster north of Boronda Lake.

Firebreak along Trappers Fire Road

Within Pearson-Arastradero Park, two prescribed burn areas have been designated: the larger (ARx1) along a long swathe of Juan Bautista de Anza Trail, and the smaller (ARx2) on Acorn Trail a little farther south. Seven areas are being grazed annually (labelled on the corresponding map as AC1 and AC3-8), and six areas are being mowed annually (labelled as AC2 and AC9-13), with two more mowing areas designated but not yet planned (AC14, a former prescribed burn area along Arastradero, and AC15, a narrow portion of Acorn Trail that has not previously been mowed).

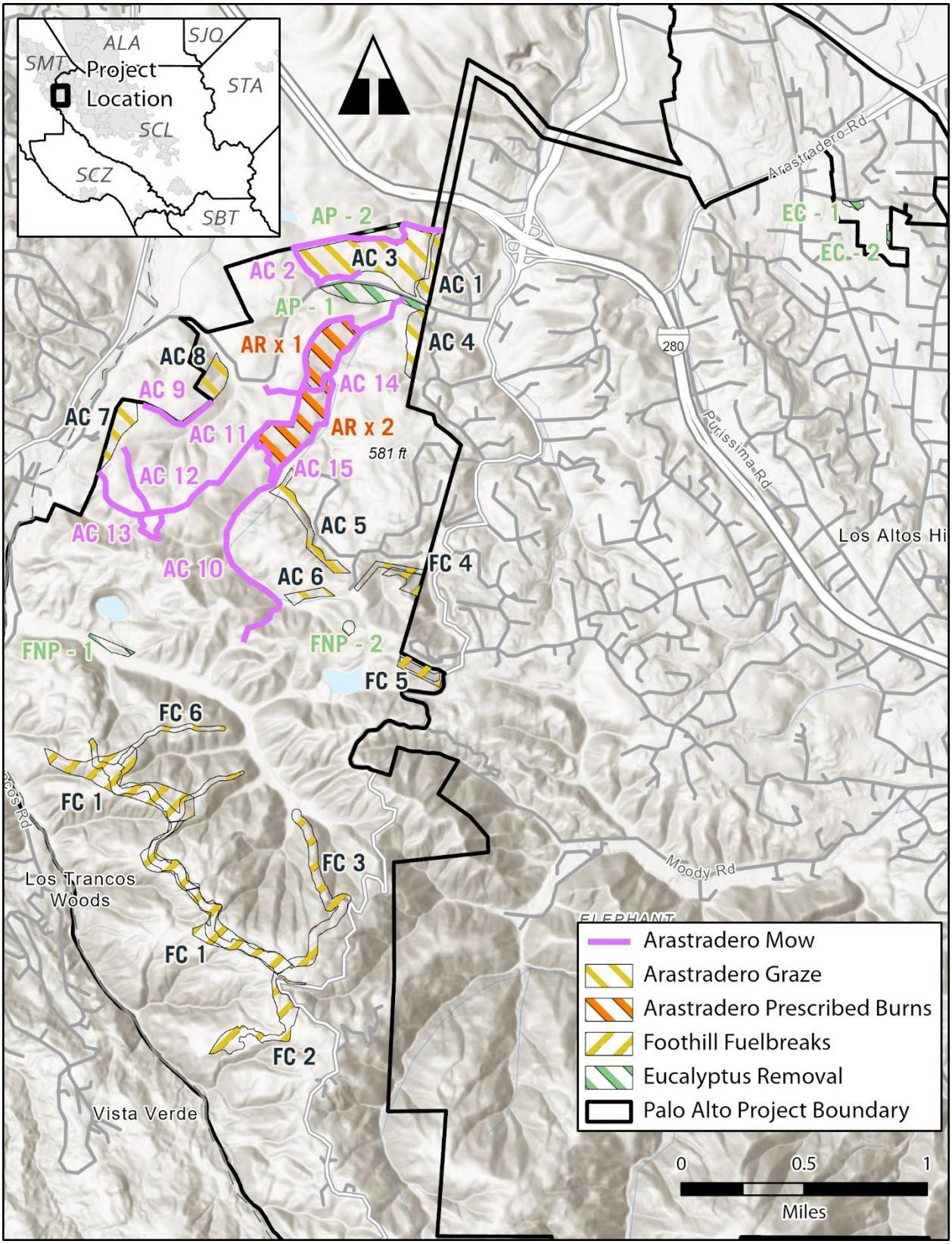

Figure 31. Planned and existing hazardous fuels projects. The extent covers all planned projects.

APPENDIX A

VEGETATION TREATMENT STANDARDS AND METHODS

Treatment Standards for Vegetation Types

For each vegetation type group, the resulting fuel bed characteristics after treatment are described[18]. Following the vegetation prescriptions, a set of guidelines for creation and maintenance of a fire safe area (defensible space) around residences and other improvements are recommended. In all vegetation types, preference for removal should be given to non-native invasive species.

Prescription for Grasslands

- Mow or graze to no longer than 4 inches in height, or disc
- Native grasses should be mowed to a height no shorter than 4 inches and may be mowed later in the year to accommodate seed ripening and seed distribution [19]
- Maintain brush cover less than 30%
    - less than 20% where slope steepness is greater than 20%
    - Requires annual treatment, usually requiring treatment of all grass near structures within 2 weeks of starting to mow.
- Alternatively, prescribed burn in late spring or early fall with a resulting cover of not less than 20%

Prescription for North Coastal Scrub and Chaparral

- Mow/grind to cut and mulch shrub tops within treatment area; alternatively,

[18] These standards/prescriptions were initially developed by Amphion, Inc. for use by the FEMA-funded East Bay Hills Vegetation Management Consortium (VMC). These standards/prescriptions have been reviewed and adopted by the following agencies in the consortium: Cities of Berkeley, Oakland, and Piedmont; East Bay Municipal Utility District; East Bay Regional Park District; University of California; Lawrence Berkeley Laboratory; and PG&E. As part of the review process, a Citizen's Advisory Committee and a Technical Advisory Committee, which were comprised by a cross-section of members of the public, reviewed and commented on the standards. The reference is Amphion Environmental, Inc. 1995. Fire Hazard Mitigation Program and Fuel Management Plan for the East Bay Hills, prepared for the East Bay Hills Vegetation Management Consortium, Oakland, California.

[19] Grassroots Ecology is available to advise on the timing of native grass seed cycles, especially in relation to invasive weed seed cycles.

- Create islands of less than 12 feet in diameter or 2 times the height of tallest shrub (whichever is smaller) can remain. Clumps should be natural in appearance including specimens of variable age classes
- Distance between islands shall be greater than 2 times the height of tallest shrub or a minimum of 8 feet, whichever is greater
- Retain between 20-30 percent of brush areas in brush crown cover
- The removal of brush should be based on criteria which are listed in approximate order of importance to fuel management objectives:
    - Relative flammability - remove the most flammable species first.
    - Plant vigor - remove shrubs of low vigor, dying or dead shrubs.
    - Sprouting capability - remove species with sprouting capacity first.
    - Effects of plant species on soils - i.e. retain shrubs with slope-holding capacity, that increase soil nutrients (ceanothus).
    - Value for wildlife food and cover.
    - Aesthetic values.
    - The order of priority will change according to local conditions such as the relative abundance of each species. For example, where coffeeberry is not abundant, it may be placed high in priority to retain. Attempts should be made to maintain diversity of species.
- Maintain a crown cover of less than 30%
- Can convert to grass, especially in fuel breaks
- Maintain less than 20% dead material in the shrub canopy
- Protect oak, madrone, buckeye and trees shorter than 6 feet in height. Cut out shrubs below drip lines and within 6 feet from edge of tree canopy
- Anticipate 3-5 year treatment cycle

Priority For Removal Follows:	Remove Only If Necessary
chamise	coffeeberry
coyote bush	buckeye
poison oak	ceanothus
Himalaya blackberry	wild currant
northern sticky monkey flower	California blackberry
coastal sage brush	bush lupine
scrub oak	madrone
manzanita	toyon
	oaks

Figure 1: *Initial Priority of Removal for Brush.*

Prescription for Oak Woodlands

- Prune branches up to 3 inches in diameter for a height of 8 feet. Prune up to a maximum of 1/3 the height of trees that are less than 24 feet tall.
- Maintain under 5 tons/acre of duff no deeper than 3 inches.
- Leave all trees bigger than 8 inches diameter. Leave 1/3 of the trees under 8 inches to retain a range of size categories and species. Maintain a stand density of less than 50 trees per acre as long as canopy is still closed.
- Can mulch site to a maximum depth of 2 inches to prevent invasion of noxious weeds.
    - Treatment cycle is from 7-10 years.

Prescription for Riparian Forest

Avoid treatment. Where necessary:

- Create or maintain an 8 feet vertical clearance between live needles and understory fuel. Remove all dead material. Prune branches up to 3 inches in diameter. Prune up to a maximum of 1/3 the height for trees less than 24 feet in height.
- Maintain less than 10 ton/ac. Depth of duff no greater than 5 inches.
- Mulch to between 2 and 5 inches in depth.
    - Treatment cycle is between 10-15 years.

Defensible Space Guidelines

Palo Alto staff will be responsible for maintaining a 100 feet wide defensible space on all sides of any structure in the two parks. All dead plants and combustible materials shall be removed within 100 feet of each structure to establish and maintain a defensible space. Removal of combustible materials includes, but is not limited to, the following actions:

- Cut grass and weeds to less than 4 inches. Cutting of native grass and wildflowers may be delayed until after seed set unless they form a means of rapidly spreading fire to any structures.
- Remove all dead plant material from within 100 feet of each structure. This includes keeping the ground, roofs, decking, and balconies free of dead leaves, needles or other plant debris. This also includes removing from trees loose papery bark, and dead branches smaller than 3 inches in diameter, to 8 feet above ground. Remove all dead branches from within live ground covers, vines, and shrubs. Refer to Figure 1 explaining pruning.
- All live vines and live branches smaller than 3 inches in diameter shall be cut up to a height of 8 feet above ground. Figure 32 provides a description of pruning best practices.

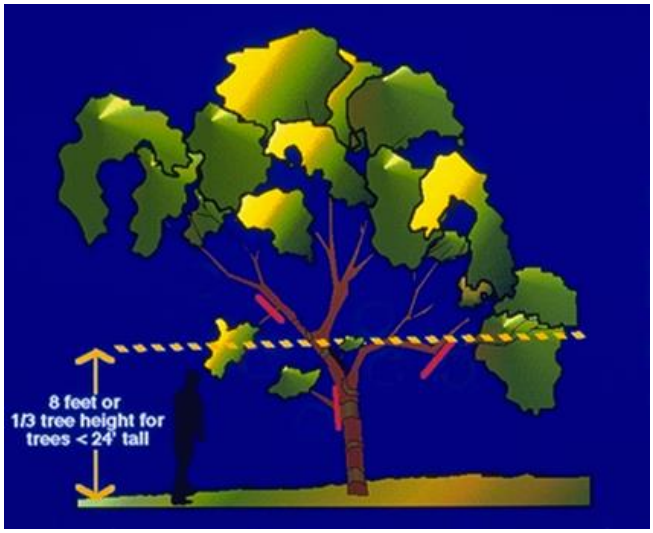

Figure 2: *Pruning Example.*
Prune branches to a height of 8 feet above the ground. In young trees, prune branches on the lower one-third of the height of the tree. Do not disturb or thin the tree canopy, as this promotes growth in the understory, which is more easily ignited.

- Remove plants as necessary to break vertical continuity between ground covers, shrubs, trees, and decks or overhangs on buildings. Vertical separation is the distance from the top of shrubs or ground cover to adjacent trees, designed to

minimize the spread of fire to the crown of trees or structure roofs. Vertical spacing should be a minimum of 8 feet or 2 times the height of the understory plants to the leaves or needles of adjacent overstory trees, decks or overhangs, whichever provides greater separation. For overstory trees under 24 feet in height, the minimum clearance can be reduced to 1/3 of the overall height of the overstory tree provided this reduced clearance does not form a means of rapid transmission of fire.

- In areas without a tree overstory, create shrub islands per the standard for north coastal scrub. Within 100 feet of improvements, grass between shrub islands should be mowed when cured (dry).
- Remove all branches within 10 feet of any chimney or stovepipe including chimneys on adjacent properties.
- Chipped materials can remain on the site provided the chipped mulch layer is no greater than 2 inches in depth.

Description of Treatment Methods

Summary

Fuels can be removed on a large scale by grazing animals, mechanical treatment and prescribed burns. In small open space areas and around structures, hand labor is effective in reducing the fuel load. Eucalyptus tree removal may be effective in specific locations of high risk. Fuels can be redistributed on a large or small scale through mechanical treatments, such as mowing, discing, or grading.

In all the following treatments except hand labor, economies of scale are dramatic; the larger the project, the greater the efficiency.

Timing of Treatments

The timing of the initial or follow-up treatments is important to achieve the desired fuel management performance standards and resource management objectives. Given the variable nature of fuels through changes in weather and season over time, the schedule of the treatment may often be just as important as the type of treatment selected. For example, treatments in grasslands typically take place when grass cures or dries out. Cutting grass too early will be ineffective, as the grass will usually grow back, negating the treatment. Conversely, cutting grass too late will leave the grass in a hazardous condition during periods of high fire danger. Fuel treatments also need to be conducted when the weather is not too dry or windy, as some treatment types - especially mechanical treatments - may inadvertently start fires.

Timing the treatment methods appropriately can reduce potential impacts to special-status species or sensitive wildlife species. It is likely that there will be some months of

the year when particular practices need to be implemented (e.g., pre-treatment nesting surveys or avoidance of breeding habitat) to avoid adverse effects to special-status species.

Timing treatments to either control or avoid the spread of invasive plant species or insect pests is also critical. For example, treatments performed when plants have set or are setting seed will spread the seed whether it is a native plant or invasive weed. Treatments should therefore take advantage of differences in the timing of seeding of native plant species and avoid periods when invasive species are in seed. Pruning of pines and eucalyptus should be done when insect pests are not flying to minimize the associated spread and damage from these insects. Pruning should take place from November to April to minimize the susceptibility to bark beetles or red turpentine beetles. In most cases, the timing and method of treatment can be modified to accommodate local habitat needs and still reduce fire hazard to an acceptable level.

Hand Labor

Hand labor involves pruning, cutting or removal of weeds or shrubs either by hand or with hand-held equipment. This process is slow and expensive, but most selective and has little impact beyond the removal of the target plants. This technique generates considerable debris when pulling, pruning, and cutting vegetation. The debris is not always removed from the site due to the high cost of doing both the clearance and removal by hand. Not removing the debris, however, leaves a significant hazard, possibly greater than pre-treatment because the debris may be voluminous, dry, well aerated, and quite flammable. This method is most used by residents to reduce fuel volume on private lands, or by hand crews on short-term contract with the City of Palo Alto to reduce hazard adjacent to improvements. Hand crews are periodically available from CAL FIRE or other agencies to perform this work. Some expertise is required to work with trouble species such as poison oak, to prune oaks and control shrubs, and to identify new fuel hazards as they arise. Hand labor encompasses the operations of pruning and weed-whipping, tree removal, pruning, bark pulling, removal of dead wood within the tree/shrub canopy, litter removal and mulching, and establishing new plant material. Hand labor allows use of a wide variety of methods to reduce fuel load, including both chemical and mechanical treatments.

Hand Labor - Pruning Trees and shrubs must be hand-pruned to vertically separate fuels. Pruning lower branches of trees is usually done with a hand-held pole saw (with or without a motorized chain saw attached). Lower branches on shorter trees can be pruned with loppers.

Hand Labor - Weed-whipping Like mowing, weed whipping reduces fire hazard by reducing the fuel height. However, it is done by hand to avoid harming rock outcrops and desired small plants (such as oak regeneration and landscape material). This treatment is generally limited to small material such as grass or short herbs. Weed whipping may be accomplished any time of the year, and regardless of whether the material has cured.

Weed whipping is performed with a hand-held, gas- or electric-powered tool that cuts grasses and very thin woody material with a fast-spinning fishing-line type of cutter. Because this method is performed manually, it can be used to selectively remove certain vegetation. Most large woody stems are not cut by the treatment; however seedlings (such as oak seedlings) can be severely damaged. Treatments can be completed with greater care than the others (however the height to which plants are cut may be difficult to control if the operator is not experienced) and minimize soil disturbance and erosion. It is also often the only type of treatment possible on steep slopes and in wooded areas. The average weed whipping rate is 750 square feet/hour.

The schedule for a skilled laborer should be tailored to the timing of their tasks. For example, selective weed whipping of annual grasses before they set seed while leaving native bunch grasses until after these plants set seed can shift the proportion of vegetative cover over time to more bunch grasses. This shift in type of grasses can shorten the length of time the landscape is prone to ignition. Similarly, thistle reproduction can be minimized by cutting while they are growing, but before they set seed. Pruning should be done from November to April; this schedule avoids spreading destructive bark beetles and/or other pathogens.

The cost varies from $10,000 per acre to approximately $1,500 per acre, depending on the time of year, extent of project, and level of detail required. Publicly funded hand crews are sometimes available at much reduced costs to the city.

Mechanical Treatments

Mechanical treatments, including mowing, weed whipping, discing, and grading, rearrange rather than reduce the actual fuel load. Heavy machinery is usually used in flat areas where terrain and the presence of rocks or numerous trees do not prohibit travel. This type of machinery should not be used on slopes over 30% because of concerns for worker safety as well as erosion control and slope stability issues.

Heavy machinery: attachments to tractors (brush hogs, flail, mowers, tiger mowers)

Roadside mowing is a prime example of the use of heavy machinery with attachments. A variety of attachments serve numerous purposes. For example, a brush hog attachment cuts and breaks brush plants off and produces a mulch of the brush debris. Mowers that cut or flail grass and small woody plants are also attached to tractors. Attachments (such as mowers) with articulated arms that reach as far as 20 feet away from the tractor reduce the area over which the tracks must travel and offer more maneuverability. These articulated arms also cut and/or break off material. Heavy machinery is a moderately fast, and a relatively inexpensive treatment. There is little control over which plants are cut, but machines can travel around isolated areas of concern. Remote-controlled machinery is now possible, thereby reducing concerns regarding operator safety.

Heavy machinery should not be used when the ground is soft to prevent ruts and bared soil. Soil movement can be caused by all users on foot, bicycle, equestrian and vehicles (patrol vehicles and fire apparatus). Soil movement can be ruts or minor depressions, which will lead to large ruts or voids. This technique can be used at almost any other time of year, but is faster when done in the summer or fall when brush is brittle and grass has cured. It must not be used during times of high fire danger because the machines can start fires. The under-carriage of the machine and attachments should be washed off after use in areas of weed infestations.

Grading and Discing involves stripping a swath of land bare of vegetation with a tractor and blade. It is very effective in producing fire trails 8 to 12 feet across and as a maintenance tool for access routes. Generally, grading is done mid-spring, by a contractor when there is still residual moisture in the soil, but after the threat of spring rains has diminished[20]. Costs are reasonable, (from $100 to $300 per acre) and relate to the size of the project and condition of trail surface.

However, there are several disadvantages to this treatment. By removing all competing vegetation, grading creates an excellent establishment site for weedy species, which may be serious fire hazards. Untimely grading, for example, in mid-summer, can help sow seeds of weedy exotics, such as yellow star thistle, mustard and Italian thistle. In addition, annual grading causes soil disturbance and alters drainage patterns. Runoff, blocked from cross-drainage by the banks on either side of a graded fire trail, is redirected down the trail. This situation favors coyote bush and exotic grasses, leading to a shift in the grassland species composition. Grading spoils will need to be feathered into the sides or smoothed back into grading area annually.

Discing involves cultivating or turning over the upper 10" of soil, and produces an uneven surface with a discontinuous fuel distribution and is appropriate only if mowing or grazing is not applicable that year or in a specific location. Rate of production is quite high; normally the operator can disc land parcels of two acres or less within one day. Discing is normally performed annually once grass has cured (so the grass will not grow back that season). A tractor with disker attachment can typically cultivate a swatch 15 feet wide in a single pass. While this is an effective barrier to surface fire spread, it is also an ideal disturbed area with prime growing conditions for weeds and distribution of their seeds. Surface erosion can be significant in areas prone to this process.

Grazing with Sheep and Goats

This method includes the intentional use of sheep and goats to consume vegetation thus reducing the amount or density of fuel. These types of livestock are not recommended to create a fuel break but can be used to maintain this type of pre-suppression feature. Similarly, livestock can prevent grasslands from shrub

[20] Residual soil moisture makes the soil pliable or workable, and allows the soil to compact. When grading is performed when the soil is completely dry, the soil is very difficult to work. Pearson-Arastradero has high clay content soils and causes premature soil movement unless the contractor supplements soil moisture with a water truck, which is an additional expense.

encroachment, and an oak woodland free of significant understory. The option is effective where the plants are palatable to the animals selected. Control of the livestock and prevention of the impacts of overgrazing is critical to successful use of this technique. As a fuel management technique, livestock need not graze every year.

Grazing can reduce or encourage weedy pest plants depending on the timing and intensity of grazing. A range management plan and a grazing monitoring program needs to be established to identify the impacts and ensure that the animals are removed once fuel management goals are met. Perennial grasses may require modifications from management of annual grasses using grazing animals. Because presence of healthy perennial grass stands has many benefits, these modifications are generally recommended. The benefits of perennial grasses are that they cure later in the season, which limits the opportunity for ignition. Mowing typically can be scheduled over a longer time period. Rotation of grazing animals is preferred over greater grazing pressure. Typically, perennial grasses react best when grazing is applied after seed maturation - from late spring through the fall. Goats may import seeds from another weedy site. The herd can be quarantined at goat herd's ranch for three days where they will be fed alfalfa to clear out their systems. The herder can also use short-haired goats that will carry fewer seeds in their fur.

The herding instinct of sheep and goats allows professional herders to range in very mobile bands without the installation and maintenance of permanent fences. Portable electric fences are commonly used to help control the herd and the outcome of their grazing. Goats will browse materials up to 6 feet above the ground creating a desirable vertical separation between the canopy and ground cover. However, measures must be taken to prevent girdling of trees by goats browsing on bark. Herd movement has the advantage of breaking off dead material in a stand as well as punching a humus layer into the soil (if the ground is somewhat moist) and thereby removing available fuel. Grazing treatments need to be repeated, however, following up or alternating with a different, complementary technique can extend its effectiveness.

If work is needed to be done during May-July, scheduling can present a challenge because many clients in the greater area desire the service at that time. To minimize the negative effects of grazing on a specific plant, goats should graze after seed set of that plant. During initial fuel reduction treatments, goats may be most cost-effective in the late fall or early spring when demand for their services, and possibly price are reduced. Multi-year contracts, and contracts for larger areas typically lower the costs per acre. Providing a place where the herd can stay during the winter also lowers costs for treatment. Providing a water source for livestock is another way to reduce costs. Water sources can be as rudimentary as a plastic wading pool or a portable trough.

A herd of 200-300 goats can generally treat one acre per day. Costs can vary from $300 to $1000 per acre with an average of $700 per acre, depending on fencing requirements as well as type and density of vegetation present. The cost includes

transportation, the shepherd's salary, supplements and healthcare for the goats, fencing and insurance.

Prescribed Burns

Prescribed burning reintroduces fire into the ecosystem as a "natural treatment" and can promote native flora and aid containment of fires by reducing fuel volumes. Implementation of this technique is challenging within the City; exploration of ways to employ this treatment is ongoing. Remote-controlled machinery with a flaming element and extinguishment – which results in a linear burned strip - is being investigated. Two types of prescribed burning, pile burning and broadcast burning, are possible. Pile burning is more frequently conducted. In this type of prescribed burning, material is cut, then piled in distinct locations. Piles are separated by a distance that limits the contagion of fire from one to the next. These piles are usually ignited when weather would not allow fire spread outside the pile. This type of prescribed burning can remove a significant amount of biomass with decreased risk.

Prescribed burns are usually performed by the local fire protection district. CAL FIRE may be willing to participate in a limited broadcast prescribed burning program as part of their hazard reduction efforts within the Vegetation Management Program, even if the project area would be outside the State Responsibility Area. If burns were conducted by CAL FIRE, the State would not only assume liability, but also share costs. Regardless, it is likely that CAL FIRE and other nearby fire protection districts and departments would offer mutual cooperation and/or assistance.

Several precautions, such as installing firebreaks and notifying various agencies, must be taken before performing a prescribed burn. For broadcast burns, treatment boundaries are often road and trail crossings, which reduces the number of fire breaks that need to be created by fire personnel, thereby reducing labor costs and time needed to prepare for the burn as well as minimizing the amount of surface soil disturbance and potential for soil erosion.

Prescribed burning requires the development and approval of a prescription or burn plan, which is typically developed by the local fire protection district in consideration of fuel reduction requirements, local weather conditions, and available resources for fire management. The soot and smoke generated, as well as the chance of escape, make prescribed burns a public safety concern. Planning and coordination with interested parties must be an integral part of the program.

Broadcast burning may occur throughout the year; however, it is usually conducted during late spring when the ground is still wet or during fall or winter after plants have completed their yearly growth cycle and their moisture content has declined. Spring burns are preferred by some fire staff to ensure a greater measure of public safety, however, there may be impacts to animal and plant reproduction activities. Fall burns are more closely aligned with the natural fire cycle found in California. If a prescribed

burn were to be conducted in the fall, the period before leaves or new herbaceous material covers the slopes will be short (possibly a month or two).

Prescribed burning can enhance the local grasslands and promote the abundance of wildflowers. Any small oaks or shrubs to be retained will need to be protected during the burn to prevent their mortality. While the abundance of wildflowers the subsequent years is an appealing sight, the burned area will be temporarily blackened.

Eucalyptus Tree Removal

By removing eucalyptus trees their canopy no longer contributes to a fire in the form of a crown fire or ember production. Additionally, the production of surface fuels is reduced since biomass production (branches, leaves, duff etc.) is decreased. This technique has positive impact on reducing spotting potential, heat output, spread rate and, potentially, ignitability depending upon what replaces the overstory.

Tree removal varies from cutting of individual trees, to removal of entire overstory canopy. This process can be slow and expensive but can be selective with limited impact beyond the removal of the target plants (depending upon scale of removal). Sometimes harvesting techniques can be quite rapid. If the whole tree is not harvested, the technique generates considerable debris (from tree branches) that should be removed using machinery to haul. The boles of trees hauled away and other debris should be either hauled away or may be burned later as a part of a prescribed burn (pile or broadcast). A portion of debris may be left as a sort of erosion control measure and to cover bare spots.

And bats may use eucalyptus trees as perches and nesting sites. Replacement perches and nesting platforms for raptors can be constructed, located, and installed prior to removal of the trees to minimize displacement of raptors. If the tree harbors a maternal bat roost, removal should be coordinated with the appropriate wildlife agencies, including the California Department of Fish and Game and possibly the US Fish and Wildlife Service. Volunteers can locate and construct the raptor perches and nesting platforms, with guidance from suitable experts (e.g. Audubon Society or the Point Reyes Bird Observatory).

Tree removal creates patches of disturbance by the removal operation. Subsequent treatment of the area is dependent upon the species that encroach into these patches. Removal of exotics or weed species on an annual basis should be anticipated until an acceptable stable vegetation type is re-established.

Sprout removal is often required as a follow up treatment, involving the application of herbicides and/or other techniques such as grinding the stump or placing plastic over the stump.

Herbicide Application to Control Invasive Plants

Using herbicides to control invasive plant species that exacerbate wildfire risk is used as part of an Integrated Pest Management[21] program and in combination with other treatment measures (e.g., mowing, burning and hand removal). Application following another treatment method in which plants are trimmed or shortened can increase the effectiveness of the chemical treatment. Herbicides can also be used to kill herbaceous plants in exposed areas, such as roadside grass and weeds, and are typically applied while the grasses and weeds are still actively growing. Foliar treatments are generally not applied within seven days of significant rain because the herbicide may be washed off before it is effective, and not on windy days because of concerns for spray drift.

The use of Garlon 4 Ultra herbicide can be used to treat areas of eucalyptus resprouting, removing the need to completely uproot or grind down the eucalyptus stump. Foliar application of Roundup to eucalyptus re-sprouts is another typical, successful chemical treatment, and can be used to eliminate small-diameter fuels in areas of high ignition risk. The use of a thistle-specific herbicide, Transline, is effective in controlling the spread of yellow star thistle, artichoke thistle, and bull thistle.

Herbicides do not remove any vegetation from an area's fuel load; the dead plant matter continues to exist at the site and could continue to be a fire hazard if not collected and disposed. Health, safety and environmental concerns have limited the widespread use of chemicals over the past 20 years, and repeated use of chemicals is not preferred due to the prevalence of unwanted species building resistance to herbicides. Additionally, concerns regarding water quality and other potential environmental impacts that may occur with prolonged use of and exposure to herbicides and other chemical applications further limit their frequent or widespread use as a treatment.

Application of herbicides is typically performed by hand, and can include sponging, spraying, or dusting chemicals onto unwanted plants. Hand application provides flexibility in application and is ideally suited for small treatment areas. Roadside application of herbicides may employ a boom affixed to or towed behind a vehicle.

Herbicide application requires specific storage, training and licensing to ensure proper and safe use, handling, and storage. Only personnel with the appropriate license are allowed to use chemicals to treat vegetation. Herbicide application is also only applied per a prescription prepared by a Pesticide Advisor licensed in that county. Personal protection equipment is essential to limit personnel exposure to chemicals.

Best Management Practices

The protection and preservation of culturally and environmentally sensitive areas is one of the primary drivers for development of an updated Fire Management Plan. The development of a comprehensive plan not only protects these features from the effects

[21] Integrated Pest Management is a strategy that uses an array of biological, mechanical, cultural, and hand labor, to control pests, with the use of herbicides as a least-preferred method of control.

of fire, but ensures that vegetation treatment, fuel management, or fire mitigation efforts are planned and executed in a manner that prevents potential additional adverse impact. The following steps are considered best management practices for the continued protection of environmental areas. These steps are ideally suited to on-going fire management planning and the execution of specific fire management actions described within this plan.

- Detailed site inventory prior to treatment to determine the location of sensitive sites. Exploration into the use of knowledgeable volunteers to conduct a more detailed, site-wide survey is warranted.
- Site planning and design to determine specific vegetation treatment actions based on fire management benefits, environmental impact, and required mitigation activities.
- Protection during vegetation treatment using best management practices tailored to impacted sensitive resources.
- Protection of disturbed environmentally sensitive areas following specific fire management actions.

The above vegetation treatment actions have been commonly used throughout the State of California. Through their implementation, a series of best practices has emerged to limit their adverse impact on the environment and to assist in the selection and planning of their application.

Hand Labor

Due to the direct relationship of personnel to the environment in which they operate, hand labor can represent an approach that provides the least adverse impact to environmentally sensitive areas. However, specific fire management goals and the characteristics of the sensitive area or resource must be assessed to develop an actual work plan and associated activities. The following management practices and considerations should be implemented during site planning and project execution.

- Provide or confirm adequate training, experience, and oversight to ensure that personnel are familiar with hand labor operations and planning, site conditions, potential and identified sensitive resources, and the identification of specific environmental features or conditions that must be avoided.
- Avoid treatment actions during conditions that may affect water or run-off including during storms or severe weather or immediately following severe weather.
- Avoid excessive foot or vehicle traffic on slopes, unimproved or non-designated trails, or outside of preexisting roads or access points.

- Inspect areas for nesting birds to determine if activity should be postponed or adjusted by the establishment of a buffer area.
- Clean all tools and equipment following actions and prior to movement into new environmental areas to prevent the spread of invasive or non-native plants.

Mechanical Treatments

Due to the potential for large equipment use, rapid action, and large-scale area operations, mechanical treatments can have significant adverse impacts on sensitive areas. As a result, pre-planning and site supervision are extremely important for any planned mechanical treatment actions. The following management practices and considerations should be implemented during site planning and project execution.

- Provide or confirm adequate training, experience, and oversight to ensure that personnel are familiar with mechanical treatment operations and planning, site conditions, potential and identified sensitive resources, and the identification of specific environmental features or conditions that must be avoided.
- Avoid treatment actions during conditions that may affect water or run-off including during storms, periods of precipitation, or immediately following severe weather. In addition, avoid scheduling any treatment actions during seasons with significant predicted precipitation. Cease operations or postpone planned operations including movement of vehicles or equipment during precipitation conditions that may combine with vehicle activity to cause damage to roads, trails, or adjacent land areas.
- Plan treatment actions and equipment selection to minimize damage or alterations to existing soils. Determine locations of potentially erosive soils prior to treatment. Restrict operations that may adversely affect sensitive soil systems such as serpentine soil areas, erosion prone soils, or riparian zones. Restriction may include using road-based operations only and avoiding riparian set-backs established by regulatory agencies.
- Maintain a buffer of 25-50 feet between operations and water bodies or designated riparian areas. Avoid crossing drainage channels, run-off areas, or dry streambeds. Install and manage run-off barriers for rainwater in all treatment and operating areas. Restrict mechanical removal of trees to areas further than 50 feet from drainage channels.
- Restrict vehicle traffic to preexisting roads or pre-planned access points based on equipment size and operations. Limit transport and support equipment to existing roads. Limit heavy equipment use to slopes less than 30%. Install erosion control measures on all vehicle roads and traffic areas.
- Maintain strict monitoring and control of fueling and maintenance operations. All maintenance actions that may produce spills should be executed in areas with

secondary containment protection, away from any water bodies or drainage areas. Clean up of all spills should be done on-site, with materials ready for use. Inspection of equipment for new leaks and mechanical problems should be performed daily, prior to operations.

- Inspect areas for nesting birds to determine if activity should be postponed or adjusted by the establishment of a buffer area.
- Clean equipment following actions and prior to movement into new environmental areas to prevent the spread of invasive or non-native plants.
- Plan operations around expected seeding conditions of targeted species (either prior to or sufficiently afterwards) to ensure efficiency of treatment action.
- Cease actions during periods of high fire danger or during red flag conditions. Ensure that all mechanical equipment have approved spark arrestors and comply with California Public Resources Code (PRC) sections 4431, 4435, 4442, and 4437 to limit potential for ignition of incidental fires.
- Maintain on-site fire suppression resources to include shovel, water pump, fire extinguisher, and two-way radio or communications for fire reporting.

Grazing with Sheep and Goats

- One of the primary adverse impacts of grazing is over-grazing and the resulting exposure of bare ground. Over-grazing can increase the potential for soil erosion, water run-off and drainage, elimination of native plant species, and spread of non-native plants and weeds. Prepare a grazing management plan by a certified range specialist that specifies goals, stocking levels, grazing periods, installation of range improvements (such as water sources) to evenly distribute utilization of feed, and monitoring and performance criteria.
- Develop a site-specific annual grazing plan that includes project-level plans for stocking, timing, and resource management goals.
- Prior to introduction, all animals should be quarantined and fed weed-free forage to limit spread of invasive or unwanted plant species as well as prevent spread of livestock diseases.
- Limit grazing to non-riparian areas.

Broadcast Prescribed Burns

Prescribed burns can have significant impacts on sensitive areas both from environmental and cultural standpoint. The planning and execution of a prescribed burn must be carefully developed. A prescribed burn can adversely affect the duff layer, generate large and unpredicted amounts of smoke, and transition from a controlled event to one that is uncontrolled and dangerous.

- Provide or confirm adequate training, experience, and oversight to ensure that personnel are familiar with broadcast prescribed burn operations and planning, site conditions, potential and identified sensitive resources, and the identification of specific environmental features or conditions that must be avoided.
- Develop a smoke management plan describing desired outcomes and specific actions for onsite personnel including a test burn, continual evaluation of smoke dispersal, monitoring of wind patterns, and monitoring of potential visibility impacts to primary roads and highways.
- Develop public safety plans to be executed throughout the prescribed burn cycle including press and information releases, signs and notifications, patrols on roads and access points, and development of a fire contingency plan.
- Maintain a buffer between the prescribed burn area and water bodies or drainage into riparian zones. Buffers should be a minimum of 25 feet for 5% slopes, 75 feet for 5-10% slopes, and 250 feet for 10% or greater slopes. No prescribed fires should be ignited near streams or in riparian zones.
- Plan the prescribed burn to minimize post-fire erosion into water bodies and drainages through natural barriers, proper construction of fire lines along contours, and proper erosion control barrier deployment. Minimize prescribed burning in areas with highly erodible soils.
- Cultural and social sites and structures shall be excluded from burn areas through planning, hand-lines, or other fire protection operations. On-site personnel will be briefed on locations and features of cultural or social sites to include incident command or response personnel. Avoid prescribed burns in areas with utility infrastructure, existing property or structures, or archeological sites.
- Manage fuel moisture through pre-fire assessment and potential fuel modification. Prior to prescribed burn, remove ladder fuels into the tree canopy to increase safety and reduce torching.
- Conduct prescribed burns only on designated burn days as authorized by BAAQMD.
- Inspect areas for nesting birds to determine if activity should be postponed or adjusted.

Herbicide Application

The application of herbicides for vegetation treatment should focus on the goal of applying the least amount of chemical required to achieve a desired outcome, consistent with the City of Palo Alto's Integrated Pest Management policy. Best management

practices for herbicide application are centered on limiting adverse or unintended impacts of herbicides due to run-off, wind-spread, or post-treatment exposure.

- Provide or confirm adequate training, experience, and oversight to ensure that personnel are familiar with herbicide operations and planning, site conditions, potential and identified sensitive resources, and the identification of specific environmental features or conditions that must be avoided. Herbicide application is only applied per a prescription prepared by a Pesticide Control Advisor licensed in that county, and applied by a licensed Pesticide Control Applicator.
- Develop public safety plans to be executed throughout the treatment cycle including press and information releases, signs and notifications, and fencing or area restrictions.
- Develop a spill contingency plan and maintain strict monitoring and control of operations. Clean up of all spills should be done on-site, with materials ready for use.
- Chemical treatments within habitat of California Red-legged Frog should be conducted according to U.S. District Court injunction and order covering 66 pesticides (Oct 2006) and subsequent EPA effects determinations.
- Clean equipment following actions and prior to movement into new environmental areas.
- Avoid treating areas adjacent to water bodies, riparian areas, and primary drainage access. Follow all herbicide labels and directions in determining applications near water resources or riparian habitats. Limit aerial application to greater than 100 feet from water resources. Limit ground and hand application to greater than 50 feet.
- Avoid treating areas used for livestock operations or intended as grazing areas.