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Attachment 2

City of Santa Rosa
CALIFORNIA

LOCAL HAZARD MITIGATION PLAN WILDFIRE ANNEX

Community Wildfire Protection Plan

APPROVAL DATE:

XXXXX 00, 2020

PREPARED BY:

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COMMUNITY WILDFIRE PROTECTION PLAN

MUTUAL AGREEMENT PAGE

The Community Wildfire Protection Plan developed for the City of Santa Rosa Fire Department:

- ✓ Was collaboratively developed. Interested parties, key stakeholders, local fire departments, and federal land management agencies managing land in the vicinity of Santa Rosa have been consulted.

- ✓ This plan identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will protect the community of Santa Rosa.

- ✓ This plan recommends measures to reduce the ignitability of structures throughout the area addressed by the plan.

The following entities mutually agree with the contents of this Community Wildfire Protection Plan:

Recommended by: _____

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Fire Chief, Santa Rosa Fire Department

Approved by: _____

Tom Schwedhelm
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Approved by: _____

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Acknowledgements

The following community representatives, agencies, and other stakeholders were involved in the collaborative process in preparation of the Wildfire Annex/City of Santa Rosa Community Wildfire Protection Plan (CWPP):

CWPP Steering Committee

Dennis Searles – Fountaingrove II Firewise Coordinator

Ben Nicholls – CAL FIRE West Division Operations

Kevin Hubred – Oakmont Firewise Coordinator

William Abrams – Sonoma County Resident

Caerleon Safford – County of Sonoma & Fire Safe Sonoma

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David Fowler - State of California, North Coast Regional Water Quality Control Board

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SECTION 1. INTRODUCTION

Santa Rosa and the surrounding area have experienced catastrophic wildfires that have been costly in terms of fatalities and injuries, damage and loss of multiple structures, and high fire suppression and fire recovery costs. On the evening of October 8, 2017, the Tubbs Fire ignited in Napa County and ran 12-miles into Sonoma County entering the City of Santa Rosa (City) at about 1:00 a.m. on October 9, 2017, becoming one of the most destructive wildfires in California history (CAL FIRE 2020).

The Tubbs Fire burned through neighborhoods in Fountaingrove and Larkfield-Wikiup. Around 2:00 a.m., the fire spotted across Highway 101 into a commercial district on Cleveland Avenue and through hundreds of homes in the Coffey Park area of the City.

Figure 1 Patients from Santa Rosa were evacuated from two hospitals during the Tubbs Fire (Photo: NBC)

On October 31, 2017, the Tubbs Fire was declared out. Sadly, twenty-two people lost their lives in Sonoma County - nine fatalities occurred within the City of Santa Rosa (City). The fire burned 26,807 acres total. It destroyed over 3,000 residential units, 25 commercial structures, and critical infrastructure with an estimated property loss of over $1.2 billion within the City alone. The long-term impacts to the City are incalculable.

The Nuns Fire also ignited on October 8, 2017 in the Sonoma County area north of Glen Ellen. This fire merged with the Norrbom Fire on October 11th then merged with the Adobe Fire on October 12th before merging with the Patrick Fire on October 13th. By October 16th, the combined fires (called the Nuns Fire) burned over 56,000 acres, destroyed 1,355 structures, damaged 172 structures, and killed three people. The Nuns Fire destroyed two homes in Oakmont and threatened the Justice Center. This fire was contained on October 30, 2017 and is California's 9th most destructive fire in history (CAL FIRE 2020).

The City was again threatened by wildfire on the evening of October 23, 2019 when the Kincade Fire started near the Geysers Geothermal plant in north Sonoma County. The Kincade Fire burned 77,758 acres and destroyed 374 buildings, prompting the largest evacuation in the history of Sonoma County. The fire burned to the outskirts of Windsor, north of the City, before the southerly progression of the fire stopped.

Although wildfires within and adjacent to the City have historically been infrequent, current climate models forecast a future dryer and warmer climate scenario for the area. With or without climate change, wildfires are inevitable, however, the risk to humans can be minimized and the loss and damage to homes, businesses, critical infrastructure, and other human development can be significantly reduced through thoughtful planning.

Following the 2017 wildfires in California, the Federal Emergency Management Agency (FEMA) requested the Administrator of Department of Homeland Security (DHS) Science and Technology

Division to research new and existing technologies that could be utilized to improve operational capacities on wildland urban interface (WUI) fires (DHS 2018). Of the seven key findings presented in the DHS report, the Santa Rosa Fire Department (SRFD) is currently taking action to address five of the key findings in order to increase their operational capacity. Two of these key findings relate to the development of a CWPP.

Support broader use of existing fire modeling and forecast tools.

> *Action:* Through the CWPP process, SRFD has developed the most current fire hazard and fire risk modeling information specific to the City. This Plan also contains fire modeling information quantifying ember exposure and ember travel distances.

Increase infrastructure resilience.

> *Action:* The CWPP process allowed the City to identify critical infrastructure that may be at risk from a wildfire. Currently information regarding critical infrastructure is found in the existing Local Hazard Mitigation Plan. The City has identified the need to improve the resilience of the communication infrastructure required to keep the community updated with emergency information. Given the City does not have jurisdictional control over all critical communication infrastructure, collaboration with Sonoma County emergency managers is required to address communication infrastructure vulnerabilities outside of their jurisdictional control.

In an effort to reduce the wildfire threat, the City applied for and received a FEMA Hazard Mitigation Grant in 2018 to fund the development of a Wildfire Annex to their 2016 Local Hazard Mitigation Plan in the form of a Community Wildfire Protection Plan (CWPP). The City hired wildfire consultant Geo Elements, LLC in the spring of 2019 to assist in the development of the Wildfire Annex/CWPP (Plan).

This Plan builds upon the October 2016 City of Santa Rosa Local Hazard Mitigation Plan providing more site-specific wildfire assessments and an action plan to address the wildfire threat to the City. This Plan meets the requirements of both FEMA's Core Capabilities and the 2003 Healthy Forests Restoration Act (HFRA) and provides the City with tools that, if implemented, can enhance the protection of life safety and improve the resiliency of structures, critical infrastructure and other assets from wildfire.

This Plan is the result of a community-wide planning effort to quantify and evaluate the wildfire threat to the City and develop hazard mitigation strategies that enhance protection of life safety and other community assets from wildfire. Using the latest wildfire science and community input serves to guide future wildfire mitigation actions by all stakeholders in their efforts to reduce the future wildfire threat.

Implementation of the hazard mitigation strategy within this document is subject to available funding, other City priorities, and environmental review under the 1970 California Environmental Quality Act (CEQA). The Plan is consistent with objectives and policies set forth in the City of Santa Rosa's General Plan, Local Hazard Natural Hazard Mitigation Plan, City of Santa Rosa Fire Department Strategic Plan, Santa Rosa Department Fire & Life Safety Plan, and City Building and

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Fire Codes, other pertinent City documents, and CAL FIRE's Strategic Fire Plan for Sonoma-Lake-Napa Unit. It exceeds the requirements of the 2003 Healthy Forests Restoration Act and positions the City well to compete for state and federal grants.

1.1 Purpose of the Plan

The purpose of this Plan is to enhance protection of human life safety and reduce the wildfire threat to community assets such as homes, commercial structures, critical infrastructure, businesses, and natural and historic resources within the City.

1.2 Goals and Objectives

The City's Local Hazard Mitigation Plan, Section 1.5 identified five priorities and goals that cover all natural and human-made disasters. The Goals and Objectives of this Plan were developed in collaboration with the SRFD, CWPP Steering Committee, Stakeholders, and from input received from the public during three open forum workshops and an on-line public survey. These goals represent desired end-states for the community, while the objectives provide measurable steps that will be undertaken to achieve the goal. Table 1 presents the Plan's goals and objectives:

Table 1 CWPP Goals and Objectives

Goals	Objectives
Minimize the wildfire threat to life safety.	• Assess wildfire hazards and risks within the Project Area, utilize results to set priorities to reduce threat to life safety. • Review the existing public alert protocols and evacuation procedures for wildfire and make recommendations for enhancement as necessary • Develop guidelines that address vulnerable populations in consideration of special needs for pre-planning evacuation. • Evaluate the effectiveness of the existing vegetation treatment fire codes (e.g. weed abatement program). • Develop fuel treatment methods and strategies for property-owners and agencies that provide guidance for adequate defensible space to structures and transportation routes in all types of wildland fuels • Develop a GIS database of existing and proposed vegetation treatments.
Reduce the wildfire threat to values/assets at risk.	• Identify values/assets at risk from wildfire in the Project Area. • Utilize the wildfire hazard and risk assessments to develop prioritized mitigation strategies to reduce the threat to values/assets.

	• Identify and promote citizen-based actions that enhance structure hardening and the development of effective defensible space. • Evaluate existing building codes to address the build-out of the community post-wildfire.
Develop priorities to mitigate risks and hazards identified.	• Create a Plan that meets the requirements of the 2003 Healthy Forest Restoration Act and FEMA's Local Hazard Mitigation Plan. • Achieve this through facilitated collaboration between stakeholders, land managers, residents, and the City to address potential wildfire hazards and risks. • Identify and further develop the building of community and regional partnerships and relationships for the Project Area. • Outreach to community and agency leaders through the use of a Steering Committee. • Develop a communication / public education strategy to inform the public of findings and mitigations.
Determine potential impacts of climate change on the local fire environment and how these impacts may influence wildfire hazard and risk in the mid-21st century.	• Assess future potential climate scenarios for the City of Santa Rosa. • Provide recommendations to assist the City in mitigating potential increase in wildfire hazard and risk for the future.
Establish a plan to track and monitor implementation of action items identified in this Plan.	• Create a method to monitor, track, and document completed action items identified in the Plan. • Identify responsible individuals for carrying out actionable items and establish accountability for actions through annual reporting to the City Council.

1.3 Policy and Regulatory Framework

Knowledge of policies and regulations ensure compliance of wildfire mitigation recommendations presented in this Plan. This Plan is consistent with federal, state, county and local policies and regulations. Relevant policy information is listed and cited in Appendix A.

1.4 CWPP Planning Process

The development of a CWPP is a collaborative process that brings together diverse local interests to develop a course of action that mitigates the wildfire threat and enhances protection of assets from wildfire.

As part of the 2003 HFRA, there are three minimum requirements for a CWPP, including:

1. Collaboration – A CWPP must be collaboratively developed. Local officials and state officials must meaningfully involve federal agencies that manage land in the vicinity of the community and other interested parties, particularly non-governmental stakeholders.

2. Prioritized Fuel Reduction - a CWPP must identify and prioritize areas for hazardous fuel reduction treatments on both federal and non-federal land and recommend the types and methods of treatment that, if completed, would reduce the risk to the community.
3. Treatment of Structural Ignitability - a CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout the area addressed by the plan.

In the development of a CWPP, the more inclusive the group and the greater the diversity of interests involved, the more likely it is to be representative of a community as a whole. The following section describes our process.

1.4.1 City of Santa Rosa's Collaborative Approach

The initial step for the City and Geo Elements was to develop a public outreach strategy to engage the community and all stakeholders in the development of this Plan. Outreach efforts focused on the entire City, as well as areas of Sonoma County (County) directly adjacent to the City.

SRFD and Geo Elements performed extensive marketing, including the following:

- SRFD's website – SRFD added a CWPP content for their webpage sharing pertinent information on the CWPP, workshops, and progress
- Social media - SRFD's Twitter and Facebook pages
- Thirty-second scripts for social and news media
- Articles specifically for the City of Santa Rosa Newsletter
- Talking points for the City Council
- A community-based survey using Survey Monkey software
- Public education presentations by SRFD

Steering Committee

A steering committee made up of key stakeholders were invited to participate as representatives of the community and as members of the Steering Committee. These key stakeholders include:

- Oakmont Firewise Coordinator
- Fountaingrove II Open Space Maintenance Association - Firewise Coordinator
- CAL FIRE, Division Chief
- Sonoma County Resident
- Fire Safe Council Sonoma
- Cal OES Region II, Assistant Chief
- City of Santa Rosa Fire Department, Deputy Chief Fire Marshal
- Geo Elements, LLC staff

Each steering committee member provided critical input and feedback throughout the development of the CWPP. The steering committee met on May 15, 2019 and July 25, 2019 and communicated by conference call and email during the development of this plan and for the review of this draft.

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Community Workshops

Community stakeholders were invited to the workshops via phone calls, direct emails, local media releases, posting on the City's website, CWPP Steering Committee outreach, social media site postings (Twitter and Facebook), as well as though flyers and posters posted throughout the community. Three community workshops occurred on:

- July 22, 2019 at the Finley Community Center (2060 West College, Santa Rosa)
- July 25, 2019 at the Veterans Building (1351 Maple Avenue, Santa Rosa)
- August 14, 2019 at the Rincon Valley Library (6959 Montecito Boulevard, Santa Rosa)

A PowerPoint presentation was presented by the Consultant at all three workshops to provide a basic understanding of the CWPP process and to share the initial wildfire hazard and risk assessment. Opportunities for the public to ask questions of the Consultant and City staff were provided at each of the workshops.

Agency/Organizational Stakeholder Meeting

Agencies and organizations were invited to attend a separate stakeholder meeting on October 9, 2019 to identify issues and concerns regarding development of this Plan. Attendees included California Department of Transportation (CalTrans), Fountaingrove II Open Space Maintenance Association, Sonoma Fire Safe Council, City staff, CALFIRE, North Coast Regional Water Quality Control Board members, Sonoma County Steering Committee Representative, and Geo Elements LLC staff.

Invitations were extended to other key stakeholders including County of Sonoma, State Parks, County Agriculture/Open Space, Sonoma County Fire District, Kenwood Fire, City Parks, and PG&E; but, unfortunately on the day of the meeting there was a Public Safety Power Shutoff (PSPS), so several stakeholders were unable to attend due to the PSPS.

During the spring and summer of 2019, Geo Elements staff met with Fountaingrove and Oakmont homeowner associations and employees of Trione-Annadel State Park to obtain additional stakeholder input.

Community Survey

An on-line survey was developed to solicit input from stakeholders that were unable to attend the workshops. Survey questions focused on nine topic areas relating to wildfire protection and public safety. The survey opened July 18, 2019 and remained open until October 1, 2019.

A total of 511 people responded to the survey, but not all respondents answered every question. The following are key findings from the CWPP Survey:

- Approximately 67 percent of the respondents agree that clearing vegetation encroaching into roadways is needed along major evacuation routes.
- Almost 50 percent believed that community or property-owner training classes would be beneficial to them and the community.
- Only 17 percent felt the city is adequately prepared for evacuation and preparedness.

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- Over 86 percent are registered for Nixle Alerts, over 56 percent were signed up for SoCoAlert, and less than 18 percent used Wireless Emergency Alerts (WEA).
- Over 66 percent strongly agreed that more education and information is needed on evacuation and preparedness.
- Over 66 percent strongly agree that clearance of vegetation encroaching into roadways is needed along major evacuation routes while almost 25 percent agreed it was needed.
- Over 78 percent would support more stringent building and fire code requirements for structures destroyed during the 2017 Tubbs Fire and new development in the WUI Fire Areas.
- Only 36 percent felt building and fire codes for existing structures in the WUI Fire Area provide adequate protection during a wildfire.
- Almost 62 percent either disagree or didn't know whether their property has adequate defensible space.
- Approximately 55 percent felt like the City's current annual Weed Abatement Program adequately addressed defensible space requirement in the WUI Fire Areas.
- Over 62 percent of the respondents support the enforcement of defensible space for a distance of 100 feet from a structure and/or property line within WUI Fire Areas.
- Almost 85 percent of the respondents believe that strategic vegetation management projects, such as creating fuelbreaks and fuel treatments zones should occur on public and private lands.
- Over 54 percent supported prescribed fire, in the form of pile burning.
- Over 64 percent believed that the use of natural-based herbicides to maintain fuel treatment projects and to eradicate exotic pest plants is acceptable in the WUI Fire Areas.

The full survey and survey analysis are available through SRFD.

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SECTION 2. COMMUNITY OVERVIEW

The City is located approximately 55 miles north of San Francisco and 20 air miles from the Pacific Ocean and is considered part of the North Bay region of California in Sonoma County. It covers almost 42 square miles and lies on the Santa Rosa Plain within the Laguna de Santa Rosa watershed, a major tributary of the Russian River Watershed. Prominent terrain features east of the city include Bennett Peak, Mount Hood, and Sonoma and Taylor Mountains.

Santa Rosa is a desirable place to live with its warm climate, redwood trees, rolling hills, beautiful scenery, and location as part of California's wine country. It features state, county and city parks with diverse recreational opportunities, urban creeks, open vistas of the Mayacamas Mountains, all while supporting a vibrant agricultural economy featuring vineyards and wineries.

Its thriving downtown includes three distinct shopping districts, five historic neighborhoods, art galleries, restaurants, wine tasting rooms, and brew pubs. There are currently eight designated Preservation Districts in Santa Rosa including Burbank Gardens, Cherry Street, McDonald, Olive Park, Railroad Square, Ridgway, St. Rose, and West End Street.

The Project Area is approximately a 2-mile radius from several nodes around the City's administrative boundary, however, the western side of the community is not addressed in this Plan as per SRFD (see Figure 2, Project Area Map).

2.1 Assets at Risk

Assets are broadly defined to include anything that is important to the character and function of a community. A community's assets typically include those things that a community values and can include both physical and intangible values. The following identifies the City's assets at risk:

2.1.1 Life Safety

The protection of human life safety is the highest priority for all wildfire mitigation strategies in this plan. As of 2018, the estimated population of Santa Rosa is 177,586 with a large portion of that population considered vulnerable individuals (U.S. Census Bureau, http://factfinder.census.gov, 25 June 2019). The central and western areas of the City have higher population density and areas with lower population density are generally located in the eastern area of the City. See Figure 3, Population Density Map.

> Life safety considers both the life and physical well-being of all people in the community including first responders.

As described in the April 2019 After Action Report of the City's Response to the 2017 Sonoma County Fires, "In the span of a few hours, life profoundly changed for thousands of people in Santa Rosa." During the 2017 Tubbs Fire, nine residents died, 3,043 residential units were destroyed displacing thousands of people from their homes, and thirty-six commercial buildings were destroyed putting hundreds of people out of work.

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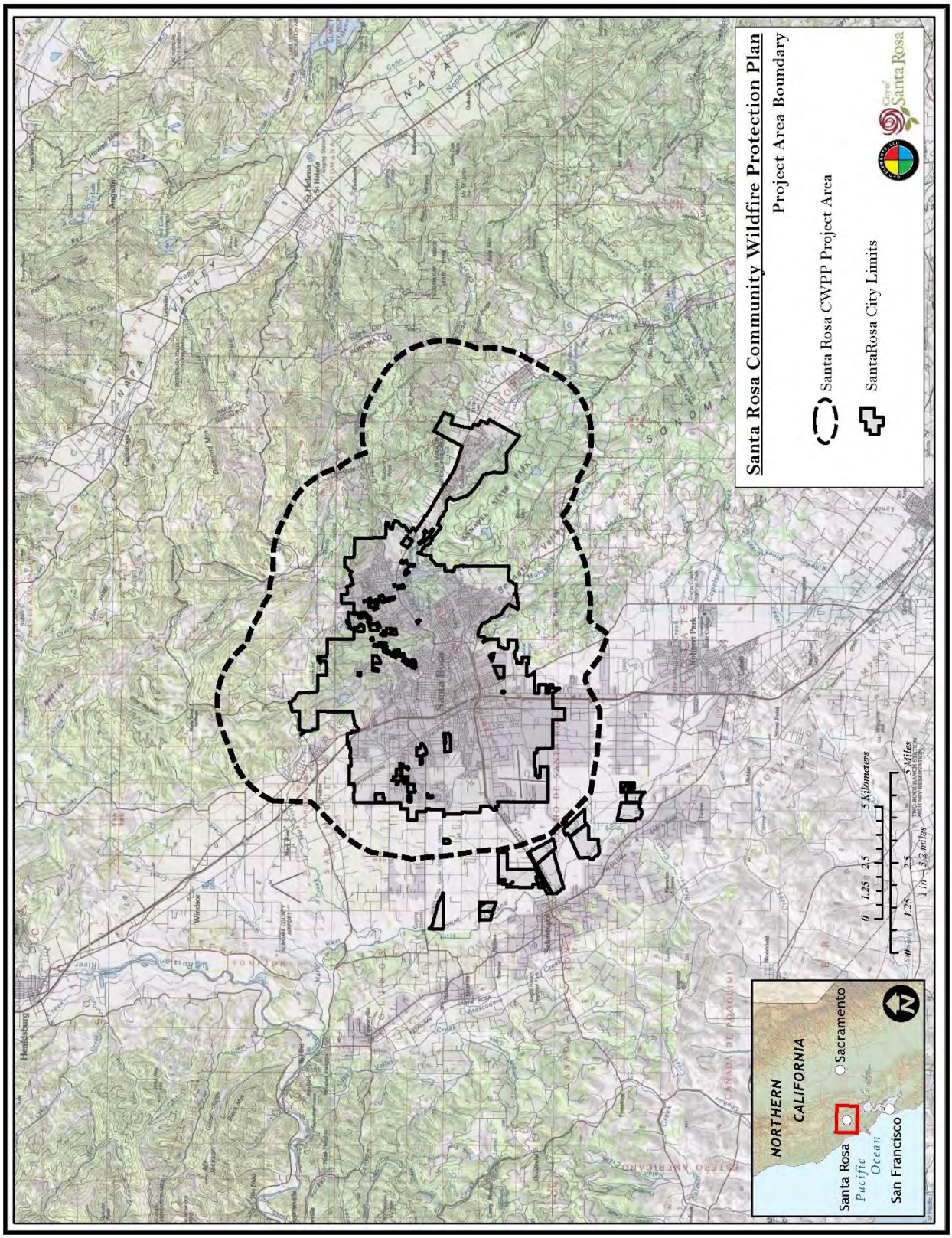

Figure 2. Project Area covered by CWPP.

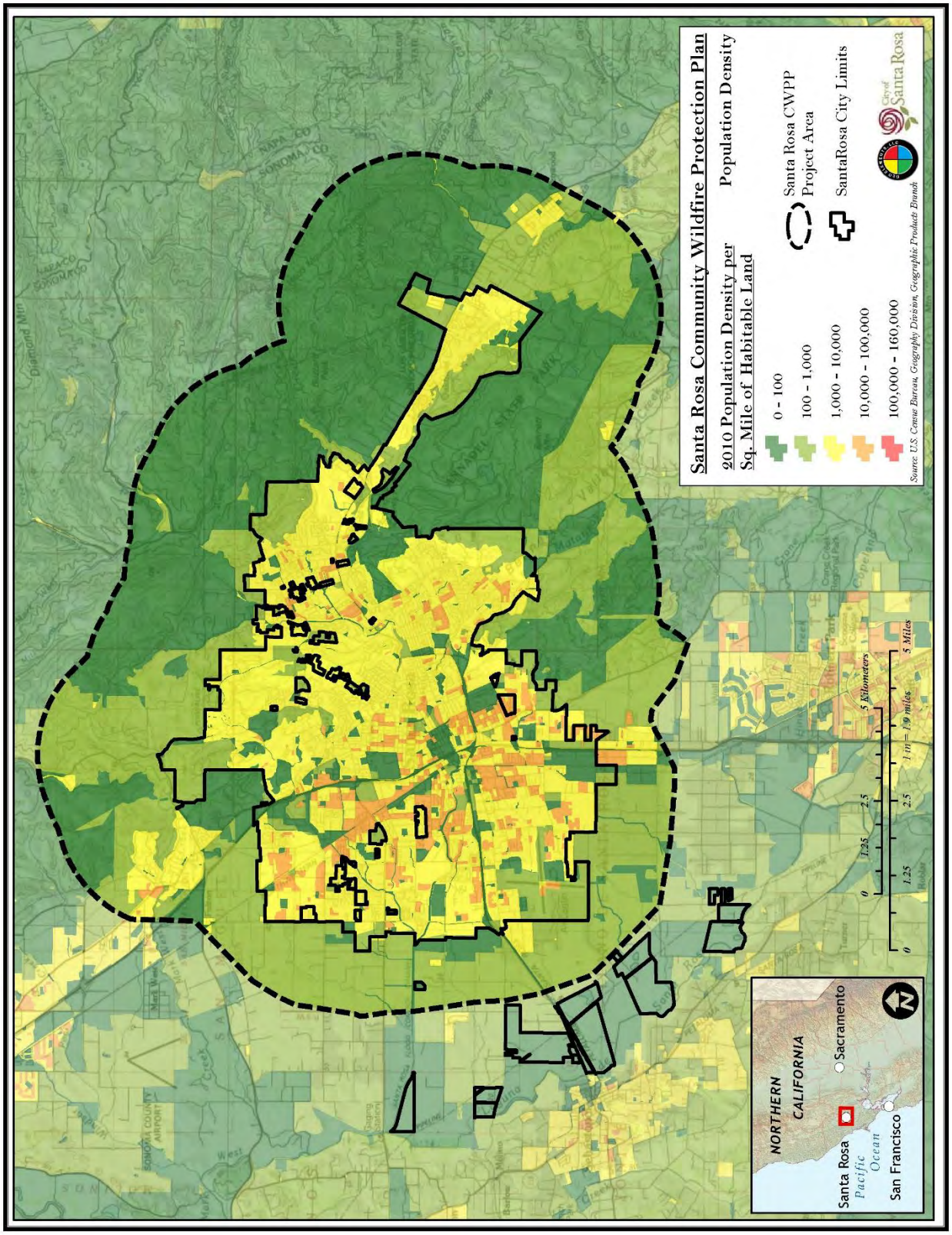

Figure 3. Population density in the Planning Area.

Of the individuals that perished in the Tubbs Fire, the majority were considered vulnerable. Vulnerable populations are typically less able to respond to, cope with, and recover from a wildfire; and less likely to get involved in wildfire mitigation activities (Ojerio 2008). Categories generally considered *vulnerable* can include:

- Age and physical and mental impairments can restrict mobility making it more difficult to evacuate during a disaster.
- Limited financial resources can hinder the ability for low-income populations to invest in emergency preparedness or taking mitigation action or to recover from loss.
- Diverse languages can result in communication barriers to understanding the wildfire threat and the need for mitigation, evacuation, and post-fire support services.

While the specific number and location of those who are vulnerable within the City are not known, the following table generally displays the known vulnerable population in the City.

*Table 2 Vulnerable Populations in the City of Santa Rosa **

Description of Vulnerable Population	Percent of Total Population (%)
Under the age of 18 years old	22.5
Under the age of 65 years old and have disabilities	8.3
Over the age of 65 years old	15.7
Language other than English spoken at home	31.0
Families/Individuals whose income is below the poverty level	8.0

* Data extracted from www.census.gove/quickfacts/fact/table/santarosacitycalifornia,US/AGE775218

Another population to consider during a wildfire are pets and large domestic animals. Many pets and large animals can face death or suffer injuries due to poor disaster planning by their human caretakers. During a wildfire, animals often become frightened and more difficult to handle, which can require more time to evacuate. Some emergency shelters and evacuation centers deny admission to pets for health and safety concerns and some people risk their lives and the lives of others to save their pets and animals.

2.1.2 Homes and Neighborhoods

The 2017 Tubbs and Nuns fires caused significant structure and property loss in the City. Prior to the Tubbs and Nuns fires, the City had an estimated 67,537 housing units (American Fact Finder; Accessed October 29, 2019 for 2016); unfortunately, the City lost approximately five

percent of the city's housing units due to the fire (After Action Report 2019). Over 41 percent of the structures destroyed during the Tubbs Fire were located outside of the City's designated WUI Fire Area in the Coffey Park neighborhood.

The rebuilding of this community began in earnest in 2018. All post-Tubbs and Nuns fires rebuilds from 2018 through December 31, 2019 are required to meet the City adopted and amended 2016 California Fire, Building and Residential Codes. Rebuilds beginning January 1, 2020 are required to meet the 2019 California Fire, Building and Residential Codes. However, homes rebuilt outside of City designated WUI Fire Areas, such as Coffey Park, are not required to meet the structural components (Building Code Chapter 7A and Residential Code, Chapter 3, Section R337) and defensible space requirements that would resist the intrusion of flames and burning embers. Because of this policy, structures outside of these WUI Fire Areas are likely more vulnerable to future wildfires.

Most housing in the City consists of single-family homes on lots that vary widely in size. As Figure 5 depicts, the greatest housing densities are in the Brush Creek, Northeast, Bennett Valley, East, Southeast, North, Coffey Park and central portions of the City. The areas with mostly lower structure density include Fountaingrove I, Fountaingrove II, Bridgewood, St Francis and Skyhawk, Oakmont, eastern edge of Summerfield, and southwest Santa Rosa. There are enclaves of lesser and higher density in each of these areas. Where homes are more tightly spaced, strong winds, and/or steeper slopes can cause a wildfire to spread from structure to structure as was observed in the Coffey Park area during the Tubbs Fire. Once ignited, structure fires threaten adjacent structures and improvements with their long burn time, intense radiant and convective heat, and the production of burning embers transported to other structures and fuels.

Whether a structure survives or not depends primarily on exterior construction material, structure design, housing density, placement relative to nearby homes, geographic location, and whether the structure has adequate defensible space.

Structures across the City vary from a mix of structures constructed prior to adoption of building or fire codes to modern structures following the most current building and fire codes. Currently, there is no data about the specific number of homes with wood shingle roofs, but several were observed on the Consultant's field visit. In addition to wood shake shingle roofs, factors that can result in the loss of structures in the City include:

- Wood exposures attached to homes, such as wooden fences, decks, and patio covers.
- Ineffective attic screens. Substandard or damaged screens will not prevent burning embers from entering, potentially causing ignitions in attics.
- Highly flammable ornamental and native vegetation create significant fire hazards when not properly maintained and watered, especially during periods of extended drought.
- Leaf and litter buildup occur in rain gutters that provide an ignition source for burning embers.

Figure 4 Wooden Fence Attached to Structure

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- There is potential for structure loss even outside of areas designated as "Very High Fire Hazard Severity Zones" or WUI. Fire modeling shows that burning embers from wildfires in the City can be carried by the wind over one mile away, so structures located within that distance that are poorly maintained, landscaped with flammable ornamental vegetation, and/or have rain gutters built up with flammable debris are at significant risk, even when a distance away from the fire.
- A structure's location on the terrain (e.g., midslope, mountain/hill-top).

The enactment of stringent building and fire codes can significantly reduce the potential loss of residential structures but will not completely eliminate the risk. Structure loss can still occur, even if structures and neighborhoods are built under modern fire-resistant building codes. A study of the 2007 fires in San Diego County indicated that the fires destroyed 13% of the homes within the fire perimeters. Homes built under building codes enacted in 2001 had a loss rate of 4%, while homes built under fire codes modified in 2004 had a loss rate of only 2% (Rahn 2009).

Wildfire can take a devastating financial toll on local homeowners. In 2019, the estimated median home value in the City is $567,900 per home (Zillow December 2019). In addition to the expense of rebuilding a home, there are repair or replacement costs for smoke damage, living expenses while rebuilding, re-landscaping costs, and replacement of personal belongings and vehicles.

2.1.3 Commercial Structures and Economy

The City has a mix of office and retail businesses attracting residents, employees, and visitors to these centralized service and entertainment opportunities. As described in the 2016 Local Hazard Mitigation Plan (Defined in Appendix A), Santa Rosa has about one-third of all businesses in the county.

In 2012, the U.S. Census estimates there were 16,588 businesses located within the City (United States Census, Accessed on 10/28/2019). The economy of the City employs approximately 85,800 people with the largest industry being health care and social assistance, which employs approximately 12,561 people (Data USA, https://datausa.io/profile/geo/santa-rosa-ca/, Accessed 10/28/2019,). Table 3 identifies the primary industry type and number in the City.

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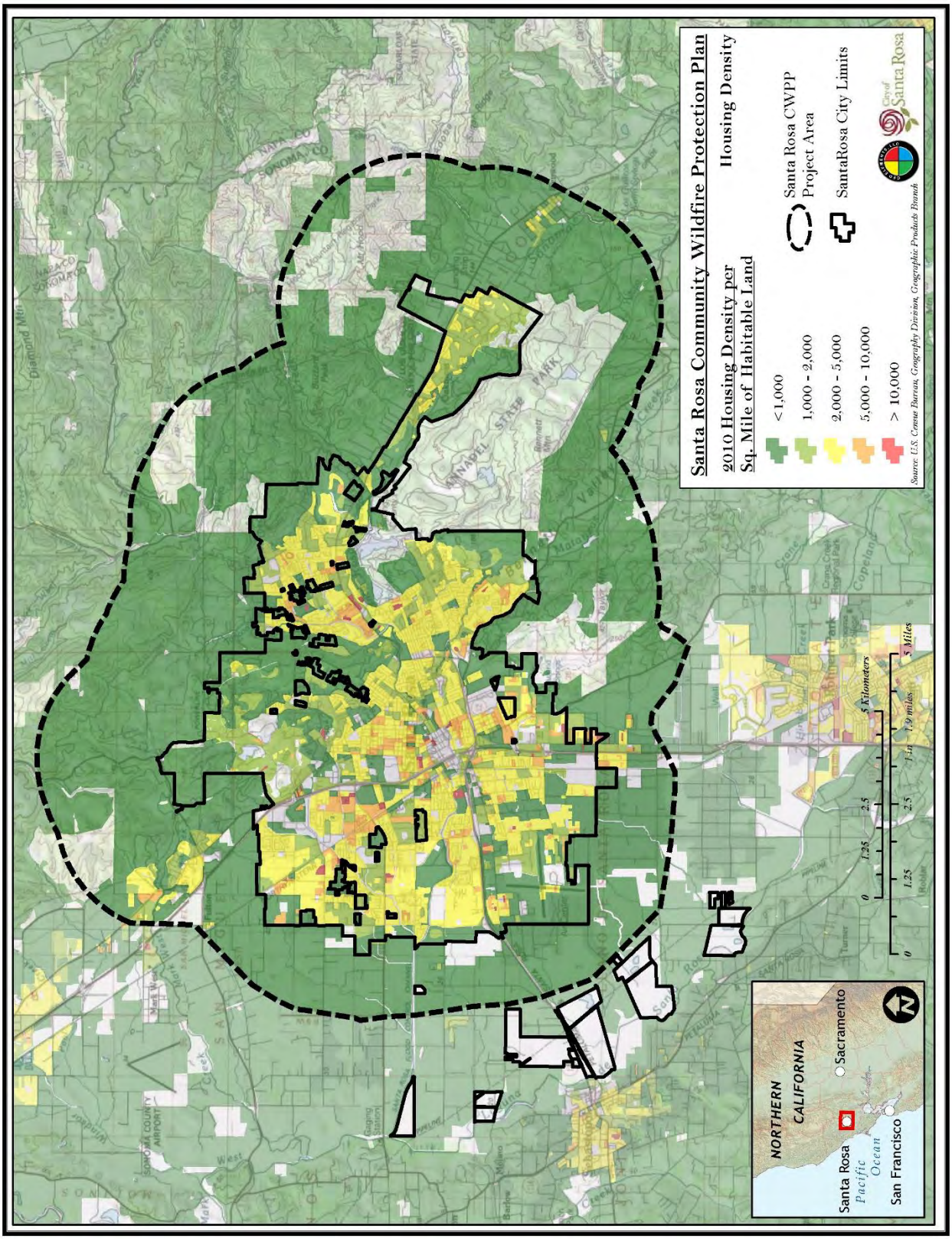

Figure 5. Housing density in the Planning Area.

*Table 3 Primary industry in Santa Rosa **

Industry Type	Number
Agriculture, forestry, fishing and hunting, and mining	1,779
Construction	6,001
Manufacturing	9,522
Wholesale trade	2,775
Retail trade	10,726
Transportation and warehousing, and utilities	2,880
Information	1,168
Finance and insurance, and real estate and rental and leasing	5,165
Professional, scientific, and management, and administrative and waste management services	9,475
Educational services, and health care and social assistance	18,706
Arts, entertainment, and recreation, and accommodation and food services	9,286
Other services, except public administration	5,183
Public administration	3,149

*Table data from Facts Finder, https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml; Accessed 10/28/2019

Destructive wildfires can significantly impact the economy of affected communities. The 2017 Tubbs Fire destroyed two hotels, a winery, a department store, and restaurants - and disrupted business for both small and large employers. This disruption in business and commercial services affected business owners and their employees. Economic losses in Santa Rosa were estimated at $1.2 billion (2017 USD), while suppression costs for the Tubbs Fire are estimated at $100 million (Wikipedia 2020).

2.1.4 Critical Infrastructure

Wildfires can damage or destroy critical infrastructure, such as utility lines, transportation systems, communication facilities, storm water pipes, and water distribution systems. The repair, restoration, or replacement of infrastructure can sometimes take weeks or months following a wildfire and cost thousands or millions of dollars. Post-fire rehabilitation of critical infrastructure and restoring basic services after a disaster is a top priority for public agencies and utility companies. These entities can incur significant repair, restoration, and rehabilitation costs after

a wildfire including the cost of maintenance and damage assessment teams, field data collection, watershed rehabilitation and restoration efforts, preparation for future potential floods, replacement or repair of utility supply lines, and replacement or repair of roads, guardrails, bridges, signage, culverts, and landscaping.

The 2016 Local Hazard Mitigation Plan (LHMP) team identified 180 critical facilities for incorporation into its hazard vulnerability and risk analysis. The list of critical facilities summary of facility types and numbers can be found in Table 4 (LHMP 2016). Figure 6 depicts critical infrastructure within the Project Area.

Table 4 City of Santa Rosa Summary of Critical Infrastructure

Facility Type	Number of Facilities
City	16
Fire	12
Government Center	4
Health and Hospitals	12
Schools	58
Utilities	78

2.1.5 Natural and Historic/Cultural Resources

Wildfire can create a range of responses of natural, historic and cultural resources to wildfire and can vary from no effect to those that are temporarily altered to damaged and/or destroyed permanently, especially in the case of historic and cultural resources.

Natural Resources

Natural resources damaged by wildfire can take years to recover and can require significant and unique restoration activities. Additionally, post-fire events such as flooding can create significant damage to watersheds and additional damage to habitat. Subsequent impacts may also include an increase in invasive species and erosion.

The environment of the Project Area includes a variety of natural resources and environmentally sensitive areas that exemplify key natural resource values. The Santa Rosa Plain, situated at the heart of the Laguna de Santa Rosa watershed, is rich in natural resources including a vast oak savannah grassland with vernal pools and swales that support endemic plants and animals. Additionally, Laguna de Santa Rosa is a major tributary to the Russian River watershed that supplies drinking water and water for agricultural purposes.

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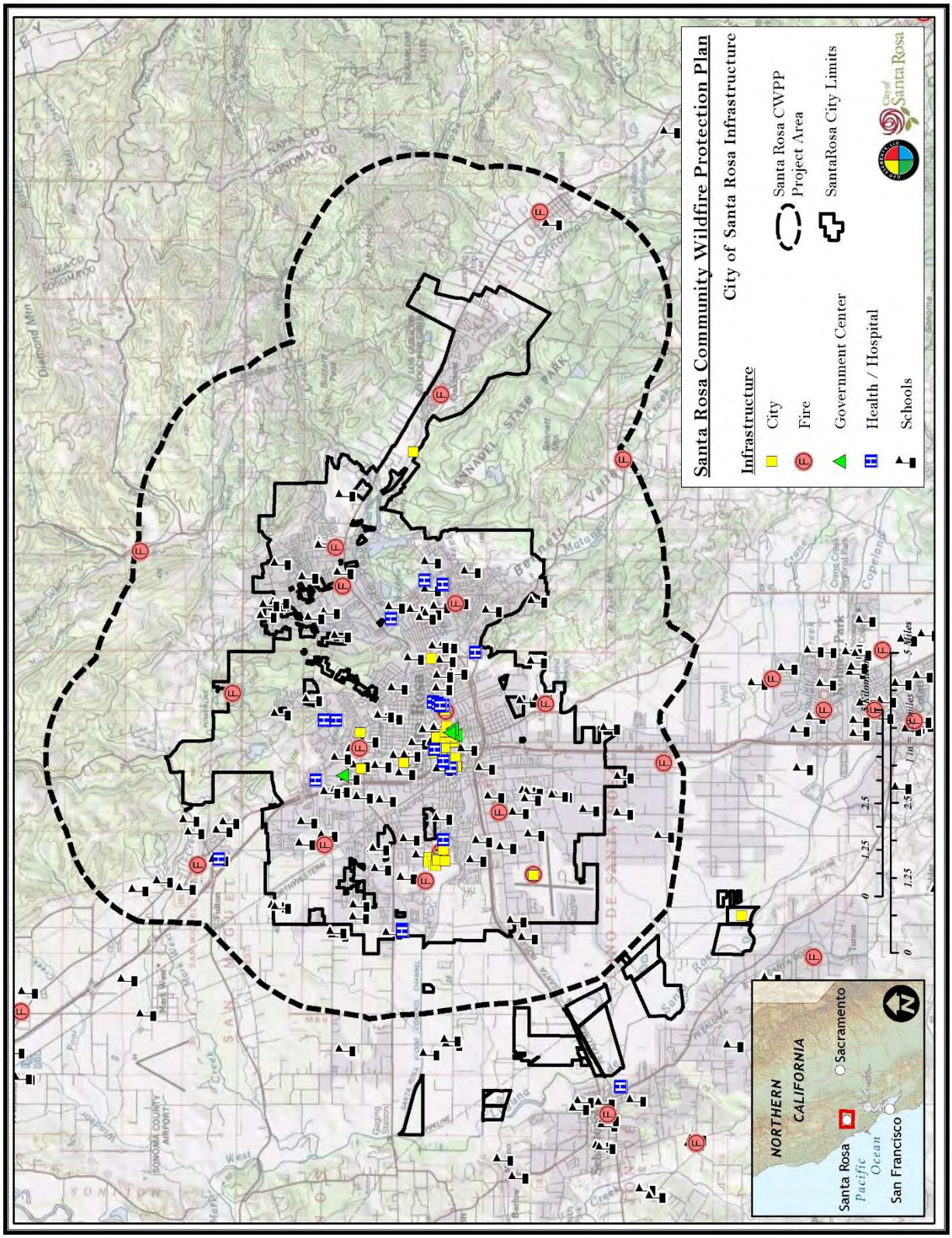

Figure 6. Critical infrastructure in the Planning Area.

Within the Project Area under the federal Endangered Species Act, six species are listed as *endangered* and two species are listed as *threatened*, as follows:

Endangered	Threatened
California tiger salamander	Coho salmon
California coastal Chinook salmon	California coast steelhead
Many-flowered navarretia	
Sebastopol meadowfoam	
Sonoma sunshine	
Burke's goldfields	

Cultural/Historic Sites

Santa Rosa has a rich history of Native American habitation dating back approximately 7,000 years. A 2001 review of records and literature on file with the California Historical Resources Information System indicated that Santa Rosa contains 190 recorded Native American cultural sites. These sites tend to be located near waterways, as well as along ridge tops, midslope terraces, alluvial flats, the base of hills, and near vegetation ecotones. Known Native American resources includes chert or obsidian flakes, projectile points, mortars, pestles, dark friable soil containing shell and bone dietary debris, heat-affected rock, and human burials.

Remnants of Native American civilization have been discovered along Santa Rosa Creek and its tributaries, in the Trione-Annadel State Park, and in the Laguna de Santa Rosa. The remains of entire settlements, including three former villages, have been found in northern Santa Rosa. Given the archaeologically rich setting of the Santa Rosa area, and the amount of unsurveyed land (at least half of the General Plan Planning Area has not been surveyed for archaeological resources), there is a high potential for finding additional Native American sites in Santa Rosa.

Santa Rosa has a rich architectural heritage spanning many periods, with Mexican Period adobes, 19th century Gothic, Greek Revival and Italianate houses, turn of the century Stick/Eastlake styles, early 20th century Craftsman and California bungalows, 1920s Spanish Revival, and 1930s art deco buildings.

The City has an eclectic collection of differing styles and periods that are represented by numerous well-preserved structures. Some of the more notable historic resources include the Luther Burbank Home and Gardens, Sonoma County Museum (United States Post Office), DeTurk Round Barn, Church of the One Tree, Carrillo Adobe, Fountaingrove Winery, and Santa Rosa Air Center and its compass rose.

There are twenty-one historical landmarks and eight designated historic preservation districts within the City (Figure 7). Historic preservation districts include Santa Rosa's historic districts, Cherry Street, Saint Rose, Olive Park, Railroad Square, West End, McDonald, and Burbank Gardens and Ridgway.

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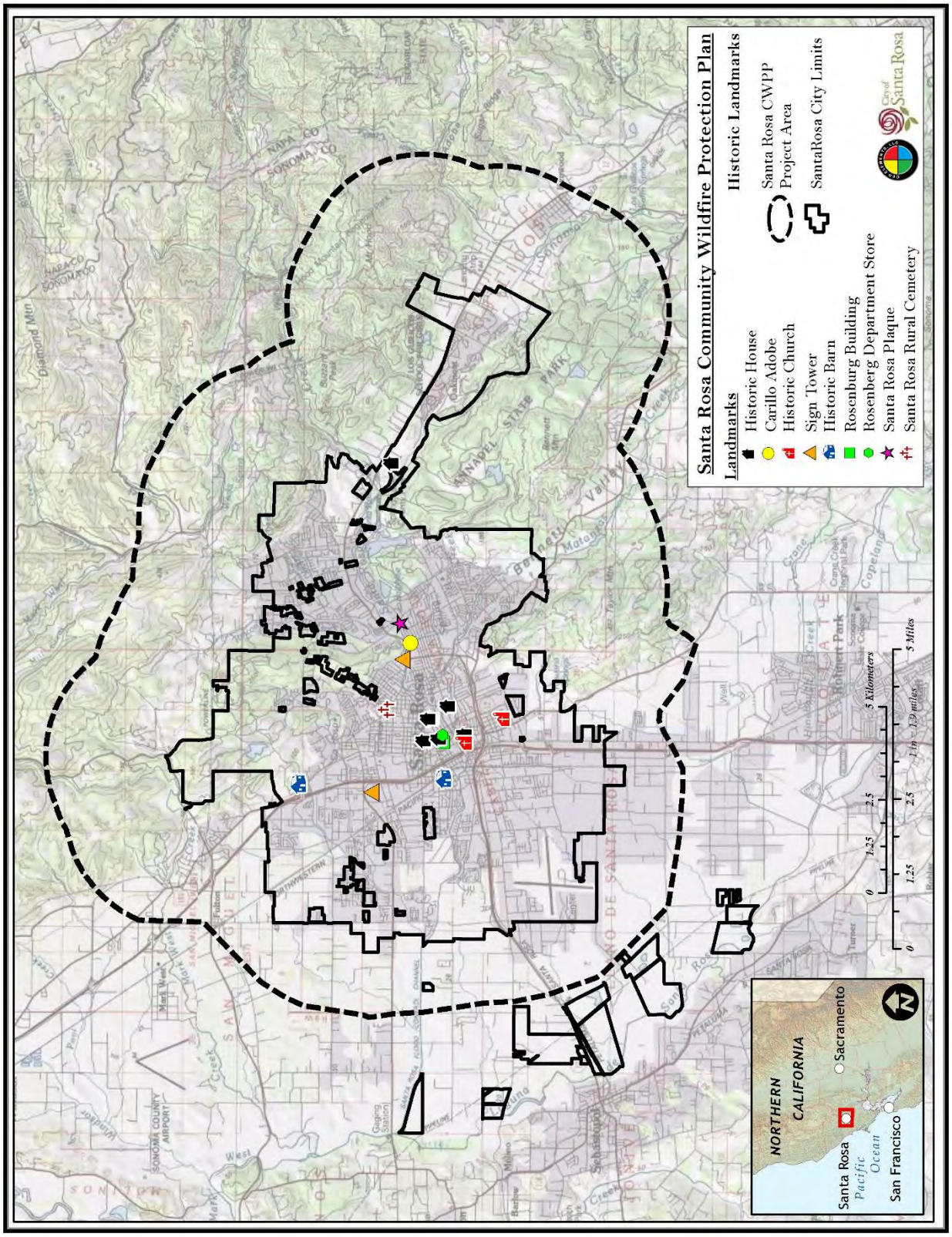

Figure 7. Historic and cultural resources in the Planning Area.

Significant historic buildings in the City include Carrillo Adobe, Church of One Tree, Comstock House, De Turk Round Barn, John Cnopius House, Hotel La Rose, Luther Burbank House and Gardens, McDonald Mansion, Old Post Office, Park Apartments, Rosenberg's Department Store, Sweet House, The Gables, Wasserman House, W. H. Lumsden House, William Hood House – (https://srcity.org/398/Historic-Preservation and City of Santa Rosa General Plan).

Figure 8 Luther Burbank House

Fire protection planning should include awareness and understanding of the inherent risks that wildfire poses to these assets. Protection of these sites during fire suppression and hazard mitigation activities is mandated under the National Historic Preservation Act.

2.2 Land Use and Zoning

Land use and zoning decisions made in the City's General Plan play an important role in the physical growth and development of a community. Incorporating wildfire resilience into local planning efforts by adopting and enforcing wildfire-specific building codes in areas of high wildfire hazard through land use and zoning regulations can reduce the impacts of wildland fire to the City.

The current City of Santa Rosa General Plan 2035 was adopted in 2009; however, in 2019 the City began a multi-year process to update its General Plan, known as Santa Rosa 2050. In the current General Plan, the definition of Land Use is the "The occupation or utilization of land or water area for any human activity or any purpose defined in the General Plan".

Within the City's WUI Fire Area, the existing General Plan identifies properties as *Very Low* and *Low Density Residential* as the required housing density requirement, with a considerably smaller number of properties identified as *Medium Density Residential*, *Office*, *Business*, *Light Industry*, *Public/Institutional*, and *Open Space*. These requirements include unincorporated enclaves of the County surrounded by City lands. Table 5 provides the number of properties within each Land Use Category based on the Parcel Assessor GIS data.

> *Note: Coffey Park and City lands to the east of the Fountaingrove WUI Fire Area were significantly affected during the 2017 Tubbs Fire and again threatened during the 2019 Kincade Fire. These areas are outside the designated City WUI Fire Areas, but ninety-seven percent of the area has Land Use designation as Low Residential with a less parcels designated as Retail and Business Service, Mobile Home Park, and Office.*

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*Table 5 Number of Properties within Each Land Use Category **

General Plan Land Use Category	Number of Parcels	Percentage
Low Residential	5,500	56.79%
Very Low Residential	3,728	38.49%
Medium Density Residential	116	1.20%
No Classification Shown (vacant)	91	0.94%
Retail & Business Services	80	0.83%
Parks and Recreation	66	0.68%
Office	38	0.39%
Public/Institutional	29	0.30%
Open Space	10	0.10%
Retail/Medium Residential	10	0.10%
Multiple	8	0.08%
Business Park	6	0.06%
Light Industry	3	0.03%
Total Number of Parcels	9,685	100.00%

**City of Santa Rosa Assessor's data*

Zoning is more detailed than Land Use and outlines a property's specific allowable use and establishes regulations governing the use, placement, spacing, and size of buildings, open spaces and other facilities. The City outlines zoning requirements through the designation of Zoning Districts in the General Plan 2035.

The Zoning District designates the majority of properties within the WUI Fire Area as Planned Development, Single-Family Residential and Rural Residential. A much smaller percentage of properties are designated as *Multi-Family Residential*, *County Rural Residential and Commercial*, *Open Space*, and *Public/Institutional*. The City zoning codes provide specific requirements for development of properties within the WUI Fire Area. Table 5 provides the number of properties within each Zoning District based on the Parcel Assessor GIS data.

> *Note: Zoning District designations for Coffey Park and City lands to the east of the Fountaingrove WUI Fire Area are largely Planned Development and Single Family Residential. A smaller number of properties are designated as General Commercial, Rural Residential, Mobile Home Park, Medium Density and Multi-Family Residential and Office Commercial.*

2.3 Fire Protection

The ability to muster a timely and robust response to a wildland fire can influence the eventual impacts of that fire on a community. SRFD has multiple jurisdictional responsibilities besides wildland fire suppression including emergency medical services, structure fire suppression, hazardous materials incidents, inspection and permitting, code enforcement and building plan permitting. In 2015, wildland fire responses represented only 0.51% of 25,109 of the Department's total emergency response workload (Emergency Services Consulting International 2016).

2.3.1 Available Resources

The City staffs a total of 16 agency-owned type 1 engines, plus hosts an additional OES type 1 engine. On regular staffing days, the Department has 10 type one engines in service with a minimum of three firefighters, as well as two truck companies staffed with four firefighters. A type 3 and type 6 wildland engine as well as a water tender are available for staffing on high fire danger days. A minimum of one Chief Officer is on duty daily to provide operational oversight.

A typical first alarm wildland fire response from the Department includes two engines and a Chief Officer. This response level meets the "Critical Tasking" guidelines found in the Department's most recent Standards of Coverage analysis.

While the Department is able to muster a first alarm response to a reported wildland fire, the location of the fire may be such that fire equipment from an adjoining agency may be positioned closer to the reported fire location. In these situations, the Department uses automatic aid agreements with Sonoma County Fire District or Kenwood Fire Protection District to assure the closest firefighting resources are sent to the reported fire. The recently created Sonoma County Fire District (SOCO Fire) includes the former Bennett Valley, Mountain Volunteer, Rincon Valley and the Windsor Fire Protection Districts and has jurisdictional responsibility for non-wildfire emergency services in much of the area surrounding the City.

In 2006, CAL FIRE and the City entered into the "Santa Rosa Area Mutual Threat Agreement" that provides for a CAL FIRE response onto LRA lands identified in the agreement (Figure 9). Wildfires reported within the defined "mutual threat zone" allows the City to leverage the considerable firefighting resources of the State of California, including aircraft. Based on fire danger, various dispatch levels have been established in the agreement that define the number and kind of resources that CAL FIRE will send to a reported wildfire. Table 6 summarizes the initial attack response from the State.

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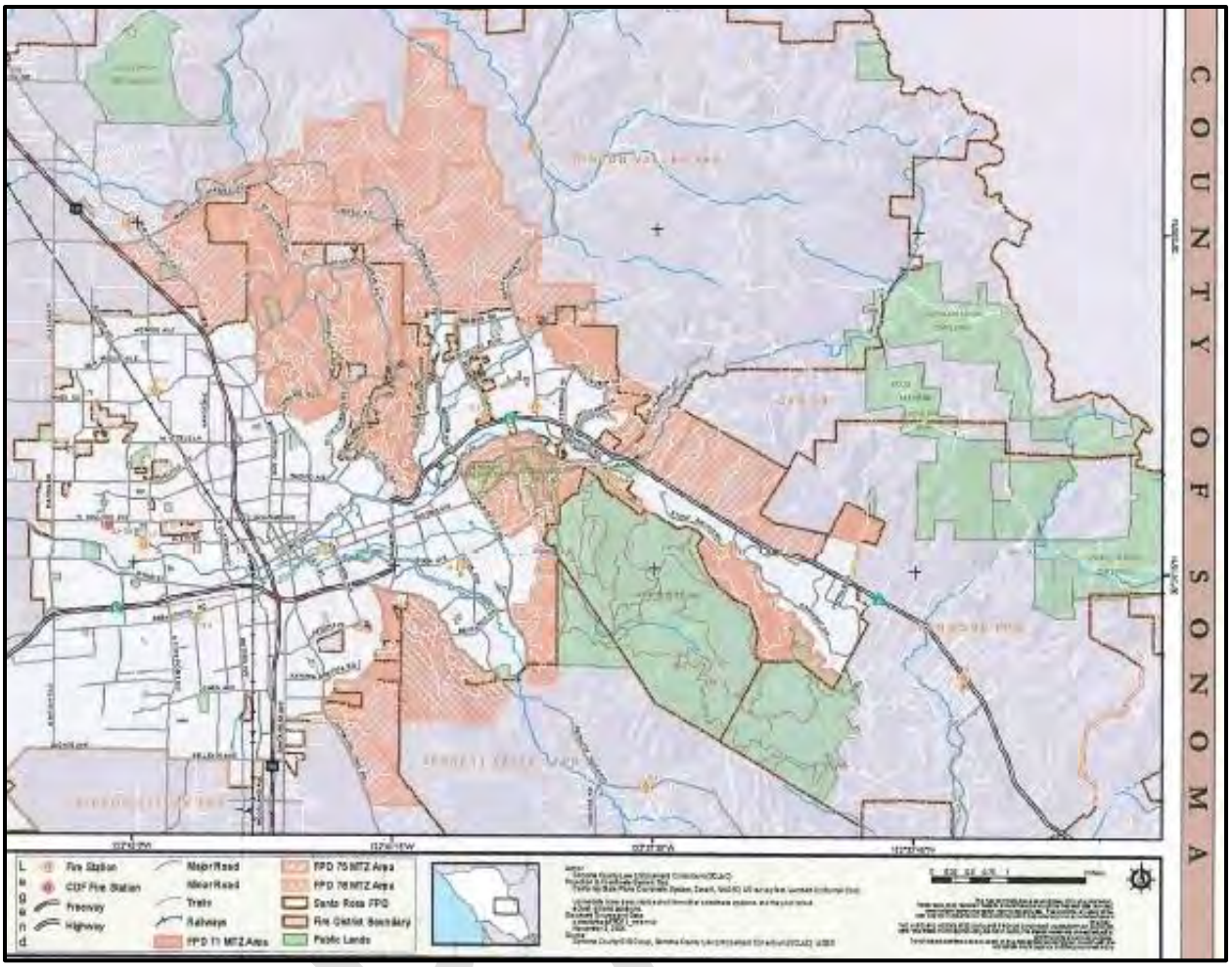

*Figure 9 Santa Rosa Mutual Threat Agreement, Threat Zone Map. **

*The salmon colored areas in Figure 9 represent locations where CAL FIRE will respond to a reported wildland fire on Local Responsibility Areas lands within and adjacent to the City.

Table 6 CAL FIRE Initial Attack Resources Dispatched under the Santa Rosa Mutual Threat Agreement

Dispatch Level	Resources						
	Engines	Crews	Helicopters	Air Tankers	Air Attack	Dozers	Chief Officers
Low	1	-	-	1	-	-	1
Medium	4	1	1	1	1	1	1
High	5	2	1	2	1	2	1

The City is located within Battalion 1410 of CAL FIRE's Sonoma Lake Napa Ranger Unit (LNU), with Stations 41 (Santa Rosa) and 46 (Glen Ellen) as the two closest CAL FIRE stations to the City.

2.3.2 Agreements

Automatic aid agreements with nearby fire agencies allow the Department to assure that the closest available fire resource is dispatched to a reported wildland fire. Currently the Department has automatic aid agreements with Sonoma County Fire District, Kenwood Fire District, and CAL FIRE.

A. *Master Mutual Aid*

Managed by the California Office of Emergency Management (CAL OES), the California Disaster and Civil Defense Master Mutual Aid Agreement of 1950 allows local governments to request assistance from other signatories to the Agreement without having to reimburse the supporting department. This agreement is "reciprocal" in that Santa Rosa, as a signatory, would not receive a reimbursement from another local government agency who might receive support from Santa Rosa Fire when their resources are mobilized under this Agreement. The City lies within CAL OES Area Region II, North.

B. *Assistance by Hire*

Where agreements do not exist for firefighting resources, requests for these resources can be placed by field Incident Commanders through the Redwood Empire Communications Authority (REDCOM). These requests will be relayed to the OES Operational Area to be fill if possible, then elevated to the OES Coordinator at the Northern California Coordination Center if the Operational Area cannot meet the needs of fire commanders. These equipment orders will be paid for by the requesting fire agency, or the cost of the equipment may be shared in a Cost Share Agreement with other jurisdictionally involved fire agencies.

C. *California Master Cooperative Wildland Fire Management and Stafford Act Response Agreement (CFMA, 2018-2023)*

The principal multi-agency agreement in California that documents a commitment to improve fire management efforts by facilitating the coordination and exchange of personnel, equipment, supplies, services, information and funds among participating agencies. Only wildland fire and non-wildland fire emergencies or Presidentially declared disasters are covered. The City is not party to the CFMA agreement; however, the City is intermingled with and/or adjacent to SRA land where this agreement may apply.

2.3.3 Responsibility Areas

Wildland fire protection in the State of California is the responsibility of the state, local, or federal governments. These fire protection responsibility areas identify areas of legal responsibility for fire protection, including State Responsibility Areas (SRA), Federal Responsibility Areas (FRA), and Local Responsibility Areas (LRA) (Figure 10).

- *Local Responsibility Areas (LRA)*
  These areas are private lands outside of watershed areas designated by the state or lands incorporated into cities. City fire departments, fire protection districts, counties, and CAL

FIRE under contract to local governments typically provide fire protection for these areas. SRFD is responsible for fire protection of LRA in the City.

- *State Responsibility Areas (SRA)*
  SRA is the area of the state where the State of California is financially responsible for the prevention and suppression of wildfires. SRA does not include lands within incorporated city boundaries, fire protection districts, or in federal ownership.

- *Federal Responsibility Areas (FRA)*

  The primary financial responsibility for wildfire suppression and prevention on federal lands is that of the federal government through the United States Forest Service, Department of the Interior - Bureau of Land Management, National Park Service, Fish and Wildlife Service, Bureau of Indian Affairs, and Defense Department for military lands.

Table 7 Project Area Fire Protection Responsibility

Responsibility	Acres	Percent of Project Area (%)
FRA	8.72	0.01
SRA	34,223.49	47.21
LRA	38,264.66	52.78
Grand Total	72,496.87	100.00

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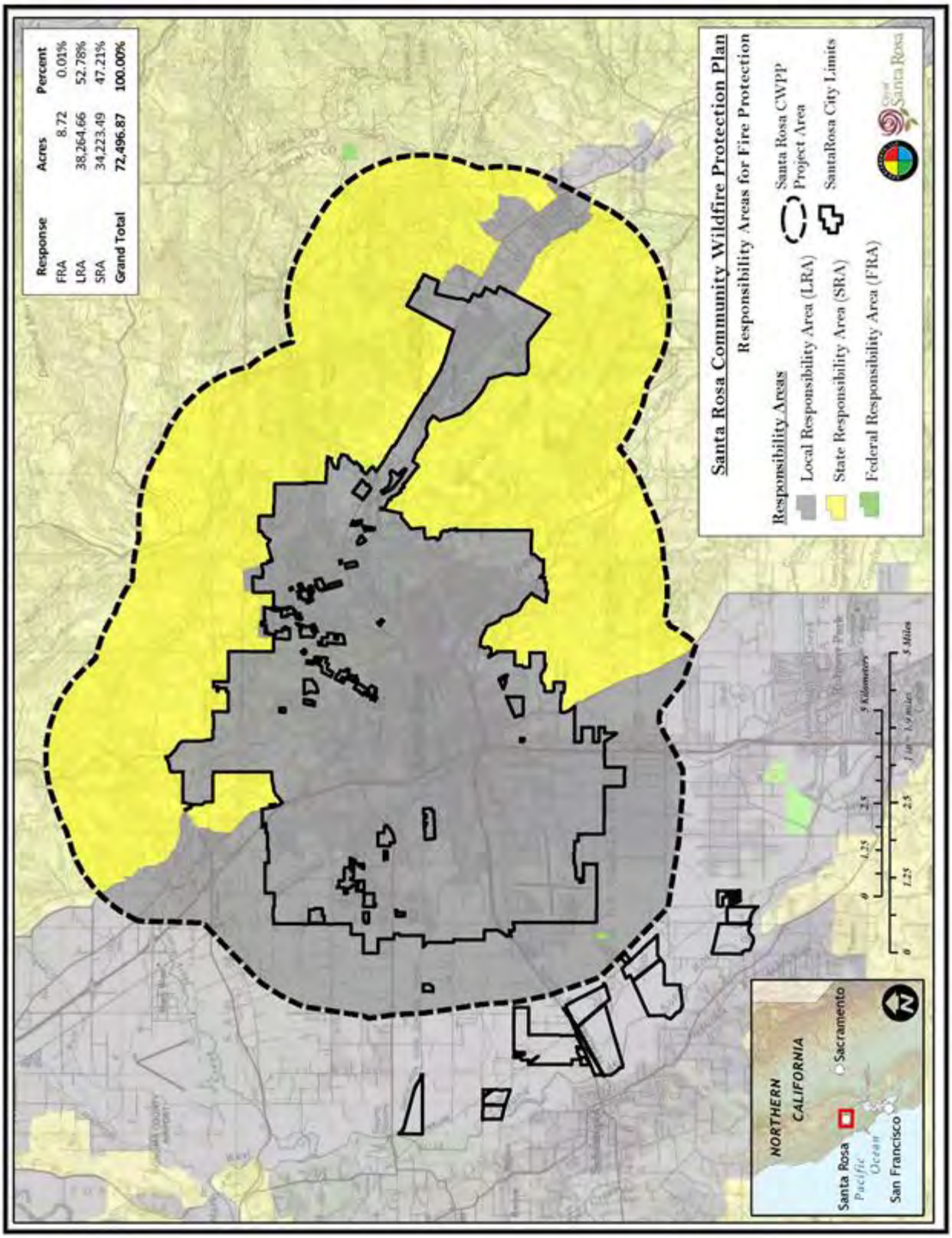

Figure 10. Federal, State, and Local Response Area responsibilities.

SECTION 3. DEFINING THE WILDFIRE PROBLEM

Each year nationally, firefighters combine efforts to successfully contain approximately ninety-seven percent of wildfires at less than ten acres. This success is a direct result of favorable weather and fuels conditions, early fire reporting, and a rapid and aggressive fire suppression response. However, when an ignition occurs during unfavorable weather and fuel conditions, or when firefighting assets are committed to fighting simultaneous wildfires, a new fire has the potential to escape the efforts of initial attack firefighters.

The probability of a catastrophic wildfire occurring at any particular location within or adjacent to the Project Area is dependent on a chain of events that includes fire ignition, fire weather, fuel, heat transfer, topography, fire behavior, suppression actions taken, and the interaction of these factors. To understand the wildfire problem in the Project Area requires an understanding of fire ecology, the expansion of the human development into wildland areas, the influences of a changing climate, fire history, and the wildland fire environment.

3.1 Fire History

Large destructive wildfires have been relatively infrequent in the region. However, because the atmospheric conditions that the produce autumn northeast wind events which facilitate large fires are mesoscale events (that occur simultaneously across most of northern California), many large fires often burn concurrently across the region. This is evident in fire history of Sonoma County and the surrounding counties (Figure 11). Most of these fires, and particularly the largest ones, ignite outside the Planning Area during a strong east wind event in autumn and burn into the city (Table 8).

Table 8. Wildfires within and adjacent to CWPP Project Area.

Fire Name	Date	Fire Size (acres)	Structures Destroyed/Damaged	Fatalities/Injuries
Kincade	October 2019	77,758	374 destroyed/60 damaged	0 fatalities/4 civilians and firefighters injured
Nuns	October 2017	54,382	1,355 structures destroyed/172 damaged	3 fatalities
Tubbs	October 2017	36,807	5,643 structures destroyed/317 damaged	22 fatalities
Lofty Perch	June 2003	42	1 destroyed	0 fatalities/several firefighters injured
Hanly	September 1964	55,961	Almost 149 destroyed	0
Nuns Canyon	September 1964	9,808	~20 destroyed	0

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Airport Fire	September 1939	~500	13	0
Mayacamas Fire	September 1923	Unknown	Many	Unknown
The Great Fire	October 1870	Unknown	~10+	Unknown

The 2017 fires were part of a series of fires along the north coast of California that burned under the same mesoscale weather pattern in October 2017, producing 60-80 mph northeast winds in the Sonoma and Napa Valleys. While the larger complex that came to be known as the Central LNU Complex or Wine Country Fires included ten large wildfires across two counties, the most destructive fire impacted Santa Rosa: the Tubbs fire, which ignited on October 8, 2017. There were additional complexes across a total of six counties.

The Tubbs Fire began to the east of Santa Rosa, near Tubbs Lane in Calistoga, just prior to 10 p.m. local time. CALFIRE ultimately determined the official cause as the malfunction of a private electrical system. Within just a few hours the fire had run several miles driven by the hot and dry katabatic winds. The fire ultimately consumed 5,643 structures, including homes and several large commercial buildings, across 36,807 acres. Due to both the speed of fire spread and the fact that it began at night, evacuation was compromised, and 22 people lost their lives. Once the Tubbs Fire moved into the suburban edges of Santa Rosa, it transitioned from a fire driven primarily by wildland vegetation into a running urban conflagration, with structures serving as the primary fuel and producing considerable ember cast given the high winds. This also facilitated the fire jumping US Highway 101 and burning over a thousand homes in the Coffey Park neighborhood of Santa Rosa, an area not previously considered at-risk to wildfires, and not designated as part of the WUI (but which was burned previously in the 1939 Airport Fire).

3.2 **City of Santa Rosa's** Wildland Fire Environment

The interaction of fire ecology, climate, weather, fuels, and topography all affect the likelihood of a fire starting, the speed, direction and intensity of the fire and the resistance to firefighting control efforts. This section describes the wildland fire environment within and surrounding the City.

3.2.1 Fire Ecology

The Planning Area sits in the Santa Rosa Plain, just west of the southern end of the Mayacamas Mountains in California's northern coastal ranges. This area is characterized as a Mediterranean climate, albeit at the very northern end of the California coastal Mediterranean landscape, and the vegetation communities are similarly described. The region is characterized by substantial land cover change from pre-European settlement, when indigenous people populated the region. However, the two primary cover classes remain extensive. Mixed oak woodlands carpet much of the terrain above the valley floor, where they have dominated for centuries, and are primarily comprised of coast redwood trees (*Sequoia sempervirens*) and several oak species (*Quercus* sp.).

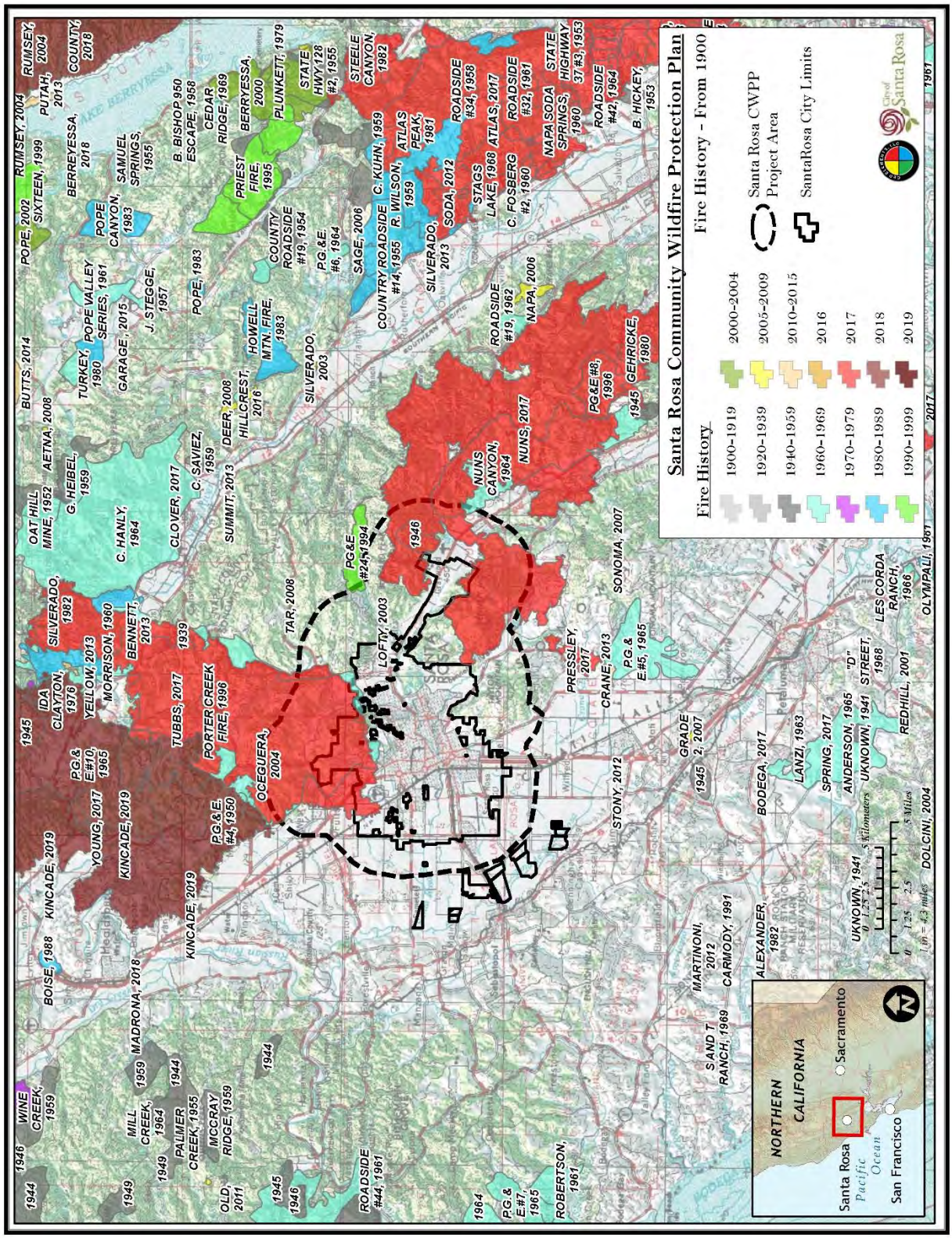

Figure 11. Fire history for Planning Area.

Chaparral shrublands tend to prevail across the drier, southern aspects and where soils are insufficient to support trees; they form a mosaic within the larger oak woodland complex that dominates the region. The majority of area burned across the Planning Area is associated with infrequent large fires, the growth of which is supported by Diablo wind events (sometimes called Foehn winds). Native species are strongly fire-adapted; either through epicormic resprout, fire-resistant bark, resprout from root systems, or dormancy during fire season. Eucalypts and many of the invasive and landscaping grasses and shrubs are the source of embers that facilitate spread in wind-driven fires (subsequently facilitating structural fires that produce more embers); this is in contrast to the native redwood and oak trees that demonstrate relatively low ember propagation capacity due to their physiology and fire adaptation.

3.2.2 Climate Change

Nearly all wildfires in the region are human-caused, and the marine layer and associated cooler conditions and higher relative humidity produce conditions that are less conducive to both ignition and fire spread in the area, particularly during the hottest portions of summer. This yields a distinct bimodal fire regime in the coast ranges of California, wherein the summer fire season is associated with a high number of ignitions from a relatively higher level of human activity in wildlands, while the autumn fire season is associated with fewer ignitions and fire activity, but larger, more destructive wildfires driven by the Diablo winds. Summer fires have historically been characterized by hot conditions and fire behavior driven primarily by fuel connectivity and topography within and around Santa Rosa, with slow-growing fires easier to suppress.

By contrast, large autumn fires grow rapidly as they are pushed by 60+ mph east/northeast Diablo winds; such winds not only desiccate vegetation and woody debris, priming them for explosive fire behavior, but also produce substantial ember cast and long-range spotting ahead of the main flaming front. Such autumn east wind events are more commonly associated with the Santa Ana fires of southern California, however, a particularly dry autumn with delayed onset of precipitation has been the driver of several large, destructive, and fatal wildfire events along the northern California coast.

Santa Rosa has warmed 2.1° F since 1895 (Figure 12). The highest amount of warming has occurred in the winter months, with substantial increases in both daytime highs and nighttime lows in the December-January-February climatological winter. Moderate warming has occurred in spring (March-April-May) and autumn (September-October-November), with the increase in autumn more pronounced. Summer (June-July-August) has seen the least warming during the period. Warming trends generally support anecdotal observation from fire suppression personnel that fires are more active at night now than they have been in the past, which is consistent with reduced nighttime relative humidity recovery from elevated temperatures.

Reduced nighttime humidity recovery across spring, summer, and fall seasons is a contributing factor to an observed trend towards increased fire danger in California more broadly, specifically because fuel aridity is greater, and fuels are less resistant to fire spread (Abatzoglou and Williams 2016). When a katabatic wind event develops in conjunction with low fuel moisture (i.e., high

fuel aridity) there is a greater probability of rapid fire spread and the development of substantial ember cast and pre-heating ahead of the main fire front.

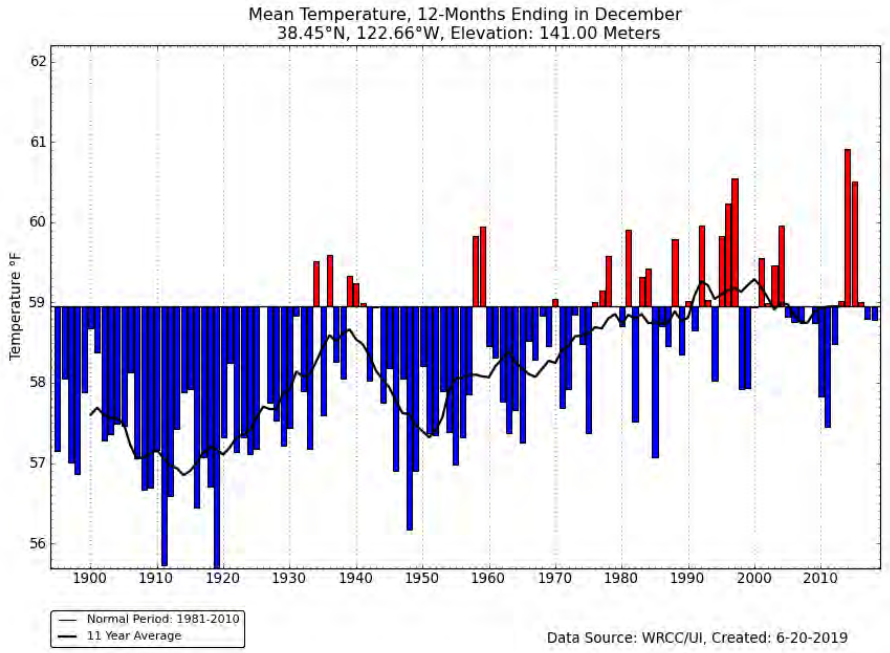

Figure 12. Mean annual temperature for the Planning Area based on January-December average, from 1895-2018. Bar color and direction indicate above and below the 1981-2010 average temperature. From the WestWide Drought Tracker (https://wrcc.dri.edu/wwdt/time/).

For the Planning Area, where the most destructive wildfires have occurred in September and early October, long-term trends indicate that mean September temperature is warming at a greater rate than the annual average over 12 months (Figure 13). There is a projected temperature increase of an additional 2-3° F by the year 2040 and 4-6° F by the year 2060 (Abatzoglou 2013) (Figure 10). These projections are based on over 20 different global climate models that all model the atmosphere in a slightly different way and have different uncertainties, so the given range represents what is called a "multi-model mean," or the area of highest certainty and agreement between models. The mean increase in temperature occurs across all seasons and includes increases in both daytime highs and nighttime lows, but the highest increases are in summer and autumn.

In contrast to high relative certainty that temperatures will continue to increase, there is less certainty about how climate change will influence precipitation. Model projections suggest that cumulative precipitation will remain relatively consistent for each season and annually until the late 21st century. However, these model projections are simply cumulative rainfall for a given period, and do not reflect any chance in the number or intensity of precipitation events. A substantial body of scientific literature suggests that climate change is producing less frequent but more intense rainfall events, with longer dry periods between them. Changes in wind events, like the Diablo wind events that produce catastrophic fire danger in the planning area, are even more difficult to project into the future, with little model agreement on changes in frequency and intensity.

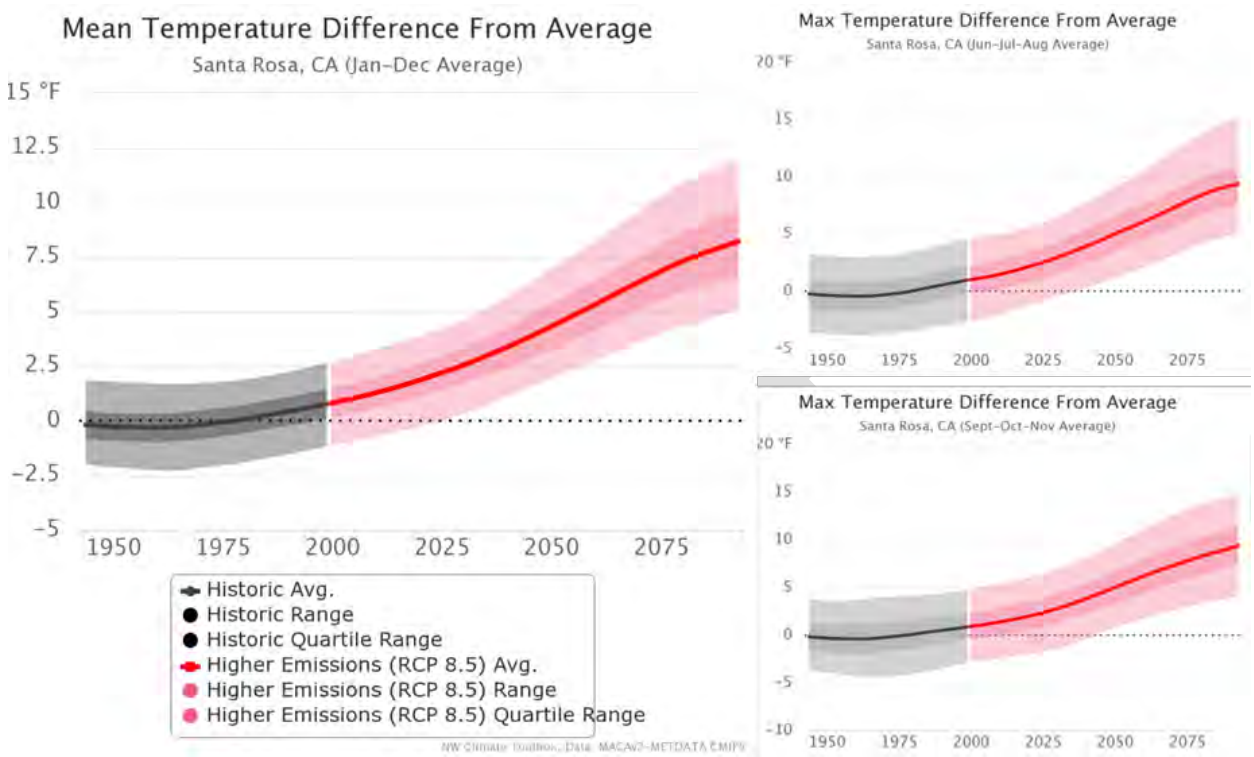

Figure 13. Projected change in average (left) and maximum temperature (daytime highs) for summer (right, top) and autumn (right, bottom) for Santa Rose through 2100.

3.2.2.1 Impacts of Climate Change

Historically, the Planning Area has seen relatively infrequent large fire events, due to two primary climatological conditions. First, the hottest climatological part of the year, summer, is also when the marine layer has the greatest influence in the region, effectively facilitating overnight humidity recovery that reduces the potential for rapid and catastrophic wildfire spread. Second, while the region is subject to the same upper-level atmospheric circulation patterns that govern the katabatic Santa Ana winds to the south, it historically has experienced much earlier autumn precipitation and higher fuel moisture levels in autumn when these winds develop, making the area less conducive to fire ignition and explosive fire spread. As noted previously, the large fire events have occurred when the onset of fall precipitation is delayed and a katabatic wind event occurs, creating hurricane-force winds that are extremely dry and hot.

Hotter and drier autumn conditions, particularly in September and October, have already been observed in the historic record and potential for increased frequency is greater under climate change. The frequency at which season-ending autumn precipitation is delayed and both live and dead fuel moistures remain at critically low levels into the autumn is projected to be greater under the projected changes in climate and produce lower mean fuel moistures (Figure 14).

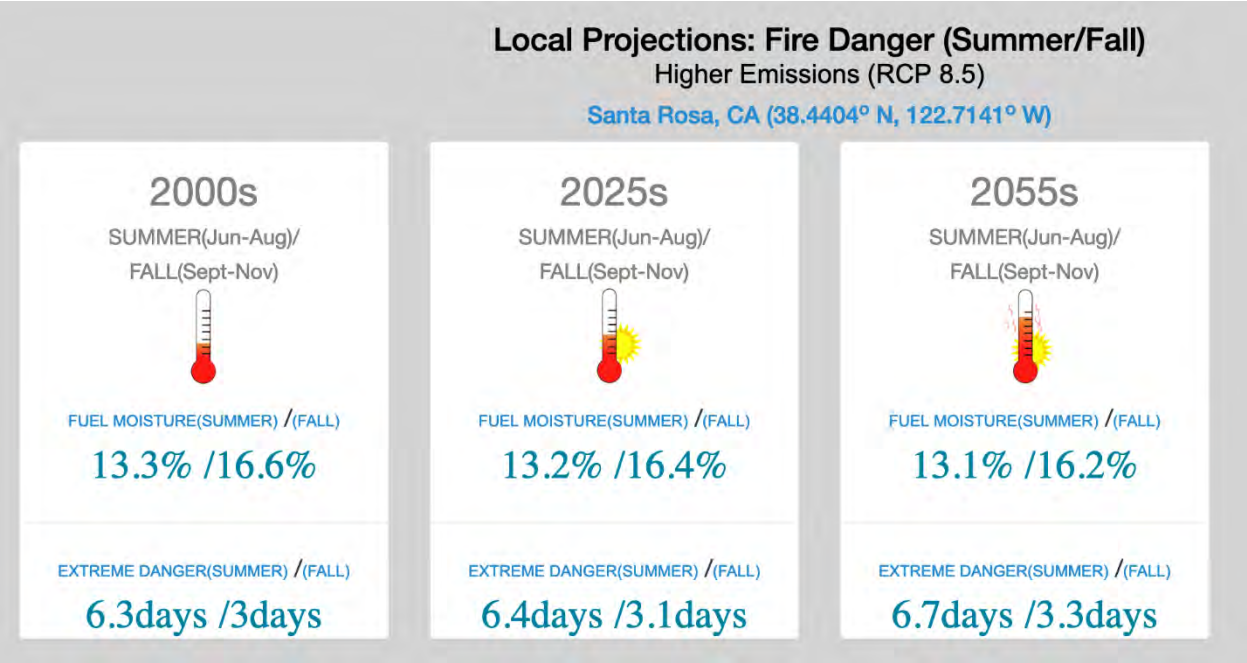

Figure 14. Projected change in average fuel moisture and the average number of days of extreme fire danger for the summer and autumn months for Santa Rosa based on global climate model outputs.

Hotter summers will likely increase summer fire potential, with some studies suggesting this will weaken the marine layer influence and increase summer fire danger. However, since summer heat waves in the region are not typically associated with east wind events, this increase in summer (and potentially even late spring) fire danger will likely increase fire frequency and behavior as fuel moisture drops and live vegetation desiccates; but is unlikely to produce fast-moving fires like the 2017 fires. These conditions were partially attributed to the size of the record 2018 Ranch Fire in the nearby mountains of the Coast Range to the east of the Planning Area.

3.2.3 Fire Weather

Weather is the most variable element in the wildland fire environment and the least predictable. The important components of fire weather are temperature, relative humidity, precipitation, wind and atmospheric stability. All of these elements have the potential to retard or enhance wildfire spread and intensity.

The average annual precipitation in the City and surrounding areas is 30.13 inches with the majority of the precipitation occurring between October and April. January is historically the wettest month of the year with rainfall averaging 6.2 inches (www.wrcc.dri.edu/, accessed August 2019). Since the City Rosa lies in an inland valley of the Coast Range, approximately 22 miles east of the Pacific Ocean, the intrusion of the marine layer inland brings low clouds and fog in the spring and early summer months. This retards wildfire spread during those time periods.

August is the warmest month of the year in the Planning Area with an average maximum temperature of 82.8° Fahrenheit (F). However, extremely hot temperatures can occur in Santa Rosa, with a high temperature of 107° F recorded at the Santa Rosa RAWS in September of 2017.

Diablo winds are offshore wind events that flow northeasterly over Northern California's Coast Ranges, often creating extreme fire danger for the San Francisco Bay and surrounding areas. Besides high wind velocities, two very important aspects of Diablo wind flow are the warming and drying of the air as it descends the lee of the mountain range (Bowers 2018). The Tubbs and Nuns fires of October 2017 burned under Diablo wind conditions. During the evening of October 8th and early morning hours of October 9th, winds were sustained at 26 miles per hour with gusts as high as 68 miles per hour. The average temperature and relative humidity for this period were 70° Fahrenheit and 6%. Diablo wind events are most frequent in the fall when fuel moistures are at their lowest levels, greatly increasing fire spread (Figure 15).

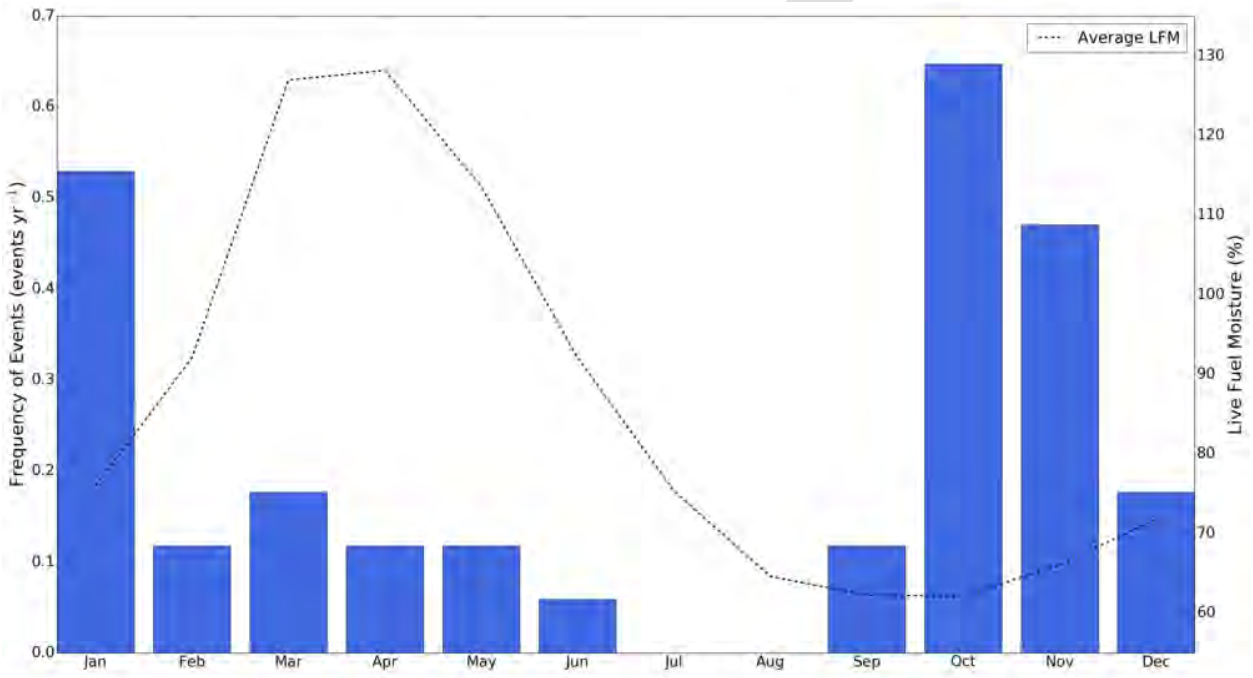

Figure 15 Monthly Frequency of Diablo Winds & Average Live Fuel Moisture Content (dashed line), Bowers, 2018)

3.2.4 Fuels

The 2017 wildfires greatly influenced the existing fuel conditions of the Project Area. Mature stands of chaparral, as well as mixed oak broadleaf forests and conifers were damaged by these wildfires. Post-fire vegetation recovery has been significant, aided by two winters of normal and above normal precipitation following the fires. Sprouting of native chaparral species is occurring and a large herbaceous grass crop of natives and non-natives species has developed across the Project Area. Fire department staff report that Scotch Broom (Cytisus scoparius) and French Broom (Genista monspessulana) has aggressively recovered post-fire and are out competing native vegetation, along roadways and other locations of disturbed soils. Recovery of native oaks post-fire has been poorer than anticipated by arborists who evaluated the oaks after the Tubbs and Nuns fires. An accumulation of dead fuels associated with dead and dying trees within these oak-dominated woodlands is found throughout the burn areas.

Fuels unburned in the 2017 wildfires have largely been undisturbed in more than 50 years. This has led to dense stands of vegetation in the foothill areas and open spaces of the community. Contiguous tree canopies with undergrowth are common in the unburned portions of the Project Area, creating heavy fuel loads within existing neighborhoods and along some primary travel routes.

In the City, median strips and freeway rights-of-way have significant grass fuel loads, which could be receptive to embers from a wind-driven wildfire. The presence of flammable vegetation in these areas weaken the ability of roadways to act as a physical barrier to fire spreading into the community.

3.2.4.1 Urban Fuels

Urban fuels consist of structures, ornamental vegetation, roads, and parking lots. The City has urban development encroaching into the wildland environment. Oakmont, Wildoak, Fountaingrove, Bennett Valley, Skyhawk and Montecito, each represent residential developments with a substantial wildland fuel component. While the Wildland Urban Interface map developed by the City captures most of the true interface locations, as the Coffey Park neighborhood demonstrated during the Tubbs Fire, a neighborhood does not have to be in a defined Wildland Interface Area to be susceptible to wildfire. A wildfire being pushed by strong winds has the potential to blow burning embers into urban neighborhoods, where ornamental vegetation or unhardened structures have the potential to transfer the wildfire from natural fuels to structures, which then propagate fire spread in an urban conflagration.

Open Space, Parks, and unimproved enclaves consist of wildland vegetation that provide recreational opportunities to residents of the City, lands preserved as open space and local, County and State Parks all provide a linkage of wildland fuels to the City. Even with as much of Trione-Annadel State Park was burned during the 2017 Nuns Fire, a heavy mixed oak and conifer fuel load remained unburned especially along Channel Drive south of Oakmont, and east of Summerfield Road in the vicinity of Annadel Heights. Spring Lake Regional Park has a well-maintained fuel component in the park, while the City-owned Howarth Park has a significant load of dead herbaceous fuels near areas of high recreational use, thereby increasing the likelihood of an accidental ignition within the Park boundaries.

Skyhawk Park and Parker Hill Open Space also are locations that bring wildland vegetation into the community. Fuel continuity in these locations will allow fire to spread into adjacent residential neighborhoods.

3.2.5 Topography

The least variable of any of the elements of the fire environment, topography still plays an important role in how winds and weather influence the fire environment, as well as influencing how fire spreads across the landscape.

Areas of the City west of Highway 101 are primarily flat with a mix of low density residential, light industrial and agricultural land uses. The topography west of Highway 101 begins a slow transition into the foothill of the Mayacamas Mountains where topography is represented by a

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series of steep undulating drainages bisected by short ridge systems. Windsor, Mark West Springs, Santa Rosa, and Matanzas Creeks make up the primary drainages of the Laguna de Santa Rosa Watershed, which feeds to the Russian River through the City.

No singular ridge system defines the Santa Rosa Plains, and no one dominate terrain feature controls local wind patterns. The hills between Sugar Loaf Regional Park and Mark West drainage are the most dominate physical feature dividing Santa Rosa from the communities of the greater Napa Valley, however, no singular local terrain feature influences wind, weather, or fire spread. The series of small-scale terrain features associated with the highly bisected landscape east of Highway 101 has the most significant local effect on fire spread.

Lacking a dominate feature to disturb wind flow patterns the City is exposed to the dominant gradient winds, especially during north winds events commonly associated with late summer and early fall. Without a dominant gradient wind, fire responds to the effects of a highly complex landscape where local winds and weather conditions would generally move fires away from the community.

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SECTION 4. A COMMUNITY AT RISK/WILDLAND URBAN INTERFACE

To help protect people and their property from potential catastrophic wildfire, the National Fire Plan directs funding to be provided for projects designed to reduce the fire risks to communities. A fundamental step in achieving this goal was to identify communities that are at high risk of damage from wildfire. These high-risk communities within the WUI were published in the Federal Register in 2001. At the request of Congress, the Federal Register notice only listed those communities that neighbored federal lands. The list represented the collaborative work of the 50 states and five federal agencies using a standardized process, whereby states were asked to submit all communities within their borders that met the criteria of a structure at high risk from wildfire.

With California's extensive WUI, the list of communities extends beyond just those adjacent to Federal lands. The California State Forester (also known as CAL FIRE Director) has the responsibility for managing the list and, in 2001, CAL FIRE added the City as a Community at Risk (CAL FIRE 2020).

4.1 State/Local Fire Hazard Severity and Santa Rosa's WUI Areas

A State of California law mandates CAL FIRE identify "fire hazard severity zones" throughout the State. There are three fire hazard severity zones identified by CAL FIRE including moderate, high, and very high fire hazard. Only Very High Fire Hazard Severity Zones (VHFHSZ) are identified within the LRA. CAL FIRE also produces WUI zone maps that designate areas with burnable vegetation and residential density greater than one unit per 20 acres and makes recommendations to LRA.

The City's designated WUI Fire Areas were adopted in 2009 and include VHFHSZ and WUI zones in one WUI Fire Area. Figure 16 depicts the City's WUI Fire Areas.

Note: The Coffey Park neighborhood, which lost approximately 1,320 homes during the 2017 Tubbs Fire, is not located within a designated WUI Fire Area. Coffey Park and other areas of the City not located within designated WUI Fire Areas and have similar characteristics of existing WUI Fire Areas at risk from wildfire. Currently, these neighborhoods are excluded from enforcement of current and future structure hardening and defensible space requirements.

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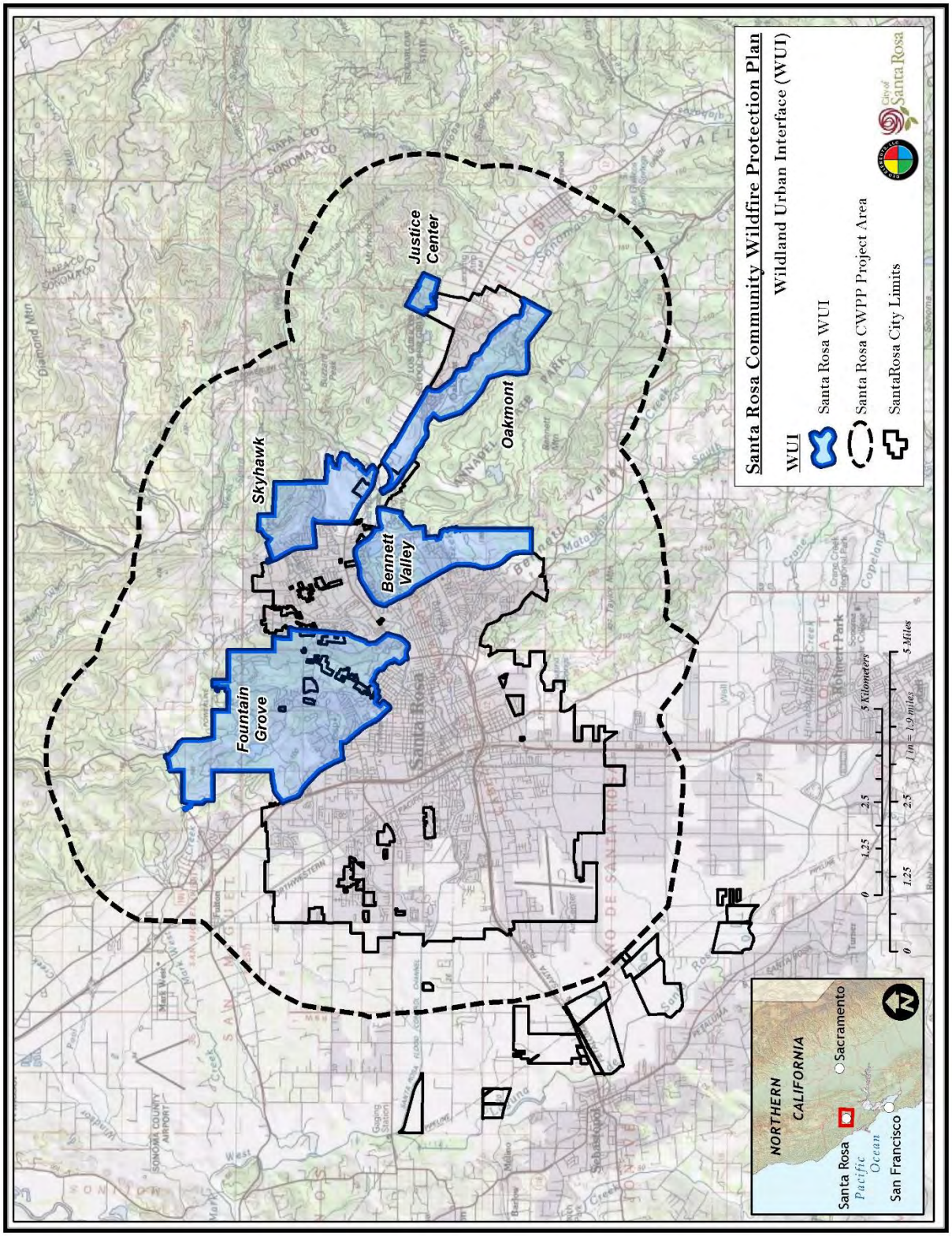

Figure 16. City of Santa Rosa Wildland Urban Interface zones.

Fire history is an indicator of wildfire threat; however, it cannot define the specific wildfire threat or help to design mitigation measures that can protect a community. In order to determine the level of wildfire threat, this Plan uses scientifically accepted fire models with results that have been validated by local fire professionals to identify the City's greatest wildfire hazard and risk, defensibility, ember exposure, fire run damage potential, speed of onset, and safe separation distances.

The purpose of the assessments is not to determine the wildfire threat to individual parcels but to provide the framework for designing and prioritizing potential wildfire mitigation strategies for the entire Project Area.

5.1 Wildfire Hazard Assessment

The objective of the hazard assessment is to spatially depict potential flame lengths from burning vegetation (Figure 17). The outputs from the fire models can then be used to determine the difficulty of suppressing a fire (See Table 16 on page 32), as well as prioritize areas in need of hazard reduction treatment.

The fire model FlamMap was used for this hazard assessment. FlamMap is a spatial fire behavior mapping and analysis program that uses elevation, slope, aspect, surface fuel model, canopy cover, fuel moisture, and historic weather data to evaluate fire behavior (Finney, 2004). The outputs from FlamMap provide a reasonable representation of surface fire behavior and crown fire potential across the landscape. The model allows evaluation of an entire Project Area under a defined set of weather and topographic conditions, thus providing insight into how fuels affect fire behavior across the landscape.

Using 97th percentile weather conditions derived from the Hawkeye Remote Automated Weather Station (RAWS), the outputs from FlamMap show concentrations of flame lengths in excess of 8 feet within the Wild Oak neighborhood as well as in the northwest corner of the City along Skyfarm Drive. The Skyhawk neighborhood displays the greatest hazard along its eastern edge of the neighborhood. As was experienced in the 2017 Tubbs and Nuns fires, wildfires burning at these intensities are difficult to control and are extremely hazardous to life safety of firefighters and residents. Considerable structure loss and damage to structures can occur during a wildfire in these areas if existing vegetative conditions are not addressed.

Although the hazard map indicates that there appears to be areas of the City that are not at risk from a wildfire, this is not a correct interpretation. Fire models have limitations, one of which is the fuel model layer. The fuels data used in FlamMap considers urban areas as *unburnable*, so the model outputs depict developed areas within the City as *unburnable.* However, as was evident in the 2017 Tubbs Fire, wildfire will spread readily through developed urban areas under conditions of high wind and low relative humidity.

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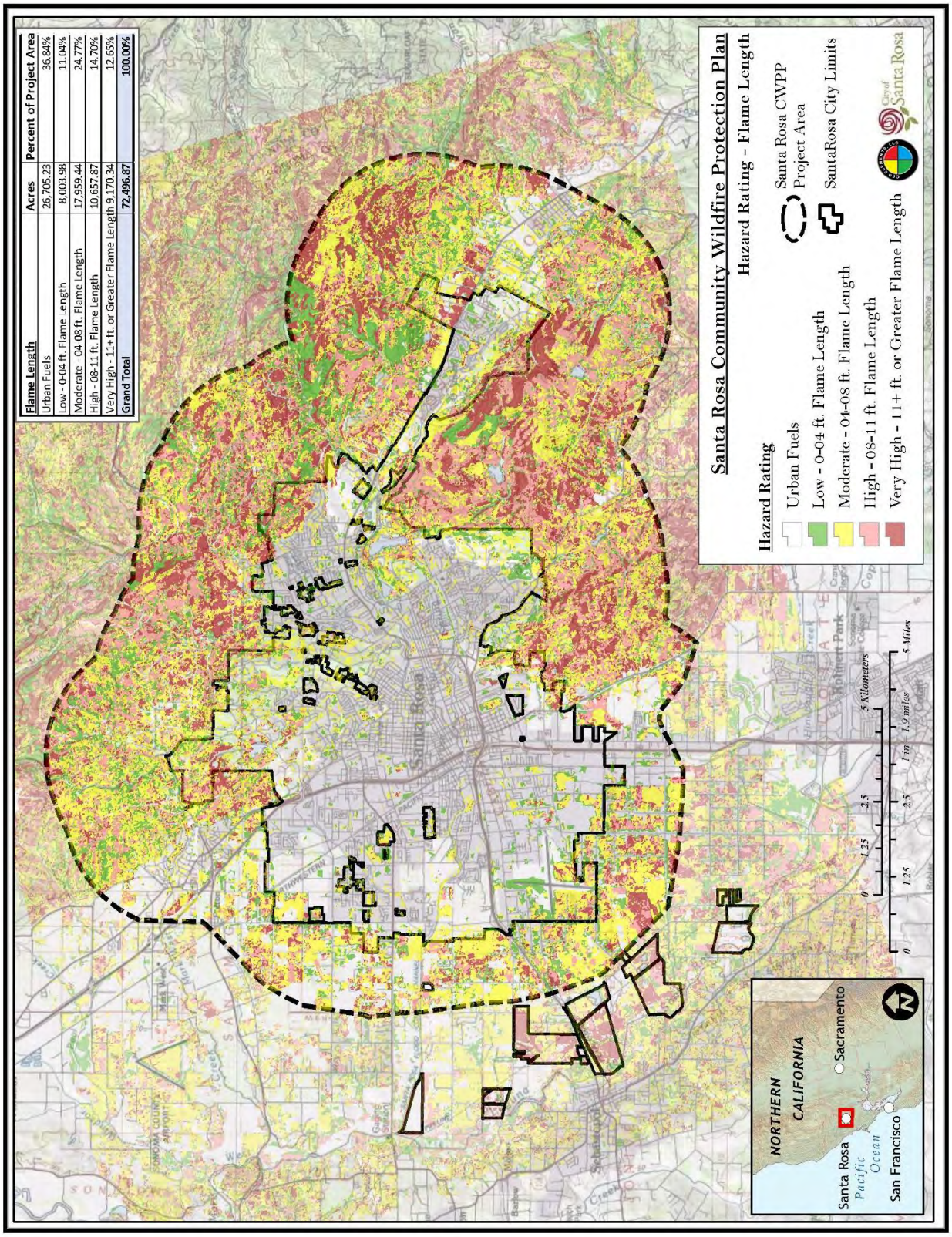
Table 9 Wildland Fire Hazard Ratings

Flame Length	Interpretations	Acres	Percent of Project Area
0 – 4 feet	Fire can generally be attacked at the head or the flanks by persons using hand tools. Handline should hold the fire.	8,004	11%
4 – 8 feet	Fires are too intense for direct attack on the head by persons using hand tools. Equipment such as bulldozers, engines and retardant aircraft can be effective	17,960	25%
8 – 11 feet	Fires may present serious control problems. Control efforts at the head of the fire will probably be ineffective.	11,190	15%
12+ feet or greater	Crowning, spotting and major runs are common. Control efforts at the head are ineffective.	8,673	12%
Urban	Fire can spread readily through urban areas under conditions of high wind and low relative humidity.	26,705	37%
	Total	72,532	100%

5.2 Wildfire Risk Assessment

The Fire Spread Probability (FSPro) model was used to evaluate the wildfire risk within and adjacent to the City. FSPro is a geospatial probabilistic model looking at fire risk as determined from historic weather data and existing fuel characteristics. FSPro calculates the probability of fire spreading from a current fire perimeter or ignition point for a specified time period. The model requires GIS landscape data as well as weather data from a representative RAWS to develop a historical data set relative to wind and potential energy release from a wildfire. The model uses these factors to simulate two-dimensional fire growth across a digital landscape. FSPro simulates fire growth for thousands of possible weather scenarios and calculates the probabilities of a wildfire spreading to points on the digital landscape by dividing how many times a point burns by the total number of fire simulations. As an example, if a point burns 512 times out of 1,024 total simulations, this point has a burn probability of 50 percent.



Flame Length	Acres	Percent of Project Area
Urban Fuels	26,705.23	36.84%
Low - 0-04 ft. Flame Length	8,003.98	11.04%
Moderate - 04-08 ft. Flame Length	17,959.44	24.77%
High - 08-11 ft. Flame Length	10,657.87	14.70%
Very High - 11+ ft. or Greater Flame Length	9,170.34	12.65%
Grand Total	**72,496.87**	**100.00%**

Figure 17. Hazard assessment showing modeled flame lengths.

For this assessment the Hawkeye RAWS was selected as the most representative location to simulate fall weather and fuel conditions. The Energy Release Component's selected for the simulations represent a mix of 90th and 97th percentile levels over the 7-day modeling period.

Three simulations were run to support the risk assessment. The ignition points for the simulations were selected in consultation with the CWPP Steering Committee and were located on the east side of the City (Figure 18). Each ignition point was assigned 1,024 fire simulations and allowed to burn unsuppressed for a 7-day modeling period (September 30 to October 6). FSPro randomly selects achieved wind data for this time period to support each of the fire simulations.

To develop the risk map, the burn probabilities generated from the three FSPro simulations were overlaid to evaluate the probability and the frequency that a point on the digital landscape burned during any of the simulations. Table 10 presents the crosswalk for assigning wildfire risk across the Project Area. As an example of the application of Table 10, if a point was found to have burned within the 80-100% probability band in two of the simulations and within the 0.2-19% probability band in the third simulation, this point would have a "Sum of Points" of 12, and be classified as a "Very High" risk point on the landscape.

Table 10 Wildfire Risk across the Project Area

Burn Probability	Point Value	Sum of Points	Risk Classification
80-100%	5	10-12	Very High
60-79%	4	7-9	High
20-59%	3	4-6	Moderate
0.2-19%	2	> 4	Low
> 0.2%	1		
No probability	0		

5.3 Wildfire Damage Potential

Wildfire damage estimates can be difficult to accurately determine as the variables that influence fire damage can be difficult to quantify. These variables can include the availability of firefighting resources, the time of day of the fire, weather conditions, defensible space, building standards and the age of structures. All of these items and others will influence the level of damage a community could experience from a wildfire. For this Plan, a simplified methodology is used to quantify the potential monetary damages which could be anticipated from a wildfire burning within and adjacent to the City given three specific ignition locations and weather scenarios.

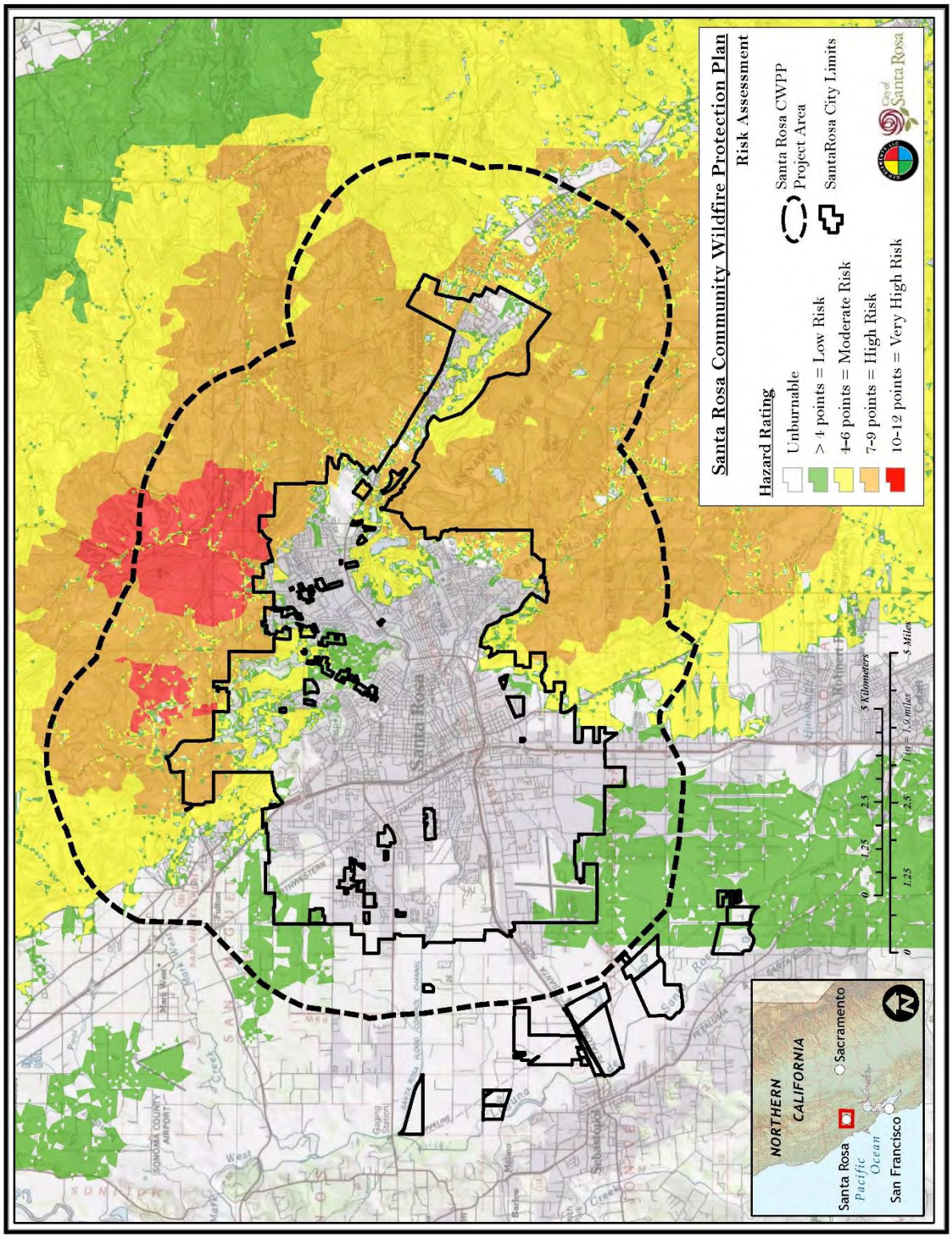


Figure 18. Risk Assessment based on modeled probability of burning.

FARSITE, is a fire growth simulation modeling system that uses geospatial information on topography and fuels along with weather and wind data to evaluate fire growth under defined spatial and temporal parameters was used for this assessment (Finney 2006).

The three ignition locations used in this assessment have their points of origin near Melita Road and Highway 12; Mark West Springs Road and Cross Creek Road; and Warrington Road near Petaluma Hill Road. Two of these fires were modeled with weather and wind data recorded by the Hawkeye RAWS during the 2017 Tubbs and Nuns Fires, while the Warrington Fire simulation used 97th percentile weather conditions determined from 28-years of weather records from the Hawkeye RAWS. Wind directions and strengths for the Warrington simulation assumed normal diurnal patterns during the 16-hour modeling period.

In order to determine a potential fire damage value for each of the three simulated fires, several assumptions were made. These assumptions are:

- Structure data obtained from the Microsoft Building Footprints (created September 25, 2018) is robust and represents only primary residents and businesses. The data does not include point locations of outbuildings.
- Structures within the simulated fire perimeter are damaged using the following matrix:
    - 25% of the structures are completely destroyed, with a total loss of value.
    - 50% of the structures have partial damage, losing 50% of the structure's value.
    - 25% of the structures are undamaged, with no loss in value.
- The median home price obtained from Zillow for Santa Rosa is $573,000 and is applied to all structures impacted by the modeled fires (www.zillow.com, accessed August 23, 2019).
- No attempt is made to capture the value of businesses or other non-residential values within the modeled fire perimeters.
- Loss of natural resource value or post-fire damage assessments are not included.
- The fire is not suppressed during the 16-hour simulation period.

GIS was used to overlay the final perimeters of the modeled fires on the Project Area. Using Microsoft's Structure Footprints, Table 11 presents the number of structures intersected by the fire perimeters. The table also captures the final fire size of these simulated fires, and the maximum number of spot fires that were burning at any one time during the simulation (Maximum Number of Active Fires). Final damage potential values were derived using the assumptions presented above.

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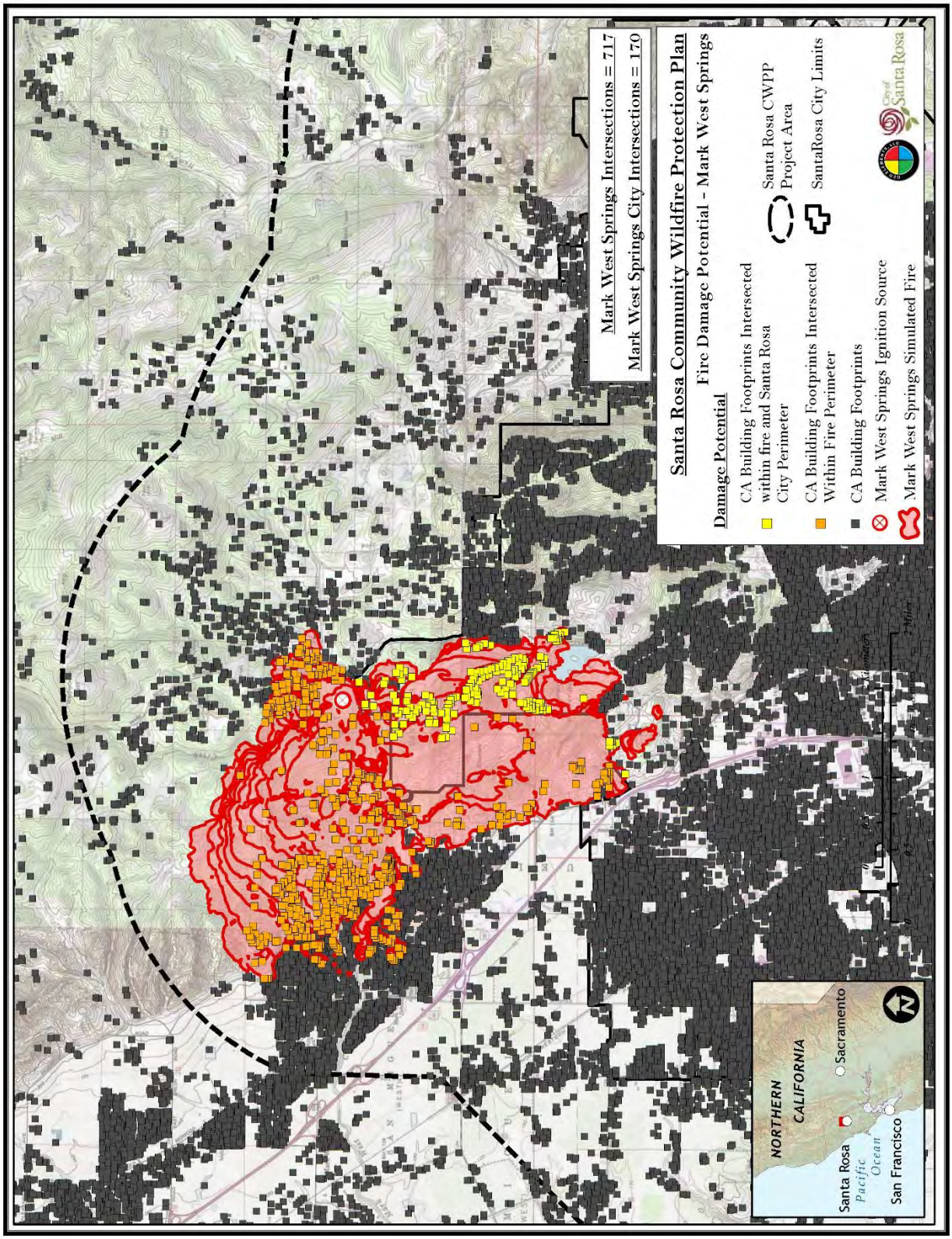

Figure 19. Fire Damage Potential run for Mark West Springs.

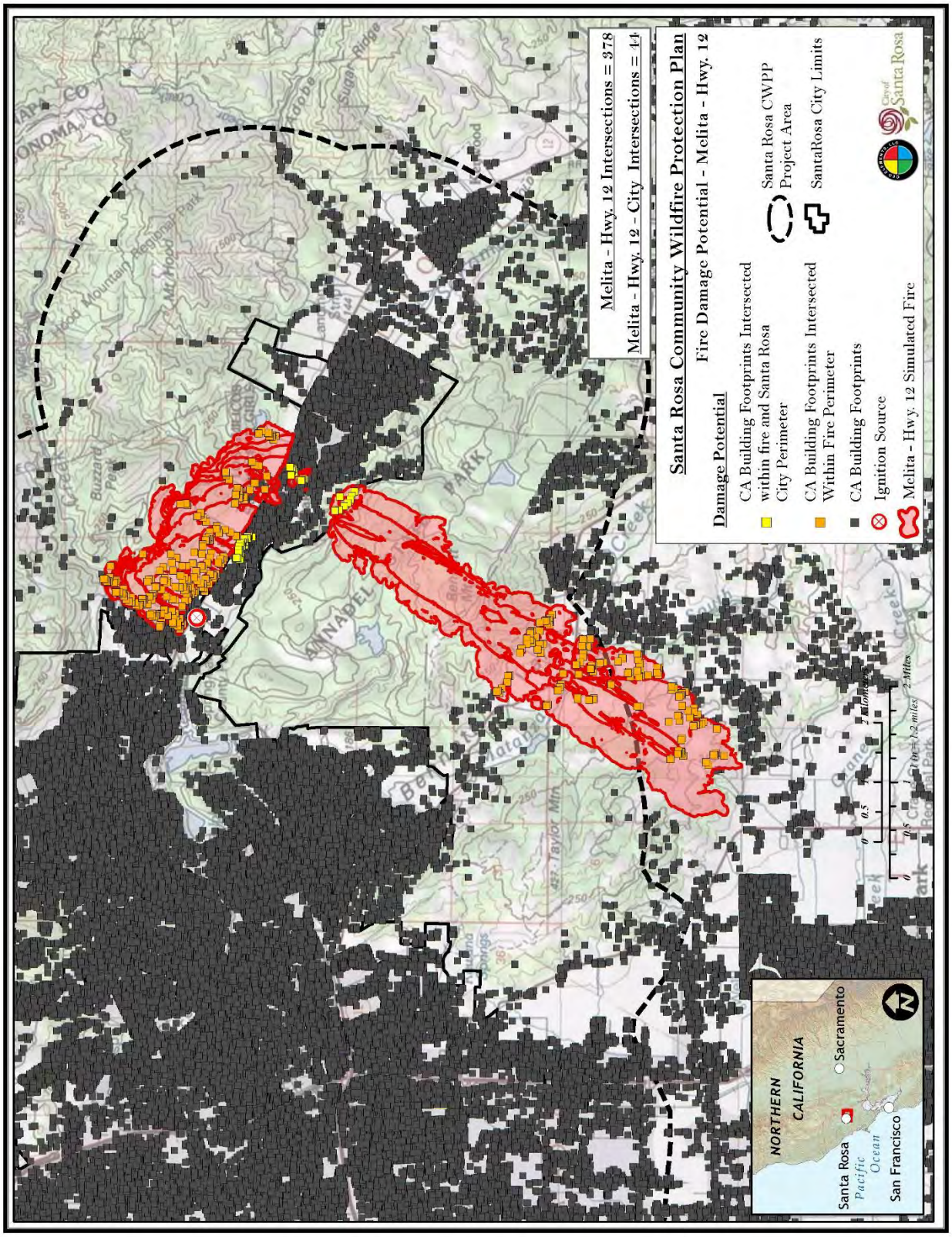

Figure 20. Fire Damage Potential run for Melita at Highway 12.

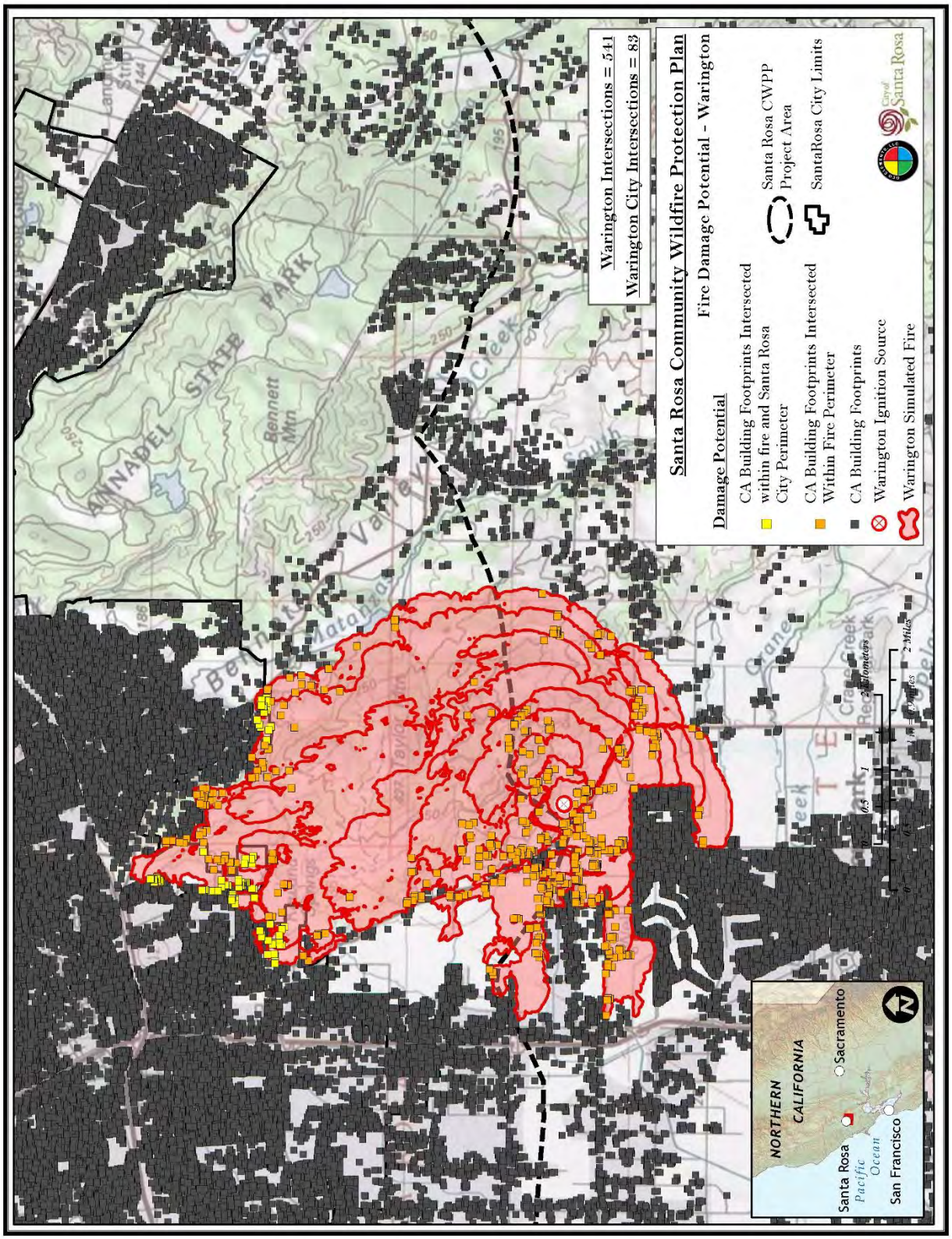

Figure 21. Fire Damage Potential run for Warrington.

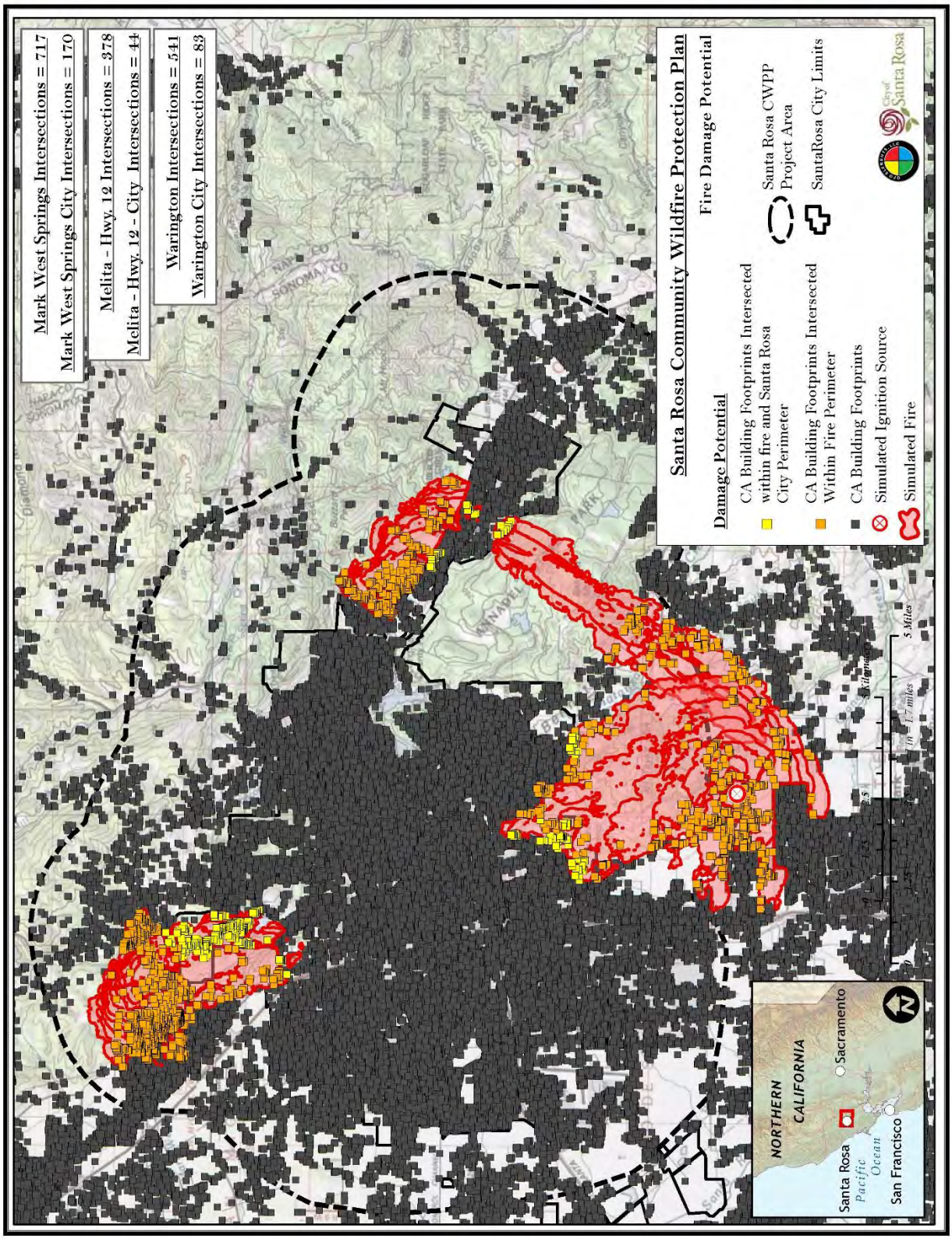

Figure 22. All three Fire Damage Potential runs.

Table 11 Number of Structures Intersected by Fire Perimeters

Simulation Name	Final Fire Size (acres)	Maximum Number of Active Fires	Total Structures within the City of Santa Rosa	Total Structures within the Project Area	Total Potential Wildfire Damage
Mark West Springs	2,470	164	170	717	$205,420,500
Melita and Highway 12	3,748	1,363	44	387	$110,875,500
Warrington Road	5,907	123	83	541	$154,996,500

5.4 Ember Exposure

This Plan uses fire modeling to evaluate the potential ember exposure of specific locations expected under offshore winds associated with a katabatic (wind-driven) weather event such as a Diablo wind. While spotting can occur from fires burning under onshore winds, fire intensity is typically lower on wildfires burning under these conditions; therefore, they are not as much of a concern to managers. Lower fire intensity leads to fewer firebrands produced and shorter transport distances for firebrands when compared to stronger offshore winds, such as Diablo wind events.

The MAXSPOT output of FlamMap modeled the maximum distances that a firebrand should travel given a 68-mph wind blowing from the northeast (the maximum gust observed at the Hawkeye RAWS during the 2017 Tubbs Fire). While FlamMap is the best available science for fire modeling, it does have limitations when it comes to evaluating shrub-dominated and oak-dominated systems. A limitation of this model is that it uses spotting distances from shrubs and oak savannahs based on a surface fire and not a crown fire. This limitation underrepresents ember exposure as presented in Figure 23, which should be used for comparative purposes rather than viewed as a specific quantified measurement of the maximum spotting distance of a wildfire. For this reason, a relative scale is utilized to quantify ember exposure.

To develop the Ember Exposure map (Figure 23), the maximum spotting distance of each pixel on the digital landscape was determined from FlamMap using a 68-mph northeast wind and the "dry" fuel moisture scenario (i.e., 3, 4, 5, 30, 60 percent). Using the outputs from FlamMap, each pixel on the landscape was buffered using ArcGIS to represent the maximum spotting distance. For example, a pixel with a 300-foot MAXSPOT distance was buffered 300 feet in all directions from the center of the pixel. This creates a circle on the digital landscape with a 300-foot radius. When ArcGIS applies this concept to all pixels on the landscape, a series of overlapping circles is developed.

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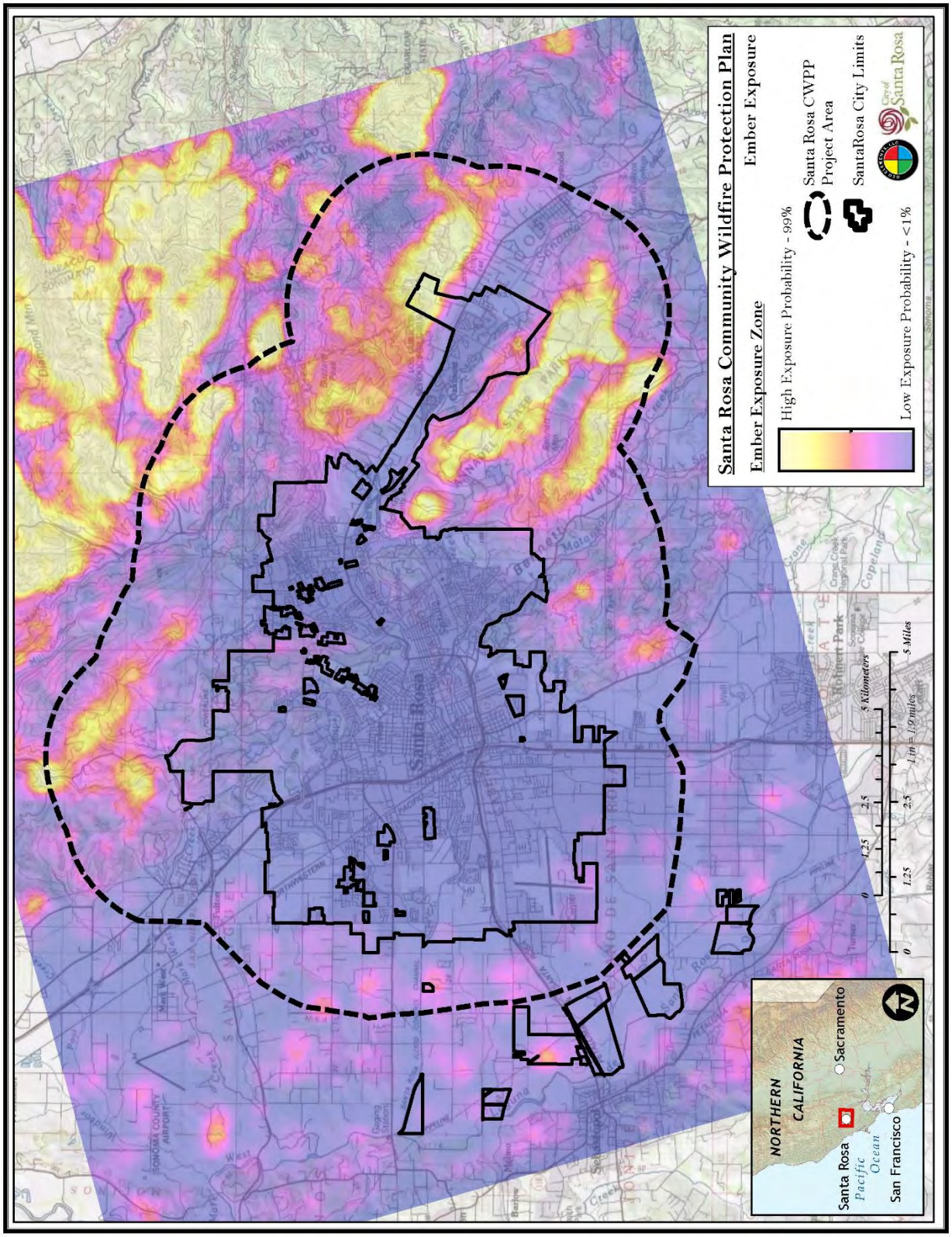

Figure 23. Ember Exposure probability.

The number of overlapping circles for any pixel is then calculated and evaluated against other pixels on the landscape to establish the relative intensity of the number of possible ember sources that can provide an ember to a pixel. This relative intensity is represented by a probability; the range of potential values was normalized to a probability between >0 and <100. This range reflects that no pixel is immune to possible ember exposure because of the nature of ember cast, and no pixel is guaranteed to receive an ember because of the variability and uncertainties of fire. Thus, the probability of a parcel being exposed to embers is from greater than 0% to just less than 100%.

NOTE: It is important to recognize that it only takes a single ember to create a spot fire; therefore, areas characterized by Low Probability of Ember Exposure are still at risk during a wildfire, and mitigation measures can reduce the probability of ignition and spread.

5.5 Wildfire Defensibility Assessment

Defining the degree to which a structure might be defendable during a wildfire is a highly complex issue; however, one of the keys to structure defense is the ability to secure a safe operational space from which firefighters can conduct tactical operations. Once a safe operational space is secured, firefighters can address several fireground challenges which may be less than optimal for successful structure defense. The Incident Response Pocket Guide developed by the National Wildfire Coordinating Group identifies the following as potential tactical challenges (NWCG 2014).

- Narrow roads, unknown bridge limits, and septic tank locations
- Ornamental plants and combustible debris next to structure
- Poor driveway access and low clearances
- Limited opportunity to observe the main fire
- Wooden siding, fences and/or wooden roof materials
- Open vents, eaves, decks, and other ember traps
- Fuel tanks, propane tanks and hazardous materials
- Powerlines
- Limited water sources
- Property-owners remaining on-site

For this Plan, a combination of wildfire hazard, steepness of slope and the proximity of an adequate water source (pressurized fire hydrant) are used to help classify structure defensibility at a Project Area level (Figure 24). This analysis does not include the site-specific tactical challenges listed above, but rather provides a more generalized approached to defensibility, allowing the public and fire district personnel to understand where structure defensibility issues may exist on a community scale.

Each of the three defensibility features (hazard class, slope and hydrant distance) was assigned criteria thresholds to develop the Defensibility rating. In general, the higher the hazard class, the steeper the slope and the greater the distance to a hydrant location; the lower the Defensibility rating. A Low Defensibility rating means that the location is considered to be relatively more difficult to defend than a High Defensibility rating.

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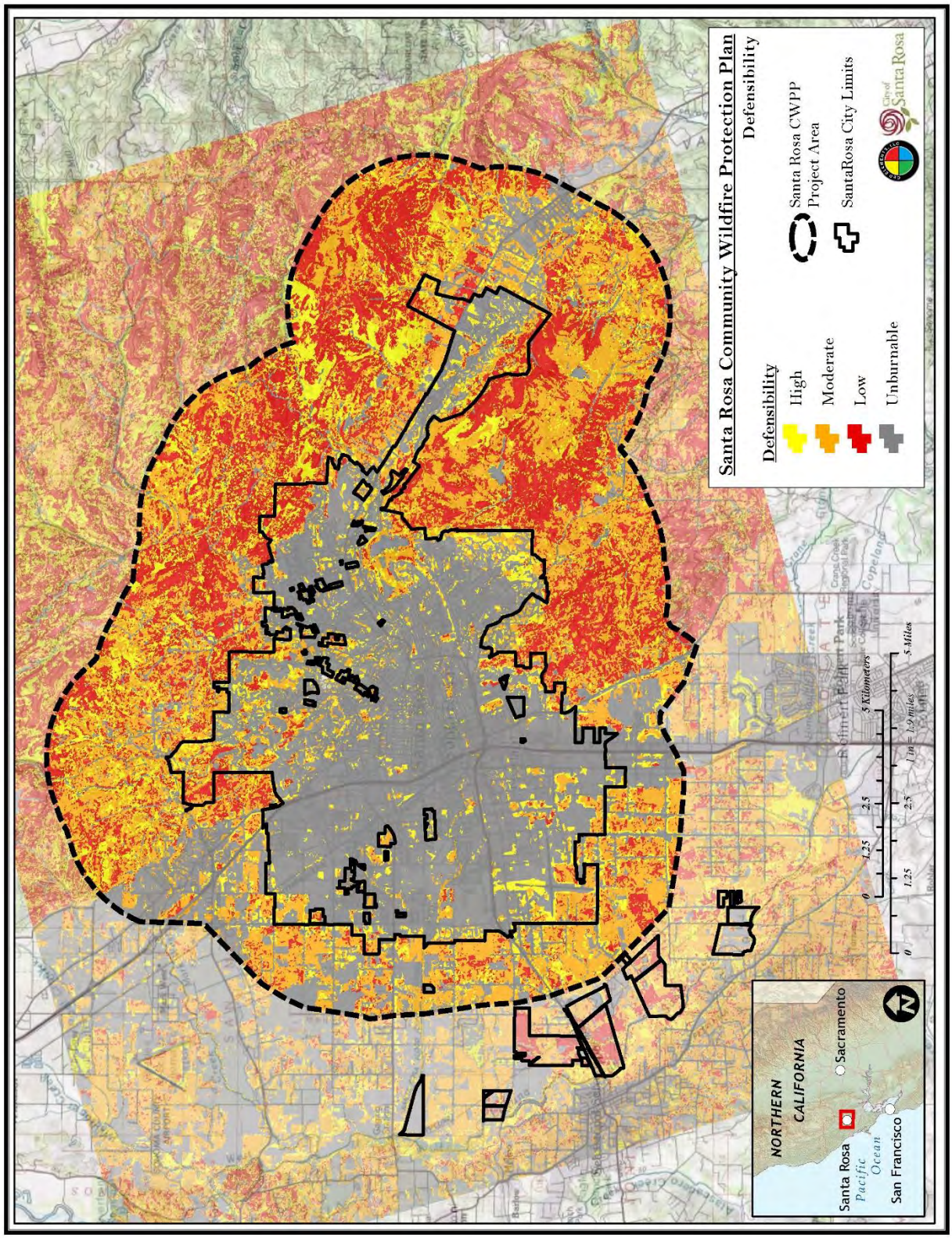

Figure 24. Defensibility rating across Project Area.

However, a High Defensibility rating does not mean that a structure or other value at risk will survive the passage of a wildfire. Good defensible space and the implementation of appropriate structure hardening techniques will have more influence on the ability of a structure to survive a wildfire than its Defensibility classification. These ratings should not lead homeowners into neglecting their responsibility to take actions that will create a more fire resilient structure.

Areas in Figure 24 without a color-coded Defensibility rating did not have an associated wildland fuel component in the fire behavior models used and therefore the hazard rating process indicates that these areas do not support wildfire spread. The fire behavior models do not consider the influence of urban fuels such as landscape vegetation, flammable mulch, wooden fences or other flammable objects that can carry a fire within the urban built environment. Additionally, these models cannot account for an urban conflagration fire, such as what occurred in Coffey Park during the Tubbs Fire, where the wildfire spread into an urban neighborhood due to the radiant heat and ember cast created by burning buildings.

Table 12 summarizes the Defensibility ratings for areas within the City and the Project Area as a whole.

Table 12 Wildfire Defensibility Ratings for Areas within the City and Project Area

Defensibility Rating	City of Santa Rosa		Project Area	
	Acres	Percent of Area	Acres	Percent of Area
High	2,685	6.90	9,001	11.25
Moderate	3,227	8.29	21,033	26.29
Low	1,227	3.15	17,759	19.70
No Rating - Urban	31,783	81.65	34,213	42.76

5.6 Safe Separation Distance

An essential question related to firefighter safety is the required distance between a wildfire and firefighters in order to prevent thermal injury. The wildfire terminology used to describe this distance is Safe Separation Distance (SSD).

The fire hazard and risk assessments does not account for life safety associated with structure defense. Defensible space helps to protect structures from igniting due to either direct flame contact or radiant and convective heat, but it is also important for the safety of firefighters assigned to defending structures.

An essential question related to firefighter safety is the required distance between a wildfire and firefighters in order to prevent thermal injury. The SSD is based on thermal exposure of skin to heat. Heat exposure creates pain at about 111° F, first degree burns occur at 118° F, second degree burns occur at 131° F, and at 162° F human skin is instantly destroyed (NIST 2016). Typical forest fuels ignite at 500 to 750° F and burning temperatures can exceed 1,800° F.

A safety zone is an area where a firefighter can survive without a fire shelter.

Safety zone guidelines (Butler 2014, 2015) include slope, burning conditions (to account for factors such as drought or presence of beetle kill), and wind as factors to calculate the SSD; thereby, accounting for convective heating. Additional information on safety zones is available at www.firelab.org/project/firefighter-safety.

The new equation for SSD is:

$$SSD = 8 * \Delta * \text{Vegetation Height}$$

Where Δ is the slope/wind factor, as determined by Table 13.

Table 13 Safe Separation Distance Equation (Butler 2015)

Δ		Slope (%)				
		0	15	30	>40	Burning Conditions
Wind (mph)	0	0.8	1	1	2	Low
		1	1	1.5	2	Moderate
		1	1.5	1.5	3	Extreme
	10	1.5	2	3	4	Low
		2	2	4	6	Moderate
		2	2.5	5	6	Extreme
	>20	2.5	3	4	6	Low
		3	3	5	7	Moderate
		3	4	5	10	Extreme

For example, a 10-mph wind, 15 percent slope, Extreme conditions (97th percentile), and 3-feet tall vegetation would require an SSD of 60 feet (8 x 2.5 x 3 = 60 feet) for a safety zone of 0.25 acres. These distances are estimated for only one firefighter and do not include firefighting equipment. Vegetation height must be either estimated on site through observations or acquired through remote sensing.

Light Detection and Ranging (Lidar) data are optimal for obtaining precise, high-resolution vegetation heights. In 2013, a vendor contracted by the County acquired high-resolution aerial Lidar data for the entire county, including the Project Area. This data was subsequently post-processed by the County into 1m vegetation height data. This product is freely available on the Sonoma County website by sub-watershed. A total of 17 subwatersheds in the greater Santa Rosa area were downloaded and compiled for the SSD analysis.

Vegetation height model data was used in conjunction with the County parcel data to quantify SSD across the Project Area, and to summarize SSD for firefighters and civilians for a worst-case scenario, winds greater than 20 mph and slopes greater than 40 percent. The SSD was calculated for each 1m pixel and a mean SSD was calculated for WUI and non-WUI Fire Areas.

Most parcels in the WUI had a mean SSD of greater than 300 feet, meaning that a house would need 300 feet of defensible space in order to be safe for firefighters to defend (Figure 25). Approximately 15% of the parcels within the WUI had an SSD of less than 100 feet; these parcels would be safe locations for firefighters to defend structures under the standard 100-foot defensible space recommendation. The application of the SSD model indicates that the 100-foot defensible space clearance provides inadequate SSD for firefighter and property-owners.

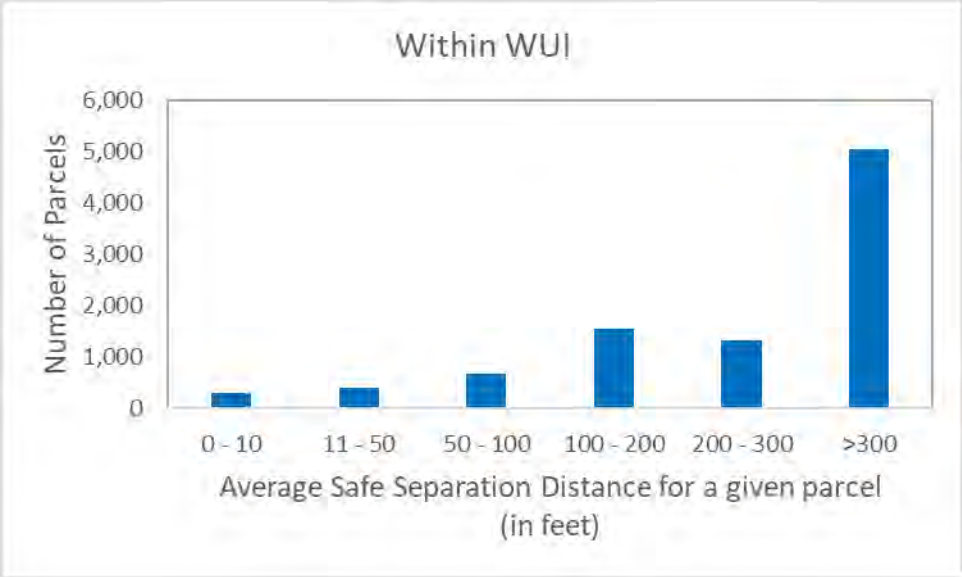

Figure 25 Mean Safe Separation Distances per Parcel within WUI

Outside of the WUI Fire Areas, but still within the larger Project Area, over half of the parcels (55%) have a mean SSD of less than 100 feet, indicating that standard recommended defensible space distances will provide a safe operating space for firefighters. Nearly one-third (32%) of parcels; however, have a mean SSD of greater than 300 feet, indicating that these parcels would be indefensible under extreme conditions. It is worth noting that a substantial proportion do fall under SRFD jurisdiction. Mean SSD values may be a helpful indicator of where additional WUI Fire Areas may be appropriate, and where vegetation management activities may reduce SSD

requirements. could be defined, and vegetation reduction enacted to reduce the SSD requirements.

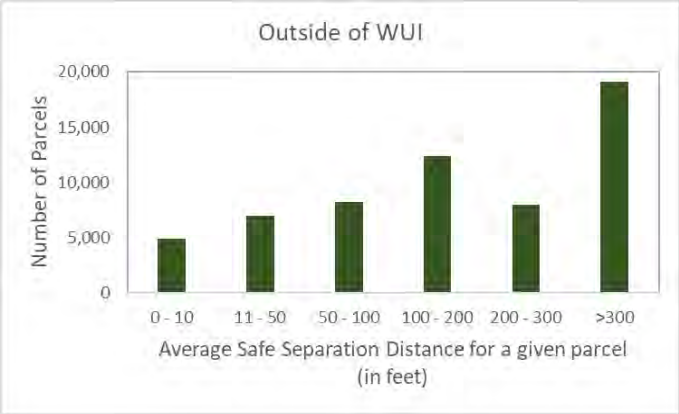

Figure 26 Mean Safe Separation Distances per Parcel within WUI

As of the 2013 acquisition of the Lidar data by the County, most of the structures in the Project Area did not have adequate SSD for life safety. This analysis presents what should be considered the most extreme estimation of SSD requirements, but extreme conditions are also when greatest loss of life occurs.

The high SSD values make it clear that under extreme conditions, such as a Diablo wind event, it is neither reasonable nor prudent for homeowners or firefighters to try to defend homes from wildfires. The term *defensible space* is a misnomer under these conditions. Vegetation modification along driveways and roads and structural hardening should be considered critical to facilitating life safety.

5.7 Speed of Onset

The speed of onset (i.e., time from ignition to arrival of the initial flaming front) can be extremely rapid especially under high wind conditions such as was experienced during the Tubbs Fire. Speed of onset affects decisions of if and when to evacuate the public, the ability of firefighters to contain a fire, and the amount and type of equipment and personnel needed to suppress a fire.

The same ignition locations used in the fire run damage assessment in Section 5.3 were used in this assessment. These ignitions were modeled with historic weather data from the Hawkeye RAWS, which represents dry late fall conditions with a 16-mph north wind.

Figure 27 depicts the speed of onset shows how quickly wildfires can move in a very short period of time. Under the prescribed weather conditions, Scenario 1 burns from the ignition point along Mark West Springs Road to within the City limits within two to three hours. Scenario 2, which starts in the wildlands to the northwest of the intersection of Plum Ranch and Calistoga Roads, reaches the City limits within one to two hours after ignition. These estimates are supported by observations of fire spread during the 2017 Tubbs Fire, and can be used to determine the timing of evacuations in future wildfires under similar conditions.

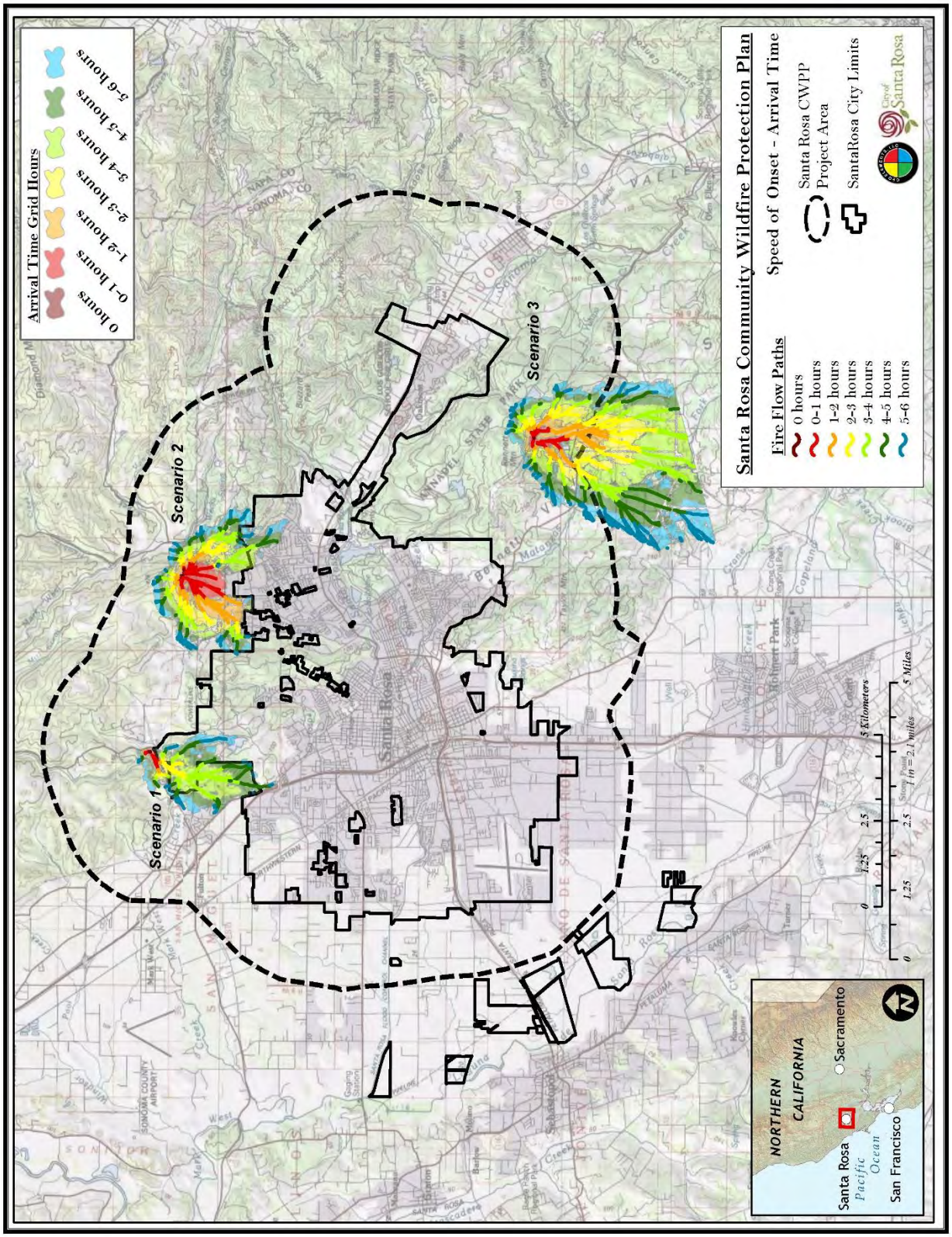

Figure 27. Speed of onset for three hypothetical ignition scenarios.

5.8 Firefighting Capacity versus Fire Behavior

Evaluating the effectiveness of firefighting resources against wildfire is a complex matter. On the same wildland fire there are locations where firefighters can be successful in defending structures or securing portions of the fire perimeter, while at the same moment in time firefighters elsewhere on the fire are being overmatched by the intensity and rate of spread of the fire. Elements such as the alignment of the fire spread (head or flanking fire versus backing fire) can significantly change the fireline intensity faced by firefighters. Other elements which can influence firefighter success include access, topography, the ability to secure a safe operational space, and the availability of aerial resources to support ground operations.

A standard used to evaluate the potential of firefighting resources is based on the fire characteristics chart found in the Wildland Fire Incident Management Field Guide (NWCG 2014). This matrix evaluates what type of firefighting resources would be required to successfully suppress the head of a wildland fire based on the observed fire length (See Table 14). Since flame lengths can be directly related to potential firefighting success, these breakpoints are used for classifying modeled fire behavior throughout the Plan.

Table 14 Fire Behavior Characteristic and Suppression Capabilities

Flame Lengths (feet)	Fireline Intensity (BTU/foot/Second)	Interpretation
0-4	0-100	Fires can be generally attacked at the head or flanks by persons using hand tools. Handlines should hold the fire
4-8	100-500	Fires are too intense for direct attack at the head of the fire by persons with hand tools. Handlines cannot be relied upon to hold the fire. Equipment such as dozers, engines and retardant aircraft can be effective.
8-11	500-1,000	Fires may present serious control problems – torching out, crowning and spotting. Control efforts at the head of the fire will probably be ineffective.
11+	1,000+	Crowning, spotting and major fire runs are common. Control efforts at the head of the fire are ineffective.
Caution: These are guides to personnel safety; fires can be dangerous at any level of intensity; Wilson (1977) showed that most fatalities occur on small fires or isolated sections of large fires.		

The classifications in Table 14 provide insights into resource capabilities but can be misinterpreted if applied out of context. For example, 8-foot flame lengths can be successfully suppressed by engine crews using hose lays, if they are able to approach the fire from a direction where convective and radiant heat are focused away from the firefighter. The same 8-foot flame length will likely overwhelm firefighters positioned in a manner where they are receiving large portions

of the heat flux from the fire. This can be the case where firefighters are performing structure defense or attempting a frontal assault on the advancing fire front. It has been found that convective energy transferred by wind gusts, fire whirls, or air turbulence can significantly increase the total heat transfer to the firefighter and increase the required safety zone size necessary to engage the fire (Butler, Cohen 1998).

The situation where firefighters must perform structure defense as a wildfire rapidly spreads downslope into the City from the east is the most likely scenario for the next major wildland fire event in Santa Rosa. As winds push a fire down slope, they also push large amounts of radiant heat ahead of them. Radiant heat affects the ability of fire firefighters to establish viable safe operational space from which to engage in structure defense action. Research indicates that a minimum of 4 times the flame height on all sides of a firefighting resources is required for a safety zone when the effects of radiant and convective heat are not considered. When factoring in these elements of the fire environment, larger safety zones are required for firefighters to safely engage a fire. The defensible space standards found in California Public Resource Code 4291 not only enhance the potential of a structure surviving a wildfire but can also provide the safe operational space from which firefighters can work.

5.9 Structure Vulnerability

The 2017 and 2018 California fire seasons demonstrated again the effects that wildfires can have on our communities. Several key findings from after action reviews of the Tubbs, Nuns, Woolsey, and Camp fires collectively show that it is not the flames or radiant heat that cause the greatest loss of structures, but rather the susceptibility of structures to receive embers and ignite fires on or immediately adjacent to homes (Los Angeles Times December 2018).

The NFPA has underscored the overwhelming evidence that structures themselves need to be "hardened" or made more resilient to fire spread and ember cast to limit structure loss from wildfire. Fuels treatment alone will not stop the advance of wildfires under severe conditions. It is the work that is done on a structure and the work in the area surrounding a structure that can determine whether a wildfire consumes the structure.

If we choose to live in the wildland urban interface, we all must take responsibility to harden our homes. Many of the structures built in and surrounding the City's designated WUI Fire Areas were built prior to the adoption of current wildfire building standards (See Section 2.1.2) that can reduce structure vulnerability from wildfire. If these building standards are applied to older structures, it may be possible to limit the number of structures lost in the next major wildfire. In response to recent wildfire losses, the Governor issued Executive Order N-05-19, mandating CAL FIRE to evaluate wildfire prevention and mitigation actions that could be taken to limit future wildfire losses. As part of the Community Wildfire Prevention and Mitigation Report, CAL FIRE recommended incentivizing home hardening to create fire resistant structures within the WUI as a mid-term priority of State government.

While the State has established goals to assist homeowner to hard structures, there are several actions the residents can immediately take to improve the wildfire resiliency of their property,

including retrofit existing structural components of their home, completing annual maintenance to mitigate any hazards on their structures, cleaning eaves or removing firewood immediately adjacent to the home, and completing and maintaining defensible space work within 100 feet of their structures (or to their property line) as required by law.

Research has shown repeatedly that the primary reason for structure loss during a wildfire is due to the ignitability of the structure itself. Low intensity fires can destroy structures that are highly ignitable, while structures with low ignitibility can survive high intensity fires (Cohen 2000).

The risk of structure ignition is a direct result of exposure to radiant or convective heat from a wildfire and/or burning embers and the vulnerability or ignitability of the structure. Structures ignite in three ways:

- Convection - the transfer of heat by the movement of rising hot air or gasses. Convective heat tends to rise and is visually observed as flames and smoke columns. Convection lifts firebrands into the sky. Flames can overwhelm a structure by direct flame impingement, which could be a result of inadequate spacing of structures, lack of defensible space, and/or extreme fire behavior.
- Radiation - heat energy released in all directions from a burning object. Exposed flammable structural elements reach their ignition temperature causing a structure to ignite. Nearby burning structures can ignite other structures in close proximity moving the fire from structure to structure. The potential for ignition is greatly reduced as space between structures and fuel (wildland and urban) is increased.
- Burning Embers - flammable material (e.g., wood shingles, tree bark, leaves) that detach from the main fire front and get carried by strong convection drafts and/or winds to receptive fuel downwind. Wildfires can produce hundreds to thousands of burning embers that can be carried very long distances by winds.

Listed below are vulnerable parts of a structure that contribute to structure ignition during a wildfire:

Roofing - Roof construction, material and maintenance is a key factor in structure loss from wildfire. It is not just the type of roofing material, but also the design, construction details, the condition of the material, and whether the roof is clear of burnable material (e.g., pine needles and other debris).

Rain Gutters - Debris built up in rain gutters can ignite by embers or firebrands in gutters and can spread fire to the roof. Vinyl (or plastic) rain gutters if ignited can detach from a structure and fall to the ground, continuing to burn and ignite other combustible material on or around a structure.

Garages - Garages with gaps at the top, bottom and edges of doors allow firebrands to enter. Oftentimes garages contain flammable materials that can enhance ignition potential. Garages usually have vents at various locations, especially if they contain gas furnaces or hot water heaters. These vents can be easy entry points for embers.

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Siding - Flammable siding can provide a pathway for flames to reach vulnerable portions of a structure, such as the eaves or windows. Siding needs a source of ignition, which in many cases includes vegetation, wooden decks, and fences, or stacked firewood or other flammable material in close proximity to a structure. This can provide a heat source that can ignite siding.

Vents - Soffit vents in the eaves are an easy entry point for wind-driven burning embers during a wildfire. Attic fires are not easily detected from the outside and structures have been lost when fire personnel have left the scene unaware that a fire has ignited within the attic.

Windows - Unprotected and inadequate windows can be another major entry point for fire. Windows broken by airborne materials or cracked by thermal expansion during a wildfire ignite materials in the structure through radiation, convection, and/or firebrands.

Nooks and crannies - Little grooves, inside corners, and roof valleys all become areas where flammable debris (e.g., pine needles, bird's nests) have collected over time. Burning embers can land on this debris, igniting it.

Crawlspace Vents - If not adequately screened, these areas, not just under a structure but also under decks and other attachments, are difficult to protect. Much like vents in the attic, firebrands enter these areas and flammable material underneath a structure can ignite.

Fences - Fences and flammable walls can contribute to the spread of a fire to a structure. If wood fences or flammable walls are attached or create a path towards the structure, they can ignite a structure through radiant or convective heat or by direct flame contact.

Decks/Patios - Decks and Patios act as a source of fuel that is attached or directly adjacent to structures. When ignited by wildfire the radiant and convective heat output can ignite structures. In addition, most decks are adjacent to large windows or glass sliders and the heat from a deck fire can cause the glass to fail allowing the wildfire to enter a structure.

Flammable landscape vegetation and/or debris – Flammable landscaping and other flammable items, such as firewood or flammable debris in close proximity to a structure can provide an ignition source to multiple portions of the structure. As a result, structures are more susceptible to ignition when exposed to significant radiant and convective heat from burning material.

Post-fire rebuilding efforts in the City began in 2018; however, much of the area is experiencing substantial construction activity that is not within the City's WUI Fire Area, therefore structures are not required to meet important WUI building standards (Building Code Chapter 7A and Residential Code, Chapter 3, Section R337) and defensible space requirements.

Some actions have been taken to increase wildfire resiliency in the non-WUI Fire Area. The removal of dead vegetation on any vacant lot is now required under the City's annual Weed Abatement Program. However, once a vacant parcel is rebuilt, the Weed Abatement Program no

longer applies, unless a property contains more than a half-acre of unimproved land. Additionally, as of January 2020 any new and existing (if remodeled) structure in the City is required to have a minimum Class A roof.

While Class A roofing will decrease structure vulnerability, as of January 2020, 87 percent of the structures in Coffey Park have either been rebuilt or are under construction (https://coffeystrong.com/) with no requirement to meet the Class A roofing standard.

Property-owners in non-WUI Fire Area should consider retrofitting building components as recommended in Table 17 – Mitigation Actions and City Codes.

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While the threat of wildfire threat to the City cannot be eliminated, stakeholders can take proactive steps to mitigate this threat to enhance protection of the City's assets.

Given the inevitability of another major wildfire, a strategy to reduce the wildfire threat to the City's assets has been developed. Informed with the wildfire assessments from Chapter 5, the activities identified in this Action Plan were developed to mitigate wildfire hazards and risks, thereby reducing the wildfire threat. Whether a wildfire is catastrophic or not will depend on the efforts of all stakeholders working with local and state agencies.

Two neighborhoods within the City have been very engaged in wildfire protection activities, Fountaingrove II, whose current CWPP was developed in 2009 (available at www.fountaingroveii.com/sites/default/files/FGII_DRAFT_CWPP_EDIT_10.02.09_to_SRCDD_0.pdf) and the Oakmont Village Association which, since 2016, has ongoing fuel treatments (additional information is available at https://oakmontvillage.com/article/category/fire). Fountaingrove II and Oakmont Village are both recognized FireWise USA communities (NFPA www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Firewise-USA/Firewise-USA-Resources/Firewise-USA-sites). These neighborhoods are great examples of communities engaged to address the wildfire threat.

Preparedness for the inevitable wildfire event includes activities and actionable items such as community education, emergency planning, protection of assets, reducing structure ignitibility, a comprehensive fuels mitigation strategy, and evacuation preparedness. A combination of hazardous fuel mitigation, structural hardening, defensible space, and emergency preparedness activities can significantly affect firefighter success in protecting life safety and reducing the threat to the City's assets.

The following describes actions that can enhance the protection of life safety and the community's assets.

6.1 Existing Community Preparedness and Programs

A challenge for all communities is how to generate interest and maximize awareness of the wildfire threat while encouraging participation in preparedness activities that effect change at the individual and community level. Communicating accurate and timely information both before and during a wildfire is a challenge that the City and County are addressing through a variety of programs before an event escalates.

City of Santa Rosa Website

Local information on the City website is a critical link to a community. SRFD provides information and material on its website, which includes information on wildfire prevention, preparing for a wildfire (defensible space and building construction), as well as what to know in the event of an evacuation that includes the City Evacuation Preparedness and Education Plan ("Know Your Ways Out").

Ready for Wildfire - California

The City, as well as fire agencies across Sonoma County utilize the CAL FIRE Ready for Wildfire Program and have incorporated the RSG methodology into a set of resources available at www.readyforwildfire.org. This program is applicable statewide and includes information for defensible space, home hardening, preparing families, and checklists to help residents. The Program provides resources that are easily understood and can be utilized by the public to prevent and prepare for wildfires. The City provides a link to the Ready for Wildfire site on the Fire Department web page.

Firewise USA

Firewise is a national program through the National Fire Protection Association (NFPA) that teaches people how to adapt to living with wildfire and encourages neighbors to work together and take actions to prevent losses. The Firewise USA program provides a way for communities to organize to reduce wildfire risk; learn about wildfire, find resources to develop and accomplish fire-safe actions, strengthen neighborhood ties, be part of a national effort in mitigating wildfire and can provide access to funding and assistance through the program.

Fire Safe Sonoma

Fire Safe Sonoma is the local countywide FSC and provides valuable educational material to all residents of the County regarding wildfire preparedness and safety. Additionally, the FSC coordinates large-scale fuels reduction projects, acts as a liaison between local communities and agencies, and seeks grant funding for wildfire safety projects. Firesafe Sonoma completed their county-wide CWPP in 2016, which can be found at www.firesafesonoma.org. The City of Santa Rosa Fire Departments currently holds a board position on Fire Safe Sonoma.

Red Flag Warning Program

A Red Flag Warning (RFW) is a forecast warning issued by the National Oceanic and Atmospheric Administration's National Weather Service (NWS) to inform firefighters and the public that conditions conducive for wildland fire ignition and rapid-fire spread are forecast or currently exist. Public notification of potential fire danger is critical to the community preparing for a potential wildfire. Fire departments in the County fly red flags marked "High Fire Danger" when the NWS issues red flag warnings. Residents can go to www.sricty.org/WeatherInfo to monitor RFW through the City's social media.

Citizens Organized to Prepare for Emergencies (COPE)

COPE is a county-wide program with the mission to encourage residents, families, and neighborhoods to become better prepared to respond and recover from emergency situations. It was originated by residents of Santa Rosa, living in the Oakmont area, with support from the SRFD and the American Red Cross. It is a grassroots effort built on the concept of "neighbor helping neighbor" by engaging communities in emergency preparedness education, advocacy, and planning. COPE fosters community preparedness in coordination with public safety agencies, non-profits, and non-governmental agencies. The COPE Program spread across Sonoma County following the 2017 fires. The website is www.srcity.org/COPE.

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Community Emergency Response Teams (CERT)

The CERT program is active within the County. It is a national program developed through the US Department of Homeland Security, Federal Emergency Management Agency, that educates volunteers about disaster preparedness and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. CERT offers a consistent, nationwide approach to volunteer training and organization that professional responders can rely on during disaster situations, allowing them to focus on more complex tasks.

Designed as a grassroots initiative, local and state program managers have the flexibility to form their programs in the way that best suits their communities. Local CERT volunteers are trained to respond safely, responsibly, and effectively to emergency situations, as well as support their communities during non-emergency events.

LISTOS

Listos is a grass-roots disaster preparedness program designed to meet the needs of Spanish-speaking communities and engage neighbors and communities in getting ready together. This program is active in the County with 25 class instructors currently certified county-wide.

Sonoma Community Animal Response Team (Sonoma CART)

CART is a community non-profit and volunteer organization that works in collaboration with local agencies to aid in animal evacuation, transport, sheltering and re-unification during and immediately after an emergency, accident or disaster. Their mission is to assist the County and local animal response agencies during an emergency or disaster, as well as provide training and education in animal disaster preparedness, response and recovery. Their website is www.sonomacart.org/.

Webcams

Since 2017, PG&E in partnership with three universities have brought online a webcam network to provide video coverage of wildfire prone area across the western United States. One of the areas is the North Bay region that covers areas around Santa Rosa. The network of cameras provides emergency responders the ability to monitor fire spread at all hours and in locations where ground access or personnel safety make human monitoring difficult. These camera feeds are publicly available at: http://www.alertwildfire.org/northbay/index.html.

6.2 Area Notification Systems

The City's Emergency Management staff have access, training, and ability to send Integrated Public Alert and Warning System (IPAWS) alerts. IPAWS provides public safety officials an effective way to alert and warn the public about serious emergencies using the Emergency Alert System (EAS), Wireless Emergency Alerts (WEA), the National Oceanic and Atmospheric Administration (NOAA) Weather Radio, and other public alerting systems—all from a single interface. To see more information about IPAWS, visit www.fema.gov/integrated-public-alert-warning-system.

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The City uses multiple notification and warning systems to make sure emergency alerts are delivered to the people who need the information. Following the 2017 fires, the City initiated an educational campaign to clarify the different alerting system, "Know Your Alerts". The information can be found at www.srcity.org/KnowYourAlerts. The emergency alert systems websites are provided on the City Fire Department website, as well as the County's website (SoCoEmergency) at https://socoemergency.org. The messages are delivered in both English and Spanish.

SoCoAlert

SoCoAlert is the preferred method of emergency notification services in the County. Through SoCoAlert, first responders can alert residents by landline or mobile phone, text message and email about imminent threats to life and property in specific impacted areas. This service requires residents to register all addresses that they would like to receive alerts for (work, child's school, etc.). It does not require you to be in the location of the emergency to actually receive the alert.

Residents must register at SoCoAlert.com OR call (866) 939-0911, press "0" at the menu, ask operator for assistance with registering for SoCoAlert.

Emergency Alert System (EAS)

The National public warning system is a notification system that will interrupt local broadcast television and radio programming to provide an alert in the event of a large-scale emergency. No registration is required for this alert system.

Wireless Emergency Alerts (WEA)

WEA is emergency alert system that sends Urgent alerts as text-like messages to your mobile phone based on your location (you will only receive notification if you are in the area of the emergency). WEA's have three alert categories-- Imminent Threat, AMBER, Presidential. You must keep the factory settings on to your WEA- capable phone to receive a WEA. No registration is required for this alert system.

Nixle

Nixle is a community information service managed by Santa Rosa Police and Fire Departments to send email and/or text message notifications related to public safety (notifications are NOT delivered by phone call). There are three types of Nixle notifications: Alert, Advisory and Community. You can customize your settings at nixle.com to control which types of notifications you receive. You must register at nixle.com or text your zip code to 888-777.

Hi/Lo Sirens

Santa Rosa police cars and fire department vehicles are outfitted with Hi/Lo sirens. This European-style, 2-tone siren is only used in an emergency to alert residents within specific areas of the need to evacuate.

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Live Events

This website provides a listing of the last 48 hours of 9-1-1 calls related to fire and smoke investigations. The purpose of this website is to enable the community to gather information on an active or recent incident. An incident that is active and has firefighters at the scene will be listed as "Open" and those incidents where all resources have been released will be listed as "Closed". The website updates every 5 minutes and is available on the City's website at www.srcity.org/Fire.

6.3 Social Network and Media Programs

Both the City and County use social networks to inform on emergent wildfire and evacuation situations. Facebook and Twitter are widely utilized by both the City Fire and Police Department, while the Police Department also uses Instagram. The principle social network accounts used by local emergency services personnel include:

- Santa Rosa Fire Department Facebook - www.facebook.com/SantaRosaFD
- Santa Rosa Fire Department Twitter – https://twitter.com/SantaRosaFire
- Santa Rosa Fire Department Instagram – www.instagram.comsantarosafire
- Santa Rosa Police Department Facebook - www.facebook.com/SantaRosaPoliceDepartment
- Santa Rosa Police Department Twitter - https://twitter.com/SantaRosaPolice
- Santa Rosa Police Department Instagram - www.instagram.com/santarosapolice/

Radio Stations and Communication Broadcast Systems

During an emergency within the City or County, radio networks (AM & FM) will generally broadcast notable alert tones (Emergency Broadcast System) and provide critical emergency specific information including further contact sources such as a specific agency website, social network site or phone number.

Residents can tune their radio to 1350 AM, 103.5 FM, 100.1 FM, 89.1 FM (bilingual), or 98.7 FM (Spanish).

NOAA Weather Radio (NWR)

This system requires you to purchase a NOAA Weather Radio that must be left on at all times. When activated by a weather event, these radios generate an alarm, voice alert, and flasher. County residents may tune their NOAA radio to frequency 162.475. If you are deaf or have hearing loss these radios have add-on equipment such as strobe lights and bed shakers to help alert everyone in the household that action is needed in an emergency.

Local Media

Local media, including television and newsprint provide messaging during an incident. The City communicates with local news broadcasters to provide updates during an emergency.

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6.4 Protecting Assets

The protection of human life is the City's first priority with the protection of property (i.e., homes, businesses, critical infrastructure) and historic/cultural resource assets secondary. Many residents incorrectly assume that there will be a fire truck available to protect their homes or structures during a wildfire; however, with thousands of structures in the City there are simply not enough personnel or equipment to defend each structure. Often in wildfire situations, it is extremely unsafe and impossible for firefighters or residents to make an effective structure protection stand; therefore, these structures and other assets must be able to survive on their own. The following sections describe actions that can enhance protection of the City's assets:

6.4.1 Life Safety

Local emergency responders generally advise residents to evacuate as quickly as possible during an emerging wildfire, even before an evacuation order has been issued, if conditions warrant it or if property-owner feels it is necessary, they should leave. Vulnerable individuals represent a unique challenge once evacuation orders have been issued. It is crucial that vulnerable and special needs populations have a defined evacuation preparedness plan prior to a significant emergency incident. Early evacuation of these individuals improves their chances of surviving a wildfire while also helping firefighters keep roads clear of congestion for fire suppression and structure defense operations.

Fighting wildfires and protecting structures is extremely complex and dangerous. However, one of the most critical decision made by firefighters during all fire suppression activities is the identification of suitable escape routes and safety zones for themselves and the public. The threat to life safety from a wildfire occurs through three mechanisms:

- Inhalation of toxic gases that poison biological functions.
- Inhalation of hot gases resulting in tissue swelling to the point of obstructing air exchange to the lungs.
- Thermal injury to skin either through convective or radiative heating.

There are many factors that affect the ability of firefighters to protect structures and other improvements so firefighters arriving on scene quickly perform an assessment or "triage" to determine whether a structure or critical infrastructure is safely defendable. Prior to engaging in structure protection activities, firefighters look for:

- adequate escape routes and safety zones
- approaching fire behavior
- access and egress issues
- whether a structure or improvement has characteristics of vulnerability or ignitibility
- hazardous material issues
- adequate water sources
- adequate defensible space and whether the defensible space provides them safe operational space

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- smoke byproducts that may be laced with chemical compounds not found in the wildland fire environment

Fire history and the wildfire assessments completed for the Project Area demonstrates that under the worst-case scenarios, such as the Tubbs Fire, 100-foot minimum defensible space is often insufficient for firefighters to safely engage in structure protection activities during a wildfire. Those structures deemed as vulnerable without adequate safe operational space and may be left on their own in order to preserve life safety of emergency responders. Firefighters and the public should be aware of the potential threat to their life safety when deciding to engage in structure protection activities.

Once ignited, a structure may not become fully involved in burning for some time after the passage of a wildfire; thus, during an emergency, firefighters may consider using a structure as a last resort safety refuge. This should only occur if the structure has been evaluated for ignition susceptibility and its involvement in the fire. For example, a structure consisting of aged weathered wood siding is less desirable than a structure with intact fire-resistant surfaces. Structures can provide protection if individuals can exit the structure into a safe environment before it is fully involved.

Although not designed for use in the WUI, wildland fire safety zone guidelines (as described in Section 5.6) can offer safer operational space for firefighters engaged in structure protection; however, the additional element of burning structures and other "non-native" fuels will significantly increase fire intensities that can threaten the life safety of firefighters and property-owners.

Life Safety and Fuel Treatments

As stated throughout this document, life safety is the priority for all activities in this Plan. There is ample evidence to support that the appropriate use of fuel treatments creates safer working environments for firefighters who might be engaged in protecting life safety and structures even under worst case conditions.

A study of the 2017 Thomas Fire showed the fuel treatments provided opportunities for firefighters to safely engage in structure defense while adequate roadside fuel treatments allowed fire apparatus safer access. Fuel treatments were used operationally as anchor points to build fireline behind structures, and firefighters were more efficient in preparation. These fuel treatments substantially reduced the intensity of the Thomas Fire as it moved into the community of Montecito with firefighters believing that the fuel treatments minimized the threat of residence-to-residence combustion, reduced the volume of ember cast, and allowed firefighters to safely engage in structure defense (2018, A Retrospective Study of Montecito Fire Protection District's Wildland Fire Program during the 2017 Thomas Fire). The SSD assessment in Section 5 demonstrates that fuel treatments, when implemented, can enhance firefighter safety.

6.4.2 Reducing Structure Ignitability

Home and property-owners (both within and surrounding the identified WUI Fire Area) are responsible for defensible space clearance and structure hardening before a wildfire occurs.

Whether a structure survives a wildfire often depends on the structure's susceptibility to ignite even in the absence of fire protection. Structures in the WUI (designated WUI Fire Area or those in non-designated areas of WUI) need to develop and maintain an environmental setting that allows a structure to withstand the passage of a wildfire without the presence of firefighters.

Most actions to reduce the ignition potential of a structure are associated directly with the structure itself and within 100-200 feet from the structure. Under some circumstances, reducing fuels beyond 200 feet may be required depending on the location of the structure on the terrain including steepness of the slope, high wind events (e.g., Diablo winds), vegetation density, and fire behavior.

When discussing structure ignitability, the structural component and defensible space are equally important factors. There are multiple sources of information providing homeowner with specific guidance for strategy to implement mitigation actions.

The Ready for Wildfire website and brochure outlines how property-owners can create and maintain defensible space and is referenced by the City on the Fire Department website (www.readyforwildfire.org/Defensible-Space/). The following provides general guidelines for developing defensible space.

Keep your property lean and green to help protect your family and home.

Creating defensible space is essential to improve your home's chance of surviving a wildfire. It's the buffer you create between a building on your property, including flammable attachments such as decks and fences, and the vegetation that surrounds it. This space is needed to slow or stop the spread of wildfire and protect your home from catching fire - either from direct flame contact or radiant heat. Defensible space is also important for the protection of the firefighters defending your home.

Home Ignition Zone (HIZ)

The Home Ignition Zone (HIZ) home protection guidelines are currently used by the City. They were developed by retired United States Forest Service fire scientist Jack Cohen in the late 1990s following research into how structures ignite due to the effects of radiant heat. It is now supported by the National Fire Protection Association (NFPA 2015) and used as a tool nationwide through www.firewise.org.

The primary responsibility for protecting a structure lies with the property-owner and actions taken within the HIZ. The HIZ includes the structure and everything from the foundation out 100 – 200 feet, depending on fire behavior conditions. Within this 200-foot area, there are three zones:

Zone 1 encompasses the structure and all its attachments (e.g., wooden decks, fences, and patios) for at least 30 feet on all sides. In this area:

- Ornamental and wildland vegetation should be carefully spaced, low growing, well-watered, and free of resins, oils and waxes that burn easily.
- Mow regularly and prune trees up six to ten feet from the ground.

- Create space between tree crowns and trim back any trees that overhang the house.
- Create a 'fire-free' area within five feet of the home, using non-flammable landscaping materials and/or high-moisture-content annuals and perennials.
- Remove dead vegetation from under deck, flammable piles, and within 10 feet of house.
- Consider fire-resistant material for patio furniture, etc.
- Remove firewood and/or stacks or piles of flammable material; they should not be located in this zone.
- Water vegetation and mulch regularly.
- Consider xeric landscaping.

Zone 2 is 30 to 100 feet from the home, and vegetation in this zone should be low growing, well irrigated and less flammable. In this area:

- Leave 30 feet between clusters of two to three trees, or 20 feet between individual trees.
- Encourage a mixture of deciduous and coniferous trees.
- Create breaks in vegetation, such as driveways, gravel walkways and lawns.
- Prune trees up six to ten feet from the ground.

Zone 3 is 100 to 200 feet from the home. Thinning in this area should occur, although less thinning is required than in Zone 2. In this area:

- Thin vegetation and remove heavy accumulation of combustible growth, ground litter, and debris.
- Reduce the density of tall trees so canopies are not touching.

Figure 28 Home Ignition Zone

The Defensible Space and HIZ concepts, when applied to other improvements in the community, can enhance their survivability as well.

Mitigating risks within the HIZ is important and can require coordinated efforts between neighbors where property lines limit implementation of HIZ concepts. Figure 29 depicts neighboring homes with an overlapping HIZ. Whether these property-owners properly maintain their HIZ, their

activities or lack of activity can influence the survivability of a neighbor's home. Small lots with homes built within 100-200′ of each can cause an overlap issue requiring risk reduction efforts by all neighbors for the benefit of all residents.

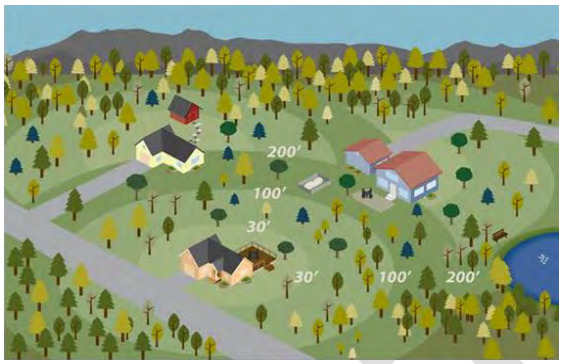

Figure 29 Home Ignition Zone Overlap

The state, county and city have adopted specific regulations within WUI areas that regulate structural components and defensible space in attempts to limit structure loss due to direct flame impingement and ember intrusion. . There are a large number of structures outside of the designated WUI, that were rebuilt after the 2017 Tubbs Fire or structures built since 2008 that are not required to follow the California Building Code Standards, Chapter 7A (WUI building construction standards) that are vulnerable to wildfires. The City adopted non-WUI regulations as a result of the 2017 Tubbs Fires and now requires class A roof for all roof assemblies here after constructed or modified.

A significant step in structure wildfire resilience occurred in 2008 when any new structures built within one of the City's WUI Fire Areas were required to conform to the California Building Code Standards, Chapter 7A. However, a large percentage of the structures within these existing WUI Fire Areas were built prior to 2008, making them especially vulnerable during a wildfire. In January 2020, with the adoption of the 2019 California Building Code and the 2019 California Residential Code (Chapter 3, Section R337), the City now requires property-owners that live within the designated WUI Fire Areas that propose alterations amended (with some exceptions) be required to make these alterations consistent with Chapter 7A and R337. These codes that apply within designated WUI Fire Areas may be used as a guide to any property-owner wanting to take steps to retrofit older structures to meet current standards.

The following mitigation actions teamed with stricter building codes will improve life safety and enhance the survivability of structures throughout the community:

Table 15 Mitigation Actions and City Codes

Structure Components	Mitigation Actions and City Codes
Defensible Space	The City requires defensible space to be maintained around all buildings and structures within the WUI Fire Areas for a distance of 100 feet from all sides of

	any structure, but not beyond the property line, except when adverse conditions exist. Ready for Wildfire and HIZ recommendations and guidelines should be used to develop defensible space. As of 2020, the City also requires that an Ignition Free Zone (IFZ) be provided around buildings or structures within the WUI Fire Area. Buildings or structures protected by an automatic fire sprinkler system require an IFZ for a distance of 3-feet from the structure. Buildings or structures not having an automatic fire sprinkler system require an IFZ for a distance of 5-feet from the structure. Within the IFZ the area should be free of combustible storage material, any vegetation, tree limbs and maintained free of leaves, needles, or other dead vegetative growth, regularly. Only inorganic, non- combustible ground covers, mulch, etc. (i.e. stone or gravel) shall be used. In areas surrounding WUI designated areas property-owners should evaluate their hazard and create defensible space as needed.
Addressing	The City requires that addresses on one- and two-family homes have a minimum of 4-inch lettering, be affixed to the structure, be illuminated during hours of darkness, have a contrasting background, and be plainly visible and legible from the road. All other buildings should be a minimum of 12-inch lettering. Specific address requirements exist for complexes and buildings that cannot be viewed from the public street. Address identification shall be maintained.
Roof	As of January 2020, the City requires all new and existing (if remodeled) buildings to have a minimum Class A roof to help protect structures within and outside the WUI Fire Areas from cast-off burning embers. The replacement of non-Class A roof assembly to meet Class A standards is highly recommended to reduce extreme fire exposure. In addition, plug any openings in roofing materials, such as the open ends of barrel tiles, to prevent ember entry and debris accumulation. Regardless of the type of roof, keep it free of bird's nests, fallen leaves, needles and branches.
Roof Gutters	Roof gutters should always be free of bird's nests, leaves, needles and other debris. Santa Rosa City Codes (SRCC) requires that roof gutters have a means to prevent the accumulation of leaves, needles, and debris. Check and clean them several times during the year.
Garages	SRCC requires that exterior garage door resist the intrusion of embers from entering the area by ensuring that all gaps surrounding the garage door do not exceed 1/8 inch. Garage openings can be retrofitted by using fire tested weather-stripping, providing door overlaps onto the door jambs and headers, or covering door jambs with metal flashing.
Exterior Siding	Noncombustible siding materials (e.g., stucco, brick, cement board and steel) are the best choices for exterior siding. If the use of noncombustible siding materials is not feasible, keep siding in good condition and replace materials in poor condition.

	SRCC has specific requirements for exterior siding that includes approved materials and construction details as to how it should be attached to the floor and roof. SRCC prohibits the use of fire-retardant-treated wood shingles and shakes in designated WUI Fire Area.
Vents	In the designated WUI Fire Area, SRCC does not allow the installation of vents in eaves and cornices, unless installed vents resist the intrusion of flame and burning embers into the attic area of the structure. Vents shall be corrosion-resistant, noncombustible wire mesh with 1/8-inch openings or its equivalent. Existing structures can retrofit vents by covering them with 1/8 mesh or replacing vents with ones that resist the intrusion of flame and burning embers.
Windows and Skylights	Single-pane windows and large windows are particularly vulnerable to thermal breakage due to radiant or convective heat in older homes built prior to current fire codes. SRCC requires the installation of dual pane windows with one pane tempered in WUI Fire Areas. The type of window frame (e.g., wood, aluminum or vinyl) is not as critical, however, vinyl frames can melt in extreme heat and should have metal reinforcements. Keep skylights free of leaves and other debris and remove overhanging branches.
Eaves	Cover the underside of the eaves with a soffit, or box in the eaves, which will reduce the ember threat. Enclose eaves with fiber cement board or 5/8-inch thick, high-grade plywood. If enclosing the eaves is not possible, fill gaps under open eaves with caulk. SRCC has specific eave construction requirements within the WUI Fire Areas to reduce the intrusion of embers into a structure.
Chimneys	SRCC requires all chimneys attached to any appliance or fireplace that burn solid fuel be equipped with an approved spark arrestor.
Decks	Keep all deck materials in good condition. Consider using fire-resistant rated materials or heavy timber construction. Routinely remove combustible debris (pine needles, leaves, twigs and weeds) from the gaps between deck boards and under the deck. Enclosing the sides of the deck may reduce this type of maintenance. Do not store combustible materials under the deck. New construction and remodels must comply with the SRCC requirements for decking that meets ignition resistant building materials and construction as outlined in the California Residential Code for WUI Fire Areas.
Fences	Fences when connected to a structure can provide a path for a fire to enter the structure. In the WUI Fire Areas, SRCC requires that fences connected to a dwelling or accessory structure have the attachment and first 5 feet be constructed of noncombustible materials. If the structure is protected with a fire sprinkler system, the distance is reduced to 3 feet.
Residential Fire Sprinkler Systems	The City requires residential fire sprinklers on all new residential structures. Existing buildings are also required to install residential fire sprinklers based on

	the percentage of remodel or aditions. Annual maintenance, service or inspection of these systems should be completed to ensure operability.
Flammable Items	Keep the porch, deck and other areas of the home free of flammable materials (e.g., baskets, newspapers, pine needles and debris). Keep firewood, bales of hay or straw, and other flammable materials at least 30-feet away from a structure. Lawn furniture can be flammable or if not flammable may blow away during high wind events and break a structures window, providing a path for fire to enter the structure. Store lawn furniture in an area where it will not blow towards the structure.

6.4.3 Natural and Cultural Resources

There are no fuel mitigation actions designed specifically to protect natural and cultural resources, however, these resources are afforded some level of protection as a result of mitigation activities that protect life safety, structures, and critical infrastructure.

6.5 Fuels Mitigation Strategy

The fuels treatment strategy for the City is based on the need to provide enhanced wildfire protection for the community, while also protecting visual quality, and biological and cultural resources. This strategy provides broad direction on where and how to manipulate vegetation to reduce wildfire hazard.

The greatest responsibility for the protection of improvements in the community rests not with the City, but with individual property-owners. The development of adequate defensible space and the hardening structures against ember encroachment are common needs in the majority of the locations evaluated for this plan.

Protecting improvements within 100-feet of structure, as required by Public Resource Code 4291, is primarily the responsibility of the property-owner. As the City looks beyond the HIZ to high wildfire hazard locations on the landscape, this strategy places the highest priority on the maintenance of existing vegetation treatments, and then looks to areas where new fuel treatments could enhance the wildfire protection of segments of the community.

This strategy is organized by creating Treatment Units (Units) based on the City's currently existing Wildland-Urban Interface Zones. These Units have been sub-divided into Compartments to assist in setting fuel treatment priorities within the Units. Priorities for future proposed treatments are set at the Unit level, and no attempt was made to set priorities at a City-wide level. The prioritization approach strategy was chosen as many locations within the City have currently existing fuels treatments or vegetation management programs which are privately funded. These programs should be encouraged to continue based on their internal direction rather than competing with locations that may be more reliant on support from local and state government funding to establish a community-based program.

In order to leverage the investment of time and money that has been expended on hazard mitigation in the past, *maintenance of existing fuel treatments is the first priority of this strategy*. Without maintenance, these treatments will diminish in effectiveness, eventually blending back into the native vegetation. Only through regular maintenance will these treatments remain viable wildfire hazard mitigations features for the community. As funding and personnel become available, new areas for hazard mitigation work should be considered for addition into the overall fuel treatment program.

6.5.1 Existing Fuel Treatment Activities

The City and local citizen groups currently manage a substantial fuel treatment program, with approximately 838 acres identified as being under some level of current management. However, the existing program is not coordinated between the active management organizations and has not created a landscape level fuel treatment program that addresses overall wildfire risk. Existing fuel treatments reflect the priorities of individual HOAs, Open Space Management Associations, the City and other lesser active entities. In fact, there is currently no responsible authority to track fuel treatments across the community nor a consolidated GIS database regarding ongoing activities did not exist prior to this Plan. Geo Elements undertook the task of creating a GIS database of existing treatments as part of this Plan, however, due to the lack of previous data management, existing fuels treatments may be more extensive than were identified by Geo Elements personnel who researched this issue (Figure 30).

Weed Abatement Program

SRFD maintains a progressive Fire Prevention Bureau staffed by a Fire Marshal, two Assistant Fire Marshals, five Fire Inspectors, a Plans Examiner, and the administrative personnel. Additionally, all ten of the City's fire stations are involved in a fire inspection program and work closely with Fire Inspectors in the Fire Prevention Bureau to reduce our community's fire risk.

To help reduce the threat of fires during fire season, the City has a Weed Abatement Ordinance (Ordinance No. 3681) that requires property-owners to cut weeds and grasses that are over four inches in height once fire season is declared, and maintain that level of compliance throughout the duration of the season.

The ordinance applies to owners of any of the following:

- Undeveloped properties (vacant lots) including those in the fire rebuild areas
- All developed properties over 0.5 acres with over 0.5 acres of unimproved land
- All properties located in the WUI Fire Area

SRFD staff conducts weed abatement inspections once fire season has been declared by CAL FIRE and continues inspections throughout the fire season. Owners of properties that do not take action to comply may be subject to a violation and abated by the SRFD. The costs will be the responsibility of the property-owner (per City Ordinance No. 3681). Info on weed abatement is found online (www.srcity.org/WeedAbatement).

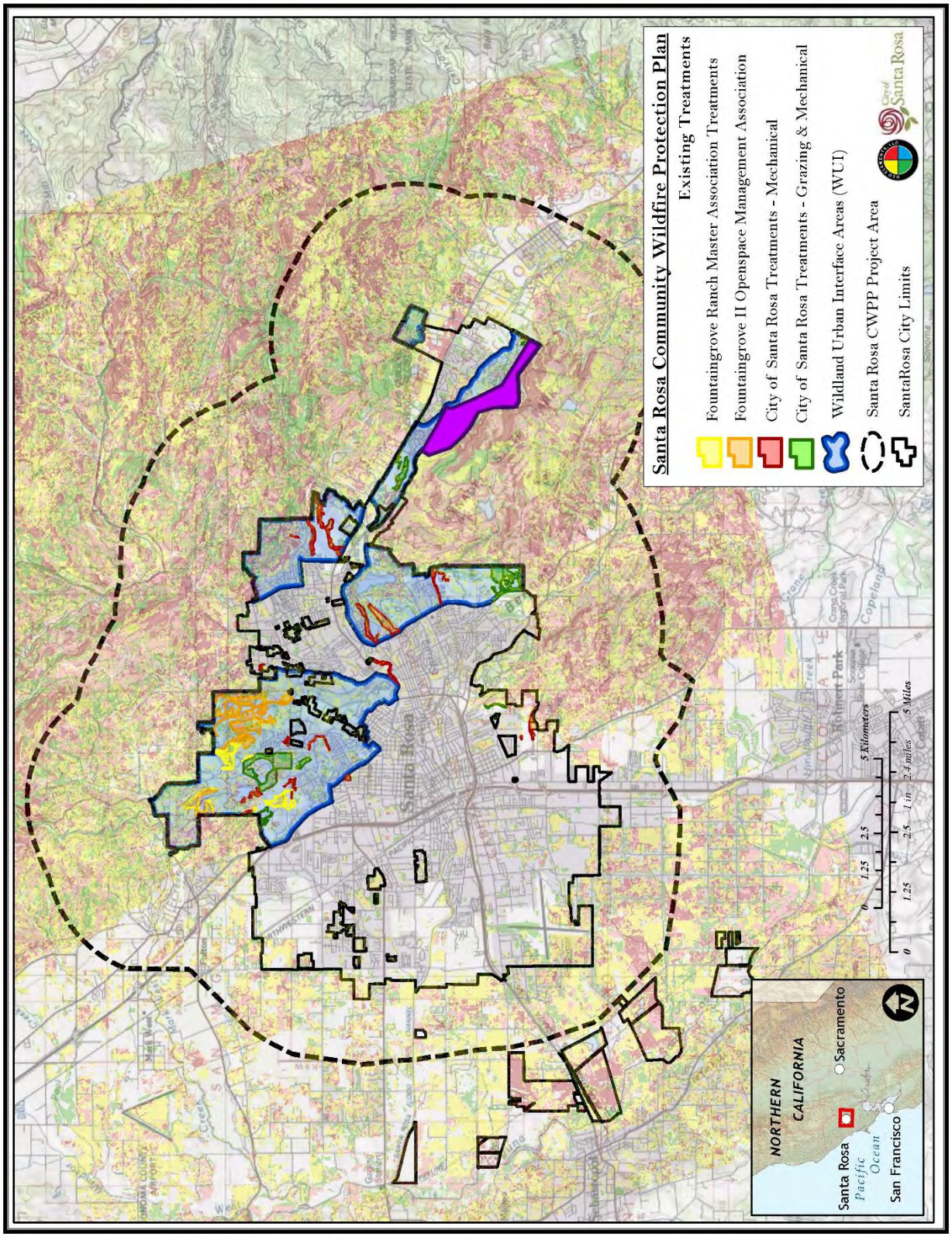

Figure 30. Existing known fuel treatments across the Project Area.

Because of the investment that various organizations and agencies have made in establishing a fuel treatment program, maintenance of these existing treatments is a priority. Maintenance and post-fire restoration of these treated areas are both cost effective and important to prevent the re-establishment of dense vegetation which supports higher wildfire intensities. Table 18 provides a summary of known existing fuel treatments by managing authority. Two overriding principles exist when looking at the maintenance of existing fuel treatments:

1. Activities should work from structures and improvements outward toward the wildland vegetation.
2. Based on historical fire flow paths, Units located on the north side of a community are higher priority for maintenance as these Units have the greatest potential to interrupt fire spread into the City.

Tables of existing fuels treatments are presented in Appendix C.

Table 16 Summary of Known Existing Fuel Treatments by Management Authority

Responsible Management Authority	Acres
Fountaingrove II Open Space Maintenance Association	234.00
City of Santa Rosa Grazing and Mechanical Treatments	246.74
City of Santa Rosa Mechanical Treatments	158.93
Fountaingrove Ranch Management Association	140.34
County of Sonoma – Chanate Campus	4.72
Total	838.10

6.5.2 Proposed Fuel Treatments

Proposed Fuel Treatment Units have been designed to enhance the effectiveness of existing treatments and create greater connectivity between Units. In two cases, Units have been proposed outside of the City's administrative boundary. These Units are associated with the Fountaingrove neighborhoods and will require intensive coordination with the County and private landowners north of the community before any work can be undertaken.

Units with proposed vegetation management actions are discussed separately below. As with existing treatments no attempt was made to prioritize treatment Compartments at a City-wide level; however, proposed treatments are prioritized within each Unit. Figure 31 depicts the proposed fuel treatments.

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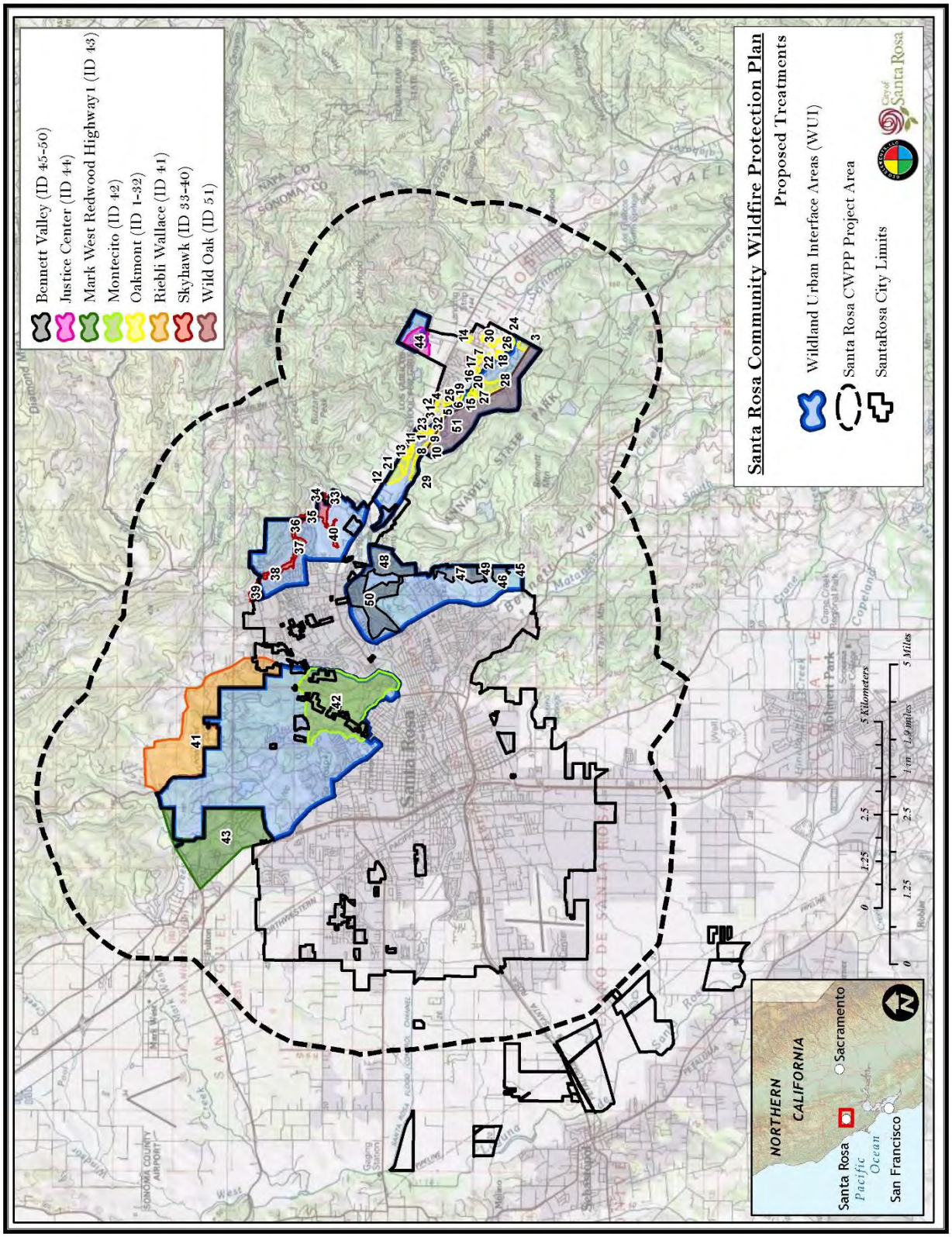

Figure 31. Proposed fuel treatments by unit.

Mark West Springs - Redwood Highway

This single Compartment is located northwest of the administrative boundary of the City and is comprised of 238 individual parcels. Opportunities exist to leverage existing agricultural lands to enhance fuel treatments within this Unit (See Sonoma County Agricultural Open Space http://sonomaopenspace.maps.arcgis.com/home/index.html) (Figure 32). Three treatment priorities were identified for the Unit. These treatments would enhance protection for the City's Fountaingrove WUI Fire Area:

1. Using a combination of citizen required defensible space and agreements with larger property-owners to treat heavier fuel loads south of Mark West Spring Road and north of Skyfarm Drive adjacent to structures.
2. Connect agricultural lands adjacent to the Old Redwood Highway to Skyfarm Road through light grassy fuels. A combination of grazing, mowing or manual cutting of grasses fuels to create a minimum of 100-foot swath of treated vegetation between these potential fire control features. Landowner agreements/participation would be required.
3. Work with the County and CAL FIRE to make a chipper available to the neighborhoods adjacent to Mark Springs West Road from Redwood Highway to Riebli Road to encourage the reduction of fuel loads along this primary west-east travel route. These roads have the ability to serve as strategic wildfire defense points and provide opportunities to reduce fire intensity prior to fire spreading from the north into the Fountaingrove community.

Riebli Wallace

The second of two Compartments located outside of the City, contains a total of 395 individual parcels. Two features exist in this Unit which can support wildfire protection to the northern portion of Fountaingrove; the abundance cultivated lands north of Riebli Road and west of Wallace Road, and a powerline corridor connecting to Amber Lane and Wallace Road from Cross Creek Road and the golf course. This powerline corridor needs to be maintained to assure an ongoing state of low vegetative cover.

Two treatment priorities and an administrative need were identified for the Unit and would enhance protection for the City's Fountaingrove WUI Fire Area:

1. Work with the County and landowners to target dense conifer stands to reduce understory vegetation and to prune trees to 6-feet or more above the surface fuel along Meadowcroft Way.
2. Work with the County and CAL FIRE to make a chipper available to the neighborhoods adjacent to Meadowcroft Way and Reibli Road to encourage the reduction of fuel loads along these primary west-east travel routes. These roads have the ability to serve as strategic wildfire defense points and provide opportunities to reduce fire intensity prior to fire spreading from the north into the Fountaingrove community.
3. Assure that PG&E has a maintenance plan for the powerline corridor and that scheduled vegetation maintenance occurs along this corridor.

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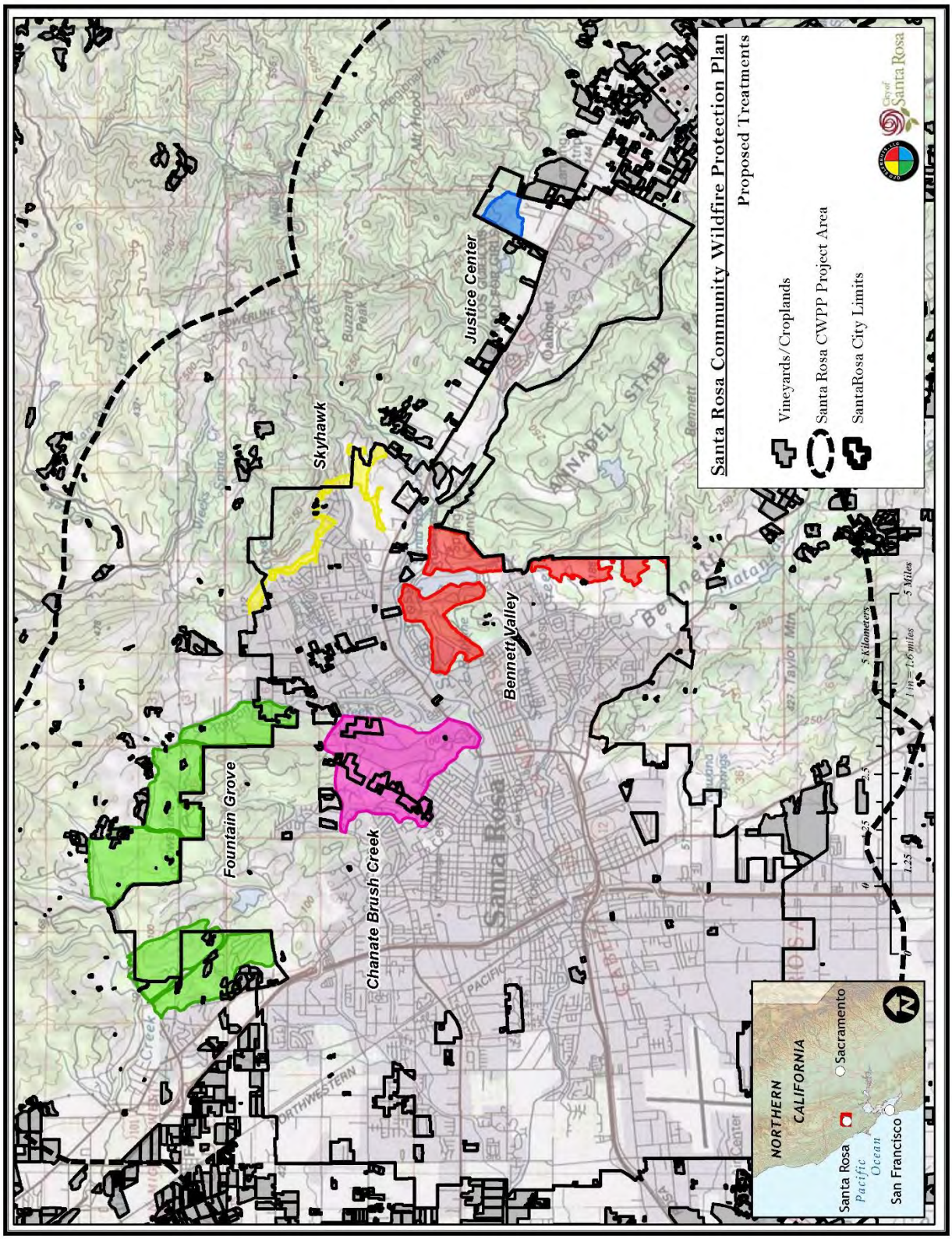

Figure 32. Proposed fuel treatments showing adjacent croplands.

Montecito

The Montecito Unit is roughly defined as Chanate Road to the north, Brush Creek Road to the east, Bryden Lane/Franklin Ave to the west and 4th Street/Highway 12 on the south. There is a significant intermix of native and ornamental vegetation in association with dense residential housing. The primary need for this Unit is the establishment of access to structures along narrow roads and driveways, and implementation of basic vegetation management by property-owners to establish defensible space which meets PRC 4291 requirements.

Three treatment priorities and an administrative need were identified for this Unit:

1. Inventory the road system within the Unit to identify and facilitate the removal of vegetation that impedes accessibility by firefighting equipment. Establish a minimum 14-foot vertical clearance for all public roadways. Work with property-owners to establish the same clearances on driveways and private roads.
2. Develop an annual neighborhood chipper program to encourage property-owners to establish defensible space on their individual properties.
3. Develop a robust fire hazard inspection program to identify properties which can be considered public hazards. Require the property-owner to abate identified hazards.
4. Cut back vegetation along Brush Creek Road, Montecito Avenue and Chanate Road to facilitate traffic movement during evacuations. Maintain the roadside and sidewalk rights-of-way along Chanate Road in in weed-free state during the fall fire season.

Skyhawk

The Skyhawk Unit is composed of eight separate compartments that connect Calistoga Road on the west to Los Alamos Road on the east to provide a linear fuels treatment zone north of the neighborhoods. Treatments are designed to take advantage of the lighter grass fuels immediately adjacent to structures, while avoiding the heavier oak woodland fuels associated with the primary ridgeline north of Skyhawk. The treatments take advantage of a network of social trails and designated roads to define compartment boundaries. Grazing, mowing or manual weed abatement would prove effective in these compartments.

Compartment 40 follows the greenbelt along Mountain Hawk Drive to near Highway 12. This greenbelt has the potential to support fire spread into the neighborhood and should have the grass vegetation maintained on either side of the riparian zone.

Table 17 prioritizes the compartments based on modeled fire intensity. However, the completion and maintenance of all seven compartments north of the neighborhood is important as unmaintained compartments will provide the most probable location for a fire breach these treatments and spread into the neighborhoods.

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Table 17 Fuel Treatment Priorities Based on Modeled Wildfire Intensity

Skyhawk Compartments	Acres	Priority
Compartment 39	25.04	1
Very High - 11+ ft.	19.54	
High - 08-11 ft.	2.89	
Moderate - 04-08 ft.	1.06	
Urban Fuels	1.55	
Compartment 37	16.20	2
Very High - 11+ ft.	9.15	
High - 08-11 ft.	2.79	
Moderate - 04-08 ft.	3.23	
Low - 0-04 ft.	0.35	
Urban Fuels	0.68	
Compartment 35	14.53	3
Very High - 11+ ft.	7.64	
High - 08-11 ft.	2.55	
Moderate - 04-08 ft.	4.25	
Low - 0-04 ft.	0.00	
Urban Fuels	0.09	
Compartment 33	14.90	4
Very High - 11+ ft.	4.67	
High - 08-11 ft.	0.59	
Moderate - 04-08 ft.	0.53	
Low - 0-04 ft.	2.82	
Urban Fuels	6.29	
Compartment 36	16.03	5
Very High - 11+ ft.	4.16	
High - 08-11 ft.	6.95	
Moderate - 04-08 ft.	3.43	
Low - 0-04 ft.	1.15	
Urban Fuels	0.34	
Compartment 38	24.74	6

Very High - 11+ ft.	4.49	
High - 08-11 ft.	3.41	
Moderate - 04-08 ft.	12.97	
Low - 0-04 ft.	3.47	
Urban Fuels	0.40	
Compartment 40	2.22	7
Moderate - 04-08 ft. Flame Length	0.30	
Low - 0-04 ft. Flame Length	0.11	
Urban Fuels	1.80	
Compartment 34	34.90	8
Very High - 11+ ft.	3.31	
High - 08-11 ft.	3.83	
Moderate - 04-08 ft.	26.95	
Low - 0-04 ft.	0.21	
Urban Fuels	0.60	

Bennett Valley

The Bennett Valley Unit is designed to treat fuels between the administrative boundary of Trione-Annadel State Park north from Woodview Drive to Spring Lake and Howarth Memorial Parks. These treatments provide a level of fire protection to the neighborhoods east of Summerfield Drive. Any treatments in Spring Lake Park would need to be in coordination with Sonoma County Regional Parks Department.

Home-Owner Associations were not responsive when outreached during the development of this Plan but could be leveraged to accomplish vegetation management work in these compartments. Existing fuel management treatments were identified in this Unit, particularly in Compartments 45 and 46. The proposed treatments build on this existing work.

Expansion of vegetation treatments should focus on building a 300-foot buffer from the structures toward the boundary of Trione-Annadel Park. Some of this responsibility will fall on individual property-owners to complete defensible space work within 100-feet of structures or to their property lines. Beyond these limits, mowing, grazing or manual removal of herbaceous fuels is the priority work in compartments 45, 46, 47 and 49.

Compartment 48 and 50 include Howarth and Spring Lake Parks. The priority for these locations is the treatment of herbaceous fuels by the jurisdictional authority in high use areas to limit the potential of an accidental fire start. These grass-type fuels need to be managed throughout the fire season in order to assure a level of low flammability heading into the critical fall fire season.

Two treatment priorities and two administrative needs were identified for this Unit:

1. Assure treatment of herbaceous fuels soon following their curing in high public use areas of Howarth Park. Vegetation needs to be managed in a state of low flammability through the fall fire season. Work with the County to establish similar protocols for Spring Lake Park.
2. Establish a working relationship with HOAs within the Unit (Bennett Valley HOA, Fairway View Estates HOA) to develop neighborhood based defensible space programs. Support with a neighborhood chipping program.
3. Develop a robust fire hazard inspection program to identify properties which can be considered public hazards. Require the property-owner to abate identified hazards.
4. Manage vegetation intrusion along City controlled areas of Channel Drive between Montgomery Drive and State Park Headquarters. Work with the County and State Parks to develop an MOU for treating fuels within the right-of-way of Channel Drive.

Table 20 establishes the priority of treatments within the compartments, however, compartments 45, 46, 47 and 49 should be considered as a connected linear fuels treatment zone to separate structures from wildland fuels. These compartments would be best treated together to assure the greatest effectiveness.

Table 18 Fuel Treatment Priority with Compartments

Bennett Valley Compartments	Acres	Priority
Compartment 48	169.40	1
Very High - 11+ ft. or Greater Flame Length	11.93	
High - 08-11 ft. Flame Length	23.23	
Moderate - 04-08 ft. Flame Length	68.78	
Low - 0-04 ft. Flame Length	24.54	
Urban Fuels	40.92	
Compartment 50	230.13	2
Very High - 11+ ft. or Greater Flame Length	14.76	
High - 08-11 ft. Flame Length	35.91	
Moderate - 04-08 ft. Flame Length	70.36	
Low - 0-04 ft. Flame Length	35.79	
Urban Fuels	73.30	
Compartment 47	101.40	3
Very High - 11+ ft. or Greater Flame Length	1.94	
High - 08-11 ft. Flame Length	1.47	
Moderate - 04-08 ft. Flame Length	34.82	

Low - 0-04 ft. Flame Length	39.41	
Urban Fuels	23.76	
Compartment 45	0.30	4
High - 08-11 ft. Flame Length	0.09	
Moderate - 04-08 ft. Flame Length	0.20	
Urban Fuels	0.01	
Compartment 46	1.73	5
Moderate - 04-08 ft. Flame Length	1.42	
Low - 0-04 ft. Flame Length	0.26	
Urban Fuels	0.05	
Compartment 49	2.61	6
Moderate - 04-08 ft. Flame Length	2.12	
Low - 0-04 ft. Flame Length	0.22	
Urban Fuels	0.27	

Justice Center

A single compartment comprises this Unit consisting of five individual parcels. Relatively flat with grass-dominated fuels, the Justice Center WUI can be simply maintained in a state of low fire flammability through either mowing or manual removal of herbaceous fuels after they are fully cured each summer. Understory vegetation removal below the conifer canopy north of Los Guilicos Road could be considered to assure that a 100-foot minimum defensible space from potentially hazardous fuels is achieved for any improvements south of the road. Wineries to the west and east, and the Oakmont community to the south, assures adequate separation of improvements from any wildfires spreading towards this WUI from these directions.

One treatment priority and administrative need was identified for this Unit.

1. Consider roadside fuels treatments, and understory vegetation removal along Pythian Road to facilitate safer egress from and access to Pythian House Cottage and a parking area associated with Hood Mountain State Park. These improvements are outside of the City and the CWPP Project Area. Agreement with landowners and the other jurisdictional agencies will be required for these treatments.

Oakmont

Thirty-two compartments organized by existing neighborhoods and HOAs within the overall Oakmont Village community comprise this Unit of more than 1,500 individual parcels. Oakmont is a recognized FireWise USA community, and much like Fountaingrove has an existing program for the management of vegetation within the community. Oakmont's existing program is self-

funded, and therefore priority setting is done within the individual neighborhoods as overseen by the Oakmont Village Association.

The greatest wildland fire threat to Oakmont Village is south and west of the combination of Stone Bridge Road and Oakmont Drive, as this portion of the Unit interfaces with heavier fuels and the native vegetation found in Trione-Annadel State Park. The remainder of this Unit is a combination of well-maintained urban landscapes, golf courses and developed sites. Pockets of wildland fuels and ornamental vegetation (such as junipers, oleanders and eucalyptus) create small-scale hazards that may affect single or small groups of residences during a wildfire.

Treatments in this Unit will contain a full range of activities with existing grazing and mechanical treatments on City lands identified in their GIS data library. Due to the number of individual compartments, the priority treatment list is attached as Appendix D (Figure 33).

Two treatment priorities and an administrative need were identified for this Unit:

1. Continue to address the removal of junipers, oleander and eucalyptus within the Unit, transitioning to a less flammable form of landscape screening. Request support from the City for grant funding to support this action.
2. Work with State Parks and PG&E to assure that the powerline corridor located southwest of the community is maintained in a state of reduced fire flammability.
3. Establish an MOU with Wild Oak Association to allow for an alternative community exit route through Wild Oak along the PG&E powerline access road that begins at the end of Oak Mesa Drive.

Wild Oak

A single compartment makes-up this Unit located adjacent to Oakmont Village which includes the Villages of Wild Oak and the Wild Oak HOA. The gated community features a built environment where homes blend into the natural landscape. While this creates an attractive visual setting, it also creates wildfire protection issues by limiting the development of defensible space near structures and allowing vegetative encroachment and canopy closure along the two laned one-way in-and-out travel routes, Wild Oak Drive and White Oak Drive.

Wild Oak consists of residential housing and common areas encompassing a total of 325 acres. There are approximately 192 residential lots developed with single and multi family homes. Additionally, there are 180 acres of common areas which include roads, gates and open spaces. The common area is owned by the Wild Oak Association for the benefit of its members (www.wildoakhoa.net, accessed January 28, 2020).

The development and maintenance of defensible space and the identification of an additional evacuation route are the focus for this Unit. Two treatment priorities and two administrative needs are identified for this Unit.

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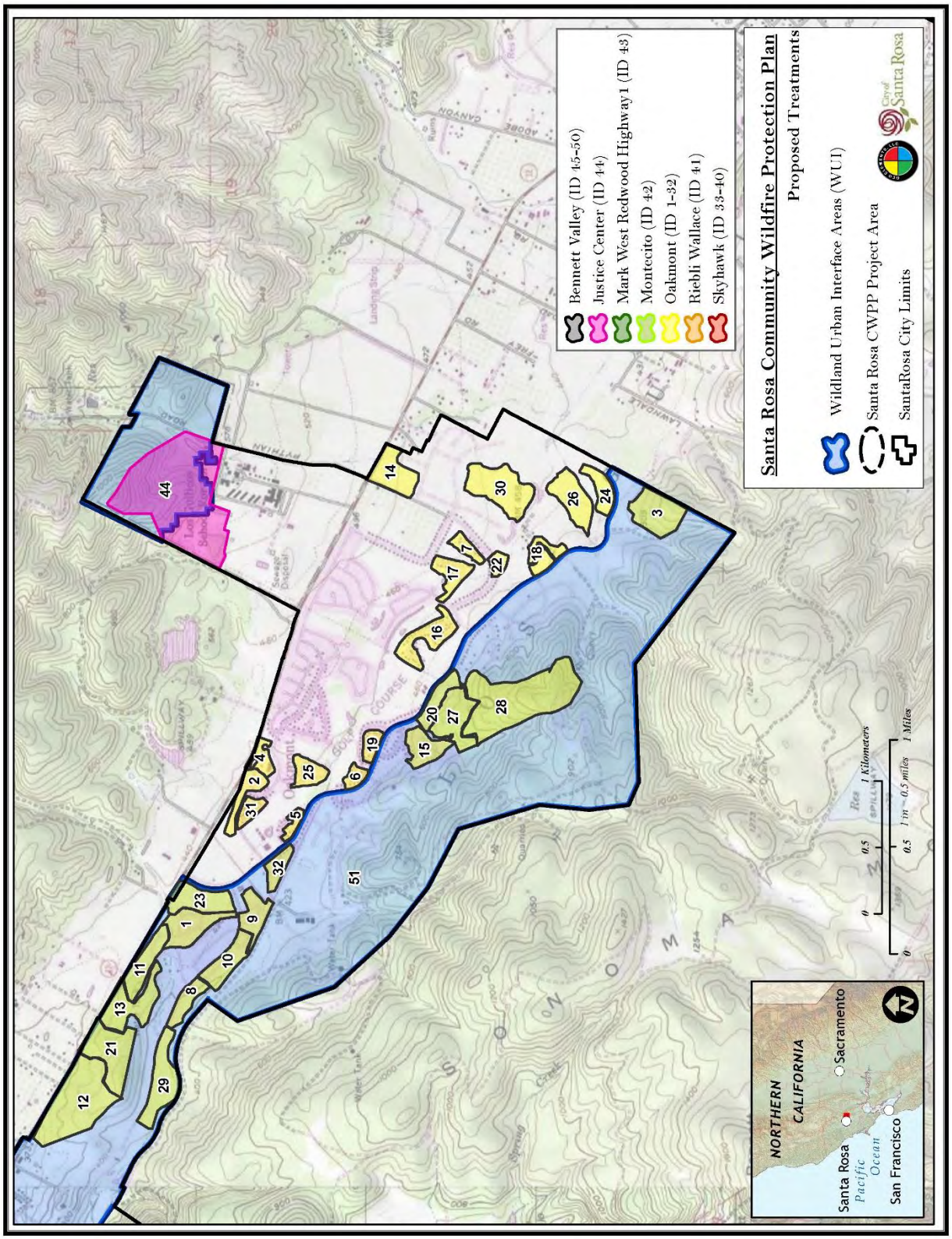

Figure 33. Oakmont proposed fuel treatments.

1. Defensible space – The responsibility of the individual property-owner, the Association in conjunction with the Fire Department should complete annual hazard abatement inspections on a portion of the community. Property-owners who are out of compliance with PRC 4192 need to be educated on defensible space requirements and enforcement of these requirements be mandated by the City. Common areas must also meet hazard abatement requirements.
2. Roadways in the Unit require inspection to assure that a minimum 14-foot clearance exists to allow access by fire equipment. The City should notify the Association and individual property-owners of trees requiring pruning, with the responsible entity required to develop adequate roadway vertical clearance.
3. Current egress from the community is restricted to two one-way roads, White Oak Drive and Wild Oak Drive. Wild Oak Association has identified a utility road that could be utilized as an alternative egress route during emergencies. The PG&E powerline road comes off the south end of White Oak Drive in Wild Oak then goes downhill to connect with Oakmont's Oak Mesa Drive. The City should inspect this proposed alternative route to determine the viability, and if deemed appropriate, work with the Association to develop an MOU for the use and management of this travel route.
4. Develop an MOU with Oakmont Village for the use of roads within Wild Oak as alternate egress route in order to enhance the overall fire safety of the greater community.

6.6 Vegetation/Fuel Treatment Guidelines

The following section provides fuel treatment prescriptions, implementation guidelines that help the City and property-owners with implementing fuel treatments, and best management practices to assist the City and property-owners with implementing fuel treatments to address the wildfire hazard while minimizing impacts to natural resources.

6.6.1 Vegetation/Fuel Treatment Prescriptions

Fuel treatment prescriptions vary from high to low intensity. The level of intensity is determined by the vegetation type, topography, and may be limited by sensitive habitats, historical and cultural sites, soil or watercourses, and proximity to structures, and roads. The intensity of treatment is measured by the amount of vegetation modification required to meet site-specific mitigation goals (e.g., high intensity treatments generally remove vegetation than do low intensity treatments). The goal of these fuel treatment prescriptions is to reduce fire behavior, thereby reducing the wildfire impacts on community assets.

It is important to understand that fuel treatment can be costly and prone to limitations such as budget, environmental clearances, property-owner participation, and an available workforce. The implementation guidelines and best management practices were developed in consultation with a biologist with Althouse and Meade, Incorporated.

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6.6.1.1 Evacuation Route Treatment Prescriptions, Implementation Guidelines, and Best Management Practices

Location → / Fuel Type ↓	Primary Zone (A) **(up to 50')** (distance varies with terrain & accessibility)	Secondary Zone (B) **(50' – 100')** (distance varies with terrain & accessibility)
Grass/ Forbs	Reduce fuelbed depth to less than 4-inches.	Treatment may not be needed.
Surface dead/down material (primarily correlated with tree and chaparral overstory)	Remove all large (>3-inches diameter) dead/down material.	Remove up to 75 percent of >3" diameter dead/down material.
Chaparral/Shrub	Remove all chaparral/shrub vegetation within this zone.	Remove up to 75 percent of chaparral vegetation. Widely spaced small pockets or clumps of chaparral/shrubs are permitted. Pockets/clumps of chaparral remaining should be healthy, early seral stage plants limbed to 1/3 height of chaparral/shrub crown. Chipped or masticated material may be "blown" back onto the slope where feasible to enhance soil coverage.
Trees Overstory (without chaparral/shrub understory)	Prune all trees to 6-feet or ½ of the live crown height, whichever is less. Remove dead standing snags and branches extending over roadways to a minimum height of 14-feet. Thin/remove smaller trees leaving larger trees (6-inch DBH) with a minimum crown spacing of 10-feet.	Same treatment as Zone A, with the exception of overstory spacing. Overstory canopy should provide shading of the surface to limit potential development of grass or shrub understory vegetation.
Trees Overstory (with chaparral/shrub understory)	Thinning specifications, same as Trees Overstory (without understory), but remove all understory chaparral/shrubs below trees in this zone.	Remove all chaparral/shrubs from the understory of the tree canopy. Where crown cover allows, ensure shading of the surface to limit potential development of grass or shrub understory vegetation.

6.6.1.2 Vegetation/Fuel Treatment Prescriptive Guidelines, Implementation Guidelines, and Best Management Practices

Location →	Primary Defense Zone (A) (0 – **30'** from a structure)	Fuel Reduction Zone (B) (**30' – 100'** from a structure)	Fuel Reduction Zone (C) (**100'** and greater from a structure)
Fuel Type ↓	*Based on California Public Resources Code 4291 and HIZ Recommendations*		*Based on Firefighter Safety*
Grass/ Forbs	Reduce fuel depth to no more than 4-inches.	Reduce grass height to 4" or less. Longer grass in discontinuous open areas is acceptable.	Treatment may not be needed.
Surface Dead/Down Material	Remove all dead/down materials.	Reduce dead/down flammable material to < 3" depth; and < 5 tons/acre, non-contiguous isolated logs acceptable.	Reduce heavier pockets of dead/down flammable material to < 5" depth; < 5-7 tons/acre in isolated logs acceptable.
Chaparral/ Shrub	Remove all but individual specimen chaparral plants. Individual ornamental/native shrubs should be spaced at a minimum 2x shrub height.	Remove up to 75 percent of chaparral/shrub vegetation. Allow for intermittent small pockets or clumps of chaparral/shrub vegetation. Pockets and clumps of chaparral/shrub remaining should be healthy young-growth stage and limbed to 1/3 height of chaparral/shrub crown.	Less intensive chaparral/shrub vegetation removal with up to 30 foot for spacing of pockets and clumps of chaparral and shrubs. The remaining pockets and clumps of chaparral should be healthy and at the young-growth stage; and limbed to 1/3 height of chaparral/shrub crown.
Trees Overstory (without chaparral/shrub understory)	Thin smaller trees leaving larger trees (>than 6-inches DBH) at 10-20-foot crown spacing (based on slope, tree size and type); limb/prune lower branches 6-feet above grade level, or lower 1/3 of tree height on smaller trees. Remove dead standing snags.	Thin smaller trees leaving larger trees (> than 6-inches DBH) at approximately 10 foot crown spacing (based on slope, tree size and type); limb/prune lower branches 6-feet up, or lower 1/3 of tree height on smaller trees and remove all broken limbs and dead material. Remove dead standing snags.	Limb and prune lower branches of larger trees up to 6-feet and remove all broken limbs and dead material. Remove dead standing snags, which increase the volume of fuel and may threaten an improvement should it fall, clear all vegetation around the base of retained snags.
Trees Overstory (with chaparral/shrub understory)	Thinning specifications are the same as Trees Overstory without Chaparral/shrub understory in Zone A. Understory: remove chaparral; limb/prune ornamental shrubs to 1/3 of shrub height.	Thinning specifications are the same as Trees Overstory without Chaparral/shrub understory (Zone B). Understory: occasional small, less dense chaparral/ shrub vegetation and small tree clumps and pockets in openings without canopy and small trees in openings (non-canopy) are acceptable.	Thinning specifications are the same as Trees Overstory without chaparral/shrub understory in Zone C. Understory specifications are the same as Chaparral/shrub in Zone C except the pockets and clumps are limited to tree openings (non-canopy).

Implementation Guidelines for All Vegetation Treatments

The following describes possible restrictions to implement fuel treatments:

- CEQA may be required prior to implementation of all site-specific projects.
- Shrubs will vary in size randomly scattered across the project area. Chipped material should not exceed 3-inches in depth.
- No burn piles will be constructed within a streambed including the riparian habitat supported by the stream.
- Boundaries between treatment levels will maintain free-form shapes and feathered edges that replicate natural patterns; avoid straight lines by scalloping and feathering along edges of vegetation. The feathering of edges includes undulating edges horizontally and diverse heights of the brush retained on site.
- Precautions will be taken to prevent scarring of trees by equipment.
- Signs should be posted warning the public of potential hazards during fuel treatment activities.

Noxious Weeds

- To limit the spread and establishment of invasive plant species (e.g., noxious weeds) into project areas, all off-road equipment used during project implementation will be washed free of invasive exotic weeds and seeds before entering project areas. If any equipment works in an area where weeds occur, it will be washed to remove weed propagules prior to entering other work locations.
- All equipment staging areas and burn pile areas will be located away from known areas with noxious weed occurrences and outside of riparian habitat area.

Cultural Resources

Any known cultural resources within the proposed treatment area will be protected. If any sensitive cultural resources are found, work will stop, and a qualified Archaeologist will be notified.

Soil and Watershed

- Minimize damage to surface soil structure to reduce potential for erosion and sediment transport to drainages.
- No mechanical equipment use on slopes greater than 30 percent with following exception: Mastication can occur on slopes greater than 30 percent where the equipment is operating on slopes less than 30 percent and accessing steeper slopes with a boom arm.
- Chipped or masticated material may be "blown" back onto the slope where feasible to enhance soil coverage.

Tree Removal

- All live tree removal will be in compliance with the City's Tree Preservation Ordinance - www.srcity.org/583/Tree-Removal-Preservation.

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Sudden Oak Disease Prevention

- During the rainy season, Oak trees will not be pruned until there is a dry spell
- Before pruning any Oak tree:
    - Sanitize saws and pruning tools with a recommended solution, such as (1) Chlorine bleach (10/90 mixture with water), (2) Clorox Clean-up, or (3) Lysol spray (preferential, since it is less corrosive to tools).
    - Tools will be sanitized as the workers move from Oak tree to Oak tree.
    - If the tree is being removed for health or safety reasons, then sanitizing tools is not necessary.
- Chipping procedures:
    - Chipper will not direct chips within 15′ from any oak tree or 25′ from any Waterway.
    - Chips will not exceed a depth of 3″ and will be kept a minimum 5′ away from the base of any tree, or 1′ from a shrub.
- Pruning's from: (1) Oaks with SOD, (2) Bays, or (3) other host plants of SOD will not be dragged within 15′ of the trunk of an Oak.

Recommend the following Best Management Practices (BMP's)

- Environmentally Sensitive Habitat Areas (ESHA) including, but not limited to riparian areas and wetlands, will be marked on the project area maps (Figure 34).
- Known landslide and unstable areas should be avoided for safety reasons and because vegetation treatment activities may result in increased potential for mass wasting and sediment delivery to stream courses.
- Heavy equipment will not work on slopes greater than 30%. Movement of any heavy equipment across slopes should be minimized. Heavy equipment will not be used in riparian areas.
- To protect streams and stream courses, the following shall be implemented:
    - Activities within the riparian zone of any stream or top of bank, whichever is further from the water course, shall be subject to a setback.
    - Location and method of stream course crossing should be identified prior to fuel reduction activities to protect the stream course. Required approvals will be obtained from the jurisdictional agencies prior to equipment crossing any water course.
    - Project generated vegetation debris shall be removed from the stream course.
    - Water bars and other erosion control structures will be located so as to prevent water and sediment from being channeled into stream courses and to dissipate concentrated flows.
- No servicing or refueling of equipment will occur on site. Operators must remove residues, waste oil, engine coolants, and other harmful materials from all worksites. Spill containment will be established prior to any on-site servicing or refueling.

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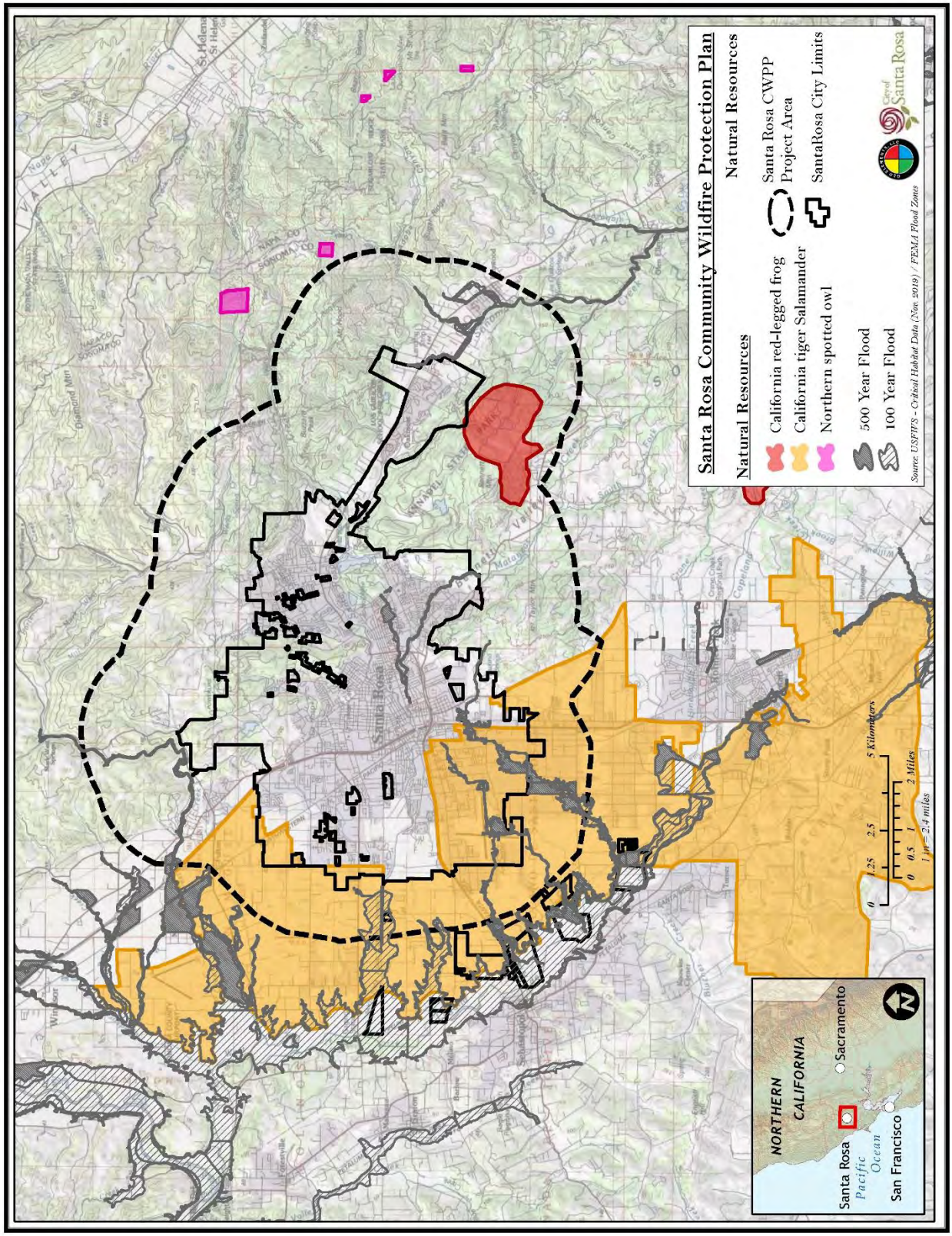

Figure 34. Environmentally sensitive habitat areas (ESHAs).

6.6.2 Fuel Treatment Categories

Fuel treatments typically fall into four treatment categories – mechanical, manual, prescribed fire (pile burning), and biological. The fuel treatment strategy for the City may involve all of these treatment types with the use of pile burning being the most complex mechanism. The following are brief descriptions of the more common fuel treatment methods:

Mechanical

This method is generally associated with larger fuel treatment areas where the cost of contracting industrial mowers or masticators can be offset by rapidly treating large portions of the landscape. Mechanical treatments can also be effective for linear treatments such as roadsides.

Mechanical treatments, such as mowing and mastication, do not reduce hazardous fuels but rearrange them into a less flammable configuration. Both methods of treatment take vertically oriented fuels and rearrange them into horizontally oriented fuels through the process of cutting and chipping of the standing vegetation. This exposes the fuel to less wind and allows it to absorb moisture from the soil. These processes reduce the potential fire behavior characteristics of the fuel.

Manual

This process utilizes human labor to manually cut and remove or rearrange fuel. Thinning, dropping dead standing trees, pruning and clearing of vegetation is the most common treatment. Fuels treated manually are either chipped into a less flammable state (like mastication), then removed from the site by a vehicle or piled for burning at a later date when weather conditions preclude fire from spreading across the landscape. Manual fuel treatments are more precise than mechanical treatments and can address hazardous fuel conditions without having a significant impact on visual, cultural, or biological resources.

Pile Burning

As of March 2020, SRFD does not authorize non-agricultural burning within the City, however, Department staff is researching the feasibility pile burning as a method to eliminate hazardous fuels.

Pile burning under appropriate weather conditions can rapidly eliminate fuel after manual or mechanical treatment activities. Pile burning is a cost-effective way to address the elimination of hazardous fuel but requires permitting from air regulators and SRFD. As with any prescribed fire, there is risk of a potential escape from a burning pile into nearby vegetation. This risk can be mitigated through the permitting process, should the City choose to adopt a pile burning program.

Biological

Biological treatments use grazing animals to consume hazardous fuel. Typically, animals are indiscriminate eaters, however, they prefer younger soft vegetation and will often eat non-target vegetation (e.g., ornamental vegetation) if not properly contained within the treatment area. The

animal of choice for grazing within communities are typically goats. Some issues associated with using animals include an increased risk of spreading invasive species when not maintained on a weed free diet prior to placement and smell and noise when utilizing animals within residential areas. Another consideration is the effect of animal waste on nearby waterways and ESHAs.

6.7 Actionable Items

The following table is a consolidated list of priorities and recommendations that identify actions that the City should consider in their efforts to reduce the wildfire threat to community assets with consideration for climate change.

These items were developed from results of the public survey, wildfire assessments, public workshops, steering committee meetings, and existing reports and documents. This list of actionable items is intended to assist with project tracking, accountability, and planning outcomes for this Plan.

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Table 19 Actionable Items Table

Actionable Items					
Objective	Number	Action	Responsible Official	Target Date	Status
A. Improve Coordination & Tracking Many public and private entities are currently taking actions to reduce wildfire intensity and provide greater community protection; however, the lack of a centralized point of contact for the City or data management protocols has led to what is believed to be an incomplete picture of all ongoing fuel treatment activities. No mechanism is in place to collect and manage the data from projects currently being implemented by the variety of partners. Knowing the location and extent of ongoing actions is an essential element of developing an effective overall fuel treatment strategy.	A-1	Develop a robust GIS database of fuel treatments occurring on public and private lands in order to fully understand the extent of these exiting actions. At a minimum, the following categories should be used to track projects including project name, georeferenced data, date started, date completed, method of treatment, acres or feet completed, and total money spent.	Fire Department – GIS Staff	Ongoing	
	A-2	Through outreach to homeowner associations, open space management associations and other large parcel-owners within and adjacent to the City, establish a mechanism where fuel treatment actions can be reported and managed by a single City data manager.	Fire Department - GIS Staff		

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	A-3	Establish an ad hoc homeowners' group to serve as a single point of contact with the Fire Department for the collection of private property fuels treatment spatial data.	Fire Marshal		
	A-4	Support ongoing actions by providing technical support from Fire Department personnel with wildland fire expertise to assist in treatment design, maintenance standards and funding opportunities.	Fire Marshal		
B. Improve Evacuation Routes Fuel treatments adjacent to roads can reduce fire behavior along important travel routes. Utilize evacuation route fuel treatment prescriptive guidelines to treat the following priority roads: • Skyfarm Drive • Saint Andrews Drive • Cross Creek Drive • Fountain Grove Parkway • Wallace Road • Brush Creek Road • Calistoga Road	B-1	Identify parcel-owners along primary evacuation routes and establish agreements with landowners to perform fuel reduction.	Fire Department - GIS Staff		
	B-2	Establish an MOU with the County for fuel reduction work on County lands within the administrative boundary of the City.	City Attorney – Assistant Chief		

• Yerba Buena Road • Saint Francis Road • San Ramon Way • Mountain Hawk Drive • Los Alamos Road • Montgomery Drive • Channel Drive • Summerfield Road • Chanate Road	B-3	Identify and fund a lead agency for the treatment of herbaceous and woody fuels along City controlled right-of ways.	Public Works – Fire Department		
	B-4	Investigate the efficiency and public support for the use of naturally based herbicides to treat invasive species, (Bromus spp.) along evacuation route rights-of-way.	Public Works – Fire Department		
	B-5	Establish responsibility for the management of weedy vegetation in median strips within the community. Work with the responsible agency to develop a program to treat these herbaceous fuels prior to September 1 annually. Focus areas should be east of Highway 101.	Public Works – Fire Department		
	B-6	Seek grant funding for the removal of fire damaged trees which may fall and impede vehicular traffic along major travel routes.	Fire Marshal		

C. Educate the Public on How to Mitigate Risk and Damage from Wildfire A challenge for all communities is how to generate interest and maximize awareness of the wildfire threat and encourage participation in preparing for a wildfire at an individual and community level. Public education is critical to community preparedness and citizens need to know where to obtain accurate information before an event occurs. Survey questions 15 through 18 looked at educational resources to determine if they were adequate and were being utilized. Only 14 percent of 460 respondents (question 15) felt there were adequate resources. While only 23 percent of 459 respondents (Question 16) had used the online resources to prepare for wildfire. Only 8 percent of 459 respondents (Question 17) had participated in a neighborhood education program (See Appendix B for details). Some recommended action items were developed based on the public's response to types of educational resources that would be most beneficial.	C-1	Increase public education to residents on defensible space, fire safe landscaping, home hardening, evacuation, wildfire preparedness.	Fire Department		
	C-2	Provide community and/or homeowner/neighborhood training classes on wildfire preparedness	Fire Department		
	C-3	Create online You Tube videos to educate residents on defensible space, fire safe landscaping, home hardening, evacuation, and wildfire preparedness. Utilize local residents and homeowner associations to develop content and provide local faces.	Fire Department – Building Department, Communications & Intergovernmental Relations Officer		
	C-4	Develop a voluntary neighborhood inspection program to provide more detailed information to residents on home hardening techniques, defensible space, and fire safe landscaping.	Fire Department – Building Department, Communications & Intergovernmental Relations Officer		

	C-5	Redesign SRFD's website to better organize wildfire education. Include information on defensible space, fire safe landscaping, structural hardening components, WUI building construction requirements, Red Flag Warning Program. Centralize information to allow users to obtain information from a single location.	Fire Department – Building Department, Communications & Intergovernmental Relations Officer		
	C-6	Create a document with graphics, which clearly explains defensible space requirements found in PRC 4291 and City specific requirements. Have information available on the website and as a handout	Fire Department – Building Department, Communications & Intergovernmental Relations Office		
	C-7	Create a document with graphics that clearly defines the City's specific requirements. Have information available on the website and as a handout.	Fire Department – Building Department, Communications & Intergovernmental Relations Officer		
	C-8	Continue educating and updating the community on the evacuation program and evacuation drills. Keep website up to date.	Fire Department		
	C-9	Create educational material on evacuation of vulnerable populations, small pets, and large animals.	Fire Department		

D. Improve Wildfire Preparedness Wildfire preparedness involves a range of that include the coordination of multiple governmental agencies and non-governmental organizations. Creating connectivity between agencies and organizations can strengthen the community's response to a significant wildfire.	D-1	Work with the County to increase the number of City residents that are trained and active in the CERT program.	Fire Department - Office of Emergency Services, homeowner associations		
	D-2	Develop a plan to effectively utilize CERT teams during a wildfire.	Fire Department - Office of Emergency Services		
	D-3	Work with the County to increase the number of City residents trained and active in the LISTOS Spanish speaking community program.	Fire Department - Office of Emergency Services, homeowner associations		
	D-4	Develop a plan to effectively utilize LISTOS teams during a wildfire. Other organizations, such as the County and the League of California Cities can be used as a model for development of the plan.	Fire Department - Office of Emergency Services		
	D-5	Develop a program to address evacuation vulnerable populations in the City.	Fire Department - Office of Emergency Services		
E. Increase Structural Hardening The 2019 California Building Code and amendments requires new development and properties completing alterations to meet WUI Fire Area construction standards; however, there are still a large percentage of structures	E-1	Continue to work with City Building officials, County Fire Departments, CALFIRE and the State Fire Marshal to develop and adopt building standards that will increase structure resiliency.	Fire Department		

within the WUI Fire Areas built prior to 2008 WUI building construction standards that are vulnerable to loss from wildfire. The cost of retrofitting existing structures with wildfire safety improvements can be significant, but retrofitting structures combined with adequate defensible space will make a difference in whether a structure survives a wildfire. Survey responses from the community for question 41 through 43 showed that 79 percent supported more stringent building and fire code requirements for new development and 62 percent supported more stringent building and fire code requirements for existing structures within the WUI Fire Areas.	E-2	Research Senate Bill 465 to determine if the City's WUI Fire Areas are eligible for PACE program financing to help property-owners retrofit existing non-conforming structures to current WUI building construction requirements (See Appendix A, Policy and Regulatory Framework, SB 465).	Fire Department		
	E-3	If the City's WUI Fire Areas are eligible for California's Property Assessed Clean Energy (PACE) Program, identify finance procedures that need to be taken by the City to make PACE financing available for wildfire safety improvements.	Fire Department – Building Codes		
	E-4	Seek grant funding opportunities that may be available to property-owners to help retrofit existing non-conforming structures to current WUI building construction standards.	Fire Department		
	E-5	Develop a voluntary home or community inspection program to provide property-owners with specific information on how they can address the specific structure hardening needs of their homes.	Fire Department – Building Official		
	E-6	Research opportunities to incentivize property-owners to harden structures through tax breaks and/or cost sharing.	Fire Department - City attorney		

F. Treat Vegetation to Reduce Wildfire Hazard Treatment of vegetation within the wildland urban interface can reduce the risk of loss and damage from wildfire. The greatest responsibility for the protection of improvements in the community rests not with the City, but with the individual property-owner through the development of adequate defensible space. The City and open space management associations have completed and maintain vegetation treatments within their respective jurisdictions. Maintenance of existing treatments and designing and implementing additional treatments will further reduce the risk of unwanted consequences of wildfire. Question 15 in the CWPP Survey asked if vegetation management resources within the City are adequate. Responses from the community indicate 64% of the public were unaware of what resources were available while 20% felt current resources were inadequate.	F-1	Support the existing vegetation management programs of Fountaingrove II Open Space Management Association, Fountaingrove Ranch and Oakmont Village Association. This can be accomplished by providing letters of support for grant applications as well as coordinating planning and implementation of treatments between HOAs and the City.	Fire Marshal-homeowner associations		
	F-2	Utilize treatment priorities identified in this Plan when developing new projects (Proposed Treatments Tables 19 & 20). Utilize site specific prescriptive guidelines provided in Sections 6.6.1.1 and 6.6.1.2 for planning and implementing vegetation treatments.	Fire Marshal-homeowner associations		
	F-3	Outreach to additional homeowner associations and individuals within designated WUI Fire Areas to identify existing vegetation treatments. Assist in planning and prioritizing where treatments would be effective but currently do not exist.	Fire Marshal-homeowner associations		
	F-4	Establish permitting protocols for the use of prescribed fire pile burning.	Fire Department – County Fire Department- Bay Area Air Quality Management District		

	F-5	Seek grant funding opportunities such as the California Climate Investments (CCI) Fire Prevention Grant Program, FEMA Fire Protection and Safety Grants, PG&E Resilient Communities Grants.	Fire Marshal-homeowner associations		
	F-6	It is recommended that the City establish a monitoring program to ensure that fuel treatment activities remain effective. Details on methods for photo monitoring can be found at: www.fs.fed.us/pnw/pubs/gtr526/.	Fire Department		
G. Improve Enforcement of Defensible Space Standards Defensible Space, Home Ignition Zone concepts and City codes outlined in Section 6.4.2, Reducing Structure Ignitability when applied to the community will increase structure survivability. CWPP Survey responses showed a high percentage of respondents would support the enforcement of defensible space requirements within the WUI Fire Areas (See Appendix B for details). Survey questions 54 and 55 asked if respondents would support implementation of a fire safe landscaping review process for new and existing developments and 86 percent of the respondents supported the implementation of a fire safe landscape review process for new	G-1	Within designated Wildland Urban Interface adopt and enforce California Public Resources Code 4291 requirements for defensible space. Develop an inspection program that focuses on property-owner education for the initial two years prior to enforcement. Target 10% of properties in the WUI for annual inspections.	Fire Department – Planning and Development, Building Official		
	G-2	Develop a staffing plan to support defensible space enforcement and seek funding to implement the plan.	Fire Department, City Manager		
	G-3	Develop a program where property-owners who fail to comply with PRC 4291 are assessed via their property tax for the cost of the city to complete fire hazard mitigation work.	Fire Department - City Attorney		

development while 74 percent supported a fire safe landscape review process for existing development.	G-4	Utilize Senate Bill 190 (described in Appendix A) to support the development of the defensible space enforcement program.	Fire Department - City Attorney		
	G-5	Work with CAL FIRE to develop a program to enforce defensible space requirements on SRA lands surrounding the City's WUI Fire Area.	Fire Department – CAL FIRE		
	G-6	Develop fire safe landscape standards to ensure compliance with defensible space requirements within the WUI Fire Areas.	Fire Department – Planning and Development, Water Resources, Design Review Board, Local Landscape Architects		
	G-7	Incorporate fire safe landscape standards into the City Development Review Process within the WUI Fire Areas.	Fire Department – Planning & Development, Design Review Board and City Council		
H. Increase Staffing to Address Wildfire Mitigation Workload Survey question 65 and 66 asked if the City had adequate resources to implement the actions identified in the CWPP. Of the 398 respondents, 43 percent believed the City did not have adequate resources, while 74 percent were supportive of a new position in the Fire Department to educate, implement, and assure compliance with the actions identified in this Plan.	H-1	Create a new fulltime Wildfire Specialist position within the Fire Department to focus on building community relations, coordinating with resident groups, and implementing actionable items in this Plan.	Fire Department – City Administrator and Department Heads		

I. Consider Expanding the Designated WUI Fire Area to include other areas of the City that are located in the WUI Structures and neighborhoods outside of the designated WUI Fire Areas were lost during the 2017 Tubbs Fire. These have the same or elevated risk of loss as areas currently identified as WUI Fire Areas. CAL FIRE's Very High Fire Hazard Severity Zones does not adequately identify WUI as was observed during the 2017 Tubbs Fire.	I-1	Utilize the National Wildfire Coordinating Group's definition of WUI, which is "The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetation fuels" to redefine the WUI Fire Areas within the City.	Fire Department		
	I-2	Assess potential fire insurance implications on property-owners of any newly proposed WUI Fire Areas, prior to adopting.	Fire Department		

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Fiscal resources are limited, and budgetary constraints can make it difficult to address all of the needs and implement all of the projects identified in this CWPP. A staggered approach to the implementation of fuel treatments and structure hardening allows the City to enhance wildfire protection while seeking additional funds through external sources (e.g., grants, stewardships). This CWPP positions the City to apply for a variety of grants to fund fuel mitigation and structure hardening activities identified in this plan.

7.1 Potential Grant Funding Sources

There are numerous opportunities for federal, state, and local grants. The following identifies several grant sources:

Fire Service Grants and Funding (AFG)

Provides direct assistance on a competitive basis to fire departments of a State or tribal nation for protecting the health and safety of the public and firefighting personnel against fire and fire-related hazards.

Fire Management Assistance Grants (FMAG)

These grants are managed through the FEMA provides reimbursement to local government agencies for cost they may incur during a wildfire emergency. CAL OES processes FMAG requests for local government who must meet specific criteria in order to qualify for this cost reimbursement. As a rule of thumb FMAG will cover 75% of local government cost incur during a wildfire emergency.

Assistance to Firefighters Grant Program (AFGP)

Through FEMA's AFGP, career and volunteer fire departments and other eligible organizations can receive funding from three different grants sources to enhance a fire department's ability to protect the health, safety of the public and protect the health of first responders, and increase or maintain the number of trained, "front-line" firefighters available in communities.

Staffing for Adequate Fire & Emergency Response Grant (SAFER)

SAFER was created to provide funding directly to fire departments and volunteer firefighter organizations to help them increase or maintain the number of trained, "front line" firefighters available in their communities. The goal of SAFER is to support a local fire departments' ability to comply with staffing, response and operational standards established by the NFPA (NFPA 1710 and/or NFPA 1720).

Fire Prevention & Safety Grants (FP&S)

The FP&S Grants are part of the AFGP and support projects that enhance the safety of the public and firefighters from fire and related hazards. The primary goal of this grant program is to reduce injury and prevent death among high-risk populations. In 2005, Congress reauthorized funding

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for FP&S and expanded the eligible uses of funds to include Firefighter Safety Research and Development.

Hazard Mitigation Grant Program (HMGP)

FEMA's HMGP represents a disaster-based approach to allocating federal funds for use in mitigating hazards that might cause future disasters. HMGP funds are administered by states as sub-grants to local governments that have FEMA-approved LHMPs. Generally, HMGP allocations have represented from 7½ to 15 percent of post-disaster Stafford Act funding authorizations by Congress.

Pre-Disaster Mitigation Grant Program (PDM)

The PDM Program, authorized by Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, is designed to assist States, territories, federally recognized tribes, and local communities in implementing a sustained pre-disaster natural hazard mitigation program. The goal is to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding in future disasters. This program awards planning and project grants and provides opportunities for raising public awareness about reducing future losses before disaster strikes. PDM grants are funded annually by Congressional appropriations and are awarded on a nationally competitive basis.

AB 1956 (Limón) Fire Prevention Activities. Local Assistance Grant Program. Chapter 632, Statutes of 2018

This measure establishes a local assistance grant program through CAL FIRE to improve fire prevention in California and ensure that fire prevention activities happen year-round. This bill also requires local agencies, resource conservation districts, fire safety councils, the California Conservation Corps, certified local conservation corps, University of California (UC) Cooperative Extension, Native American tribes, and qualified nonprofit organizations to be eligible for grants.

SB 1079 (Monning) Forest Resources. Fire Prevention Grants. Advance Payments. Chapter 622, Statutes of 2018 (Urgency)

This measure authorizes CAL FIRE to make advance payments to grantees, including local governments, from specified grants it administers. This bill limits these payments to 25% of the total grant award and requires CAL FIRE to report to the Legislature on the program by January 1, 2023. This measure sunsets on January 1, 2024.

SB 465 (Jackson) Property Assessed Clean Energy Program. Wildfire Safety Improvements. Chapter 837, Statutes of 2018

This measure expands, PACE financing until January 1, 2029 and to allow cities and counties in very high fire hazard severity zones to authorize contractual assessments for property-owners to finance wildfire safety improvements. Eligible wildfire safety improvements are those identified by CAL FIRE that can be fixed to an existing residential, commercial, industrial, agricultural or other building or structure, including ember-resistant roofs, dual-paned windows, driveways, and various ignition-resistant products such as walls, decks, and patio covers. This measure outlines

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a procedure to be taken by the local agency before PACE financing can be used for wildfire improvements. This process is as follows:

- Requires the legislative body of any public agency that has accepted the designation of very high fire hazard severity zones to identify an area within these zones where public officials and property-owners may enter into PACE agreements; and
- Requires the legislative body to adopt a resolution indicating its intention to establish this program and requires the resolution to identify the kinds of wildfire safety improvements that may be financed, among other things.

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SECTION 8. MONITORING

Effective monitoring of wildfire planning efforts provides important opportunities to evaluate the overall success of this CWPP in reducing wildfire risk and improving planning processes. This Plan does not end when it is adopted, but evolves with a continuous cycle of collaborative planning, implementation, monitoring and adapting strategies based on lessons learned. The development of a wildfire resilient community is not a destination but a journey. The following describes monitoring of the CWPP and fuel treatments:

8.1 CWPP Monitoring

The Fire Marshal has the responsibility to conduct a review of this plan at a minimum of 5-year intervals to ensure its relevance. Significant changes in policy, budget, and/or environmental conditions may require a more frequent review.

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Appendix A – Policy and Regulatory Framework

The following describes the federal, state, county, and city levels of policy and regulations that pertain to a CWPP:

Federal Level Policy

Disaster Mitigation Act (2000–present)

Section 104 of the Disaster Mitigation Act of 2000 (Public Law 106-390) enacted Section 322 - Mitigation Planning of the Robert T. Stafford Disaster Relief and Emergency Assistance Act - that created incentives for state and local entities to coordinate hazard mitigation planning and implementation efforts, and is an important source of funding for fuels mitigation efforts through federal hazard mitigation grants.

National Incident Management System (NIMS)

NIMS provides a systematic, proactive approach to guide government agencies, nongovernmental organizations, and the private sector to work together to prevent, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity, in order to reduce the loss of life and property and harm to the environment. The NIMS improves a community's ability to prepare for and respond to potential incidents and hazard scenarios.

National Fire Plan (NFP) 2000

In 2000 dry climatic conditions resulted in a historic number of wildland fires within the United States (mainly the Western U.S.) It is estimated that 7.2 million acres, nearly double the 10-year average burned. Costs in damages including fire suppression activities were approximately 2.1 billion dollars. Congressional direction called for substantial new appropriations for wildland fire management. This resulted in action plans, interagency strategies, and the Western Governor's Association's, "A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment - A 10-Year Comprehensive Strategy - Implementation Plan". This collectively became known as the National Fire Plan. This plan places a priority on collaborative work within communities to reduce their risk from large-scale wildfires.

National Cohesive Wildland Fire Management Strategy (2009)

The National Cohesive Wildland Fire Management Strategy is a strategic push to work collaboratively among all stakeholders and across all landscapes, using best science, to make meaningful progress towards the three goals: resilient landscapes, fire adapted communities, and safe and effective wildfire response. Its vision is to safely and effectively extinguish wildfire when needed; use wildfire where allowable; manage our natural resources; and as a nation, to live with wildland fire.

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National Fire Protection Association

The NFPA maintains numerous codes and standards that provide direction on development in the WUI including:

- NFPA 1, Fire Code, Chapter 17
- NFPA 1141, Standard for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas
- NFPA 1142, Standard on Water Supplies for Suburban and Rural Fire Fighting
- NFPA 1143, Standard for Wildland Fire Management
- NFPA 1144, Standard for Reducing Structure Ignition Hazards from Wildland

State Level Policy

(NOTE: See section 1.4.1 for California Master Agreement Policy)

California Strategic Fire Plan 2018

The Strategic Fire Plan is one of the preeminent policies specified by the Board of Forestry and Fire Protection's (Board). The Board has adopted these Plans since the 1930s and periodically updates them to reflect current and anticipated needs. Over time, as the environmental, social, and economic landscape of California's wildlands has changed, the Board has evolved the Strategic Fire Plan to better respond to these changes and to provide CAL FIRE with appropriate guidance "…for adequate statewide fire protection of state responsibility areas" (PRC § 4130). This 2018 Plan reflects CAL FIRE's focus on (1) fire prevention and suppression activities to protect lives, property, and ecosystem services, and (2) natural resource management to maintain the state's forests as a resilient carbon sink to meet California's climate change goals and to serve as important habitat for adaptation and mitigation.

California State Multi-Hazard Mitigation Plan (Version 2013; update in progress)

The purpose of the State Multi-Hazard Mitigation Plan (SHMP) is to significantly reduce deaths, injuries, and other losses attributed to both natural and human-caused hazards in California. The SHMP provides guidance for hazard mitigation activities emphasizing partnerships among local, state, and federal agencies as well as the private sector.

Public Resource Code Sections 4125-4137 – Fire Protection Responsibilities

This policy defines suppression and prevention roles and responsibilities of the incumbent agencies within and across administrative boundaries. Fire protection responsibility area designations directly correlate to specific financial responsibility for wildfire prevention and suppression actions. Area mutual aid agreements and assistance agreements are reviewed on a regular (annual) basis, to ensure accuracy in updates and procedures.

Public Resource Code Sections 4201-4204 – Fire Hazard Severity Zones

Requires CAL FIRE to classify lands within State Responsibility Areas in accordance with the severity of fire hazard present for the purpose of identifying measures to be taken to slow wildfire rates of spread and to reduce the potential intensity of uncontrolled fires that threaten to destroy resources, life, or property. These measures are part of an overall strategy to implement community adaptability in the wildfire environment.

Public Resources Code Section 4291 and California Code of Regulations (CCR) 1299.1

A state law, effective in January 2019, this section requires 100 defensible space clearance around homes and structures for wildfire protection, but not beyond the property line. The code applies to all lands that have flammable vegetation. The regulations include several requirements for how the vegetation surrounding buildings and structures should be managed to create defensible space.

Public Resources Code 4292-93, 4296 and 14 CCR 1256: Fire Prevention for Electrical Utilities

These statutes and regulations address the vegetation clearance standards for electrical utilities. They include the standards for clearing around energy lines and conductors such as power line hardware and power poles. These regulations are critical to wildland fire safety because of the substantial number of power lines in wildlands, the historic source of fire ignitions associated with power lines, and the extensive damage that results from wildfires caused by power lines in severe wind conditions.

Public Resource Code Section 4296.5 – Railroads – CCR 1290 Railroad Right-Of-Ways

Established in 1999, this code empowers the Board Director to adopt regulations establishing fire prevention and hazard reduction standards that any Railroad Corporation or person owning a Railroad in this state must abide by. The resulting formulated PRC 4296.5 regulations are found in the California Code of Regulations (CCR's), Title 14; Article 2; Sections 1290 through 1295.

Public Resource Code Section 4421-4446 – Prohibited Activities

This series of codes specifies the prohibited human actions regarding setting fire or causing fire to be set to any forest, brush, or other flammable material which is on any land that is not his own, or under his legal control, without the permission of the owner, lessee, or agent of the owner or lessee of the land. Proper burn permitting needs are identified. Prohibited actions involving use of noncompliant industrial and/or mechanical equipment is also cited.

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Public Resources Code 4741 - Wildland Fire Prevention and Vegetation Management

In accordance with policies established by The Board, CAL FIRE shall assist local governments in preventing future wildland fire and vegetation management problems by making its wildland fire prevention and vegetation management expertise available to local governments to the extent possible within the department's budgetary limitations. Department of Forestry recommendations shall be advisory in nature and local governments shall not be required to follow such recommendations.

California Code of Regulations Title 24

California's building regulations and standards are contained within Title 24 of the California Code of Regulations (CCR) published by the California Building Standards Commission. These are regulations passed by California agencies charged with enforcing the state's various laws and requirements for builders and property owners. Title 24 includes all regulations for how buildings are designed and constructed and are intended to ensure the maximum structural integrity and safety of private and public buildings. It contains requirements for the structural, mechanical, electrical and plumbing systems, and requires measures for energy conservation, green design, construction and maintenance, fire and life safety, and accessibility.

The City adopted Title 24 of the California Code of Regulations by reference, with the additions, insertions, deletions and changes. This code is amended on a 3-year cycle and additions, insertions, deletions and changes are effective January 1, 2020.

2019 California Fire Code

This code establishes regulations affecting or relating to structures, processes, premises and safeguards regarding residences and historic buildings. The code includes: 1) hazards of fire and explosion arising from the storage, handling or use of structures, materials or devices; 2) conditions hazardous to life, property or public welfare in the occupancy of structures or premises; 3) fire hazards in the structure or on the premises from occupancy or operation; 4) matters related to the construction, extension, repair, alteration or removal of fire suppression or alarm systems; and 5) conditions affecting the safety of fire fighters and emergency responders during emergency operations.

California Building Code 2019 Chapter 7A (includes section 705A – roofing)

Establishes minimum standards for the protection of life and property by increasing the ability of a building located in any FHSZ within SRA or any WUI Fire Area to resist the intrusion of flames or burning embers projected by a vegetation fire and contributes to a systematic reduction in conflagration losses.

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California Residential Code 2019 Chapter 3 Building Planning, Section R337 Material and Construction Methods for Exterior Wildfire Exposure

Establishes minimum standards for the protection of life and property by increasing the ability of a building located in any Fire Hazard Severity Zone within State Responsibility Areas or any Wildland-Urban Interface Fire Area to resist the intrusion of flame or burning embers projected by a vegetation fire and contributes to a systematic reduction in conflagration losses.

California Building Code 2019 Chapter 7A

California Code of Regulations Title 14, 1270.04 (relates to PRC 4290)

This subchapter specifies the following directives: (a) local jurisdictions shall provide the Board Director with notice of applications for building permits, tentative parcel maps, tentative maps, and use permits for construction or development within a SRA, (b) the Board Director shall review and make fire protection recommendations on applicable construction or development permits or maps provided by the local jurisdiction, and (c) the local jurisdiction shall ensure that the applicable sections of this subchapter become a condition of approval of any applicable construction or development permit or map.

Government Code 51175-51189: Chapter 6.8 - Very High Fire Hazard Severity Zones

This code defines Very High Fire Hazard Severity Zones (VHFHSZ) and designates lands considered by the State to be a very high fire hazard. The purpose of this chapter is to classify lands in the state in accordance with whether a very high fire hazard is present so that public officials are able to identify measures that will retard the rate of spread, and reduce the potential intensity, of uncontrolled fires that threaten to destroy resources, life, or property, and to require that those measures be taken. For more detail and a discussion regarding wildland fire hazard severity in general and VHFHSZ's specifically, see Section 5.1.

Government Code 51189: WUI Building Standards (referenced from Ch. 6.8 in paragraph above, for emphasis)

This code directs the Office of the State Fire Marshal to create building standards for wildland fire resistance. The code includes measures that increase the likelihood of a structure withstanding intrusion by fire (such as building design and construction requirements that use fire-resistant building materials) and provides protection of structure projections (such as porches, decks, balconies and eaves) and structure openings (such as attics, eave vents, and windows). For more detail and further discussion on WUI building standards, see Section 5.4.

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Government Code 65302.5: General Plan Fire Safety Element Review

This statute requires the Board to provide recommendations to a local jurisdiction's General Plan fire safety element at the time that the General Plan is amended. While not a direct and binding fire prevention requirement for individuals, General Plans that adopt the Board's recommendations will include goals and policies that provide for contemporary fire prevention standards for the jurisdiction.

California Health and Safety Code: DIVISION 12. Fires and Fire Protection; Chapter 1 Liability in Relation to Fires; Section 13000

Every person is guilty of a misdemeanor who allows a fire kindled or attended by him to escape from his control or to spread to the lands of any person other than the builder of the fire without using every reasonable and proper precaution to prevent the fire from escaping.

California Environmental Quality Act (CEQA)

The 1970 CEQA has evolved into one of the most prominent components of community planning in California. It requires state and local agencies to follow a protocol of analysis and public disclosure of environmental impacts in proposed projects and to include feasible measures to mitigate those impacts. Any proposed hazardous fuel treatment project recommended in this CWPP must comply with CEQA regulations.

Senate Bill 979: Water Quality, Supply, and Infrastructure Improvement Act of 2014: Protecting Rivers, Lakes, Streams, Coastal Waters, and Watersheds

This Act is a useful reference during planning and implementation of fuel treatment projects to reduce wildfire risk, because it can help to ensure those projects account for the protection and restoration of California's rivers, lakes, streams and watersheds, protect watersheds tributary to water storage facilities, and promote watershed health. It also determines priorities for water security, climate, and drought preparation.

California Civil Code 1103.C.3 : Law Governing Natural Hazard Disclosure

This code deals with the Transfer of Real Property and the Disclosure of Natural and Environmental Hazards: Article (3) states "A transferor of real property that is located within a very high fire hazard severity zone, designated pursuant to Section 51178 of the Government Code, shall disclose to any prospective transferee the fact that the property is located within a very high fire hazard severity zone and is subject to the requirements of Section 51182 of the Government Code". Details go on to include information regarding property transferor, information regarding agency, county assessor and map documentation.

California Emergency Services Act - Chapter 7, Section 8550-8551 (CESA)

The CESA ensures preparations within California will be adequate to deal with natural, manmade, or war-caused emergencies. It declares it necessary to give the Governor, chief executives and governing bodies of political subdivisions of the state emergency powers to provide for state assistance in the organization and maintenance of emergency programs The Act created the Office of Emergency Services, within the office of the Governor, and gave it the powers and duties to (1) provide for the assignment of functions to state entities to be performed during an emergency and for the coordination and direction of the emergency actions of those entities; (2) provide for the rendering of mutual aid by the state government and all its departments and agencies and by the political subdivisions of the state in carrying out the purposes of this chapter; and (3) authorizes the establishment of organizations and directing actions necessary to protect the health and safety and preserve the lives and property of the people of the state.

It further declared the purpose of Chapter 7 and the policy of the state that all emergency services functions of the state be coordinated, as far as possible, with the comparable functions of its political subdivisions, of the federal government including its various departments and agencies, of other states, and of private agencies of every type, to the end that the most effective use may be made of all manpower, resources, and facilities for dealing with any emergency that may occur.

California Regional Water Quality Board

The California State Water Resources Control Board (Board) has jurisdiction throughout California. Created by the State Legislature in 1967, the Board protects water quality by setting statewide policy, coordinating and supporting the Regional Water Board efforts, and reviewing petitions that contest Regional Board actions. There are nine regional water quality control boards that exercise rulemaking and regulatory activities by basins. The City falls within the jurisdiction of the North Coast Regional Water Quality Board (NCRWQB).

California Air Resources Board

The California Air Resources Board is responsible to reduce air pollution and protect public health. Their role is to set the state's air quality standards at levels to protect public health, identify and measure pollutants, research the cause and effect of air pollution problems and potential solutions, develop and adopt specific rules and regulations needed to achieve healthful air quality and lead California's efforts to reduce climate-changing emissions through measures that promote a more energy-efficient and resilient economy.

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AB 1956 - Fire Prevention Activities. Local Assistance Grant Program. Chapter 632, 2018

The measure establishes a local assistance grant program through CAL FIRE to improve fire prevention in California and ensure that fire prevention activities happen year-round. This bill also requires local agencies, resource conservation districts, fire safety councils, the California Conservation Corps, certified local conservation corps, University of California (UC) Cooperative Extension, Native American tribes, and qualified nonprofit organizations to be eligible for grants.

AB 2911 - Fire Safety. Chapter 641, 2018

Measure makes changes to fire safety planning efforts, defensible space requirements, and electrical transmission or distribution lines' vegetation clearance requirements with the intent to improve the fire safety of California communities. Specifically, this measure:

- Requires a local agency to transmit a copy of its adopted ordinance designating very high fire hazard severity (VHFHS) zones to the Board of Forestry and Fire Protection (Board);
- Removes exemptions from requirement that a local agency designate, by ordinance, very high fire hazard severity zones in its jurisdiction within 120 days of receiving recommendations from the director of CAL FIRE;
- Requires the State Fire Marshal (SFM), in consultation with CAL FIRE and the Director of Housing and Community Development (HCD) to recommend building standards that provide for comprehensive site and structure fire risk reduction to protect structures from fire risk;
- Requires the SFM, in consultation with CAL FIRE and HCD to develop a list of low-cost retrofits that provide for comprehensive site and structure fire risk reduction to protect structures from fire risk;
- Requires CAL FIRE to incorporate the list in its fire prevention education and outreach efforts;
- Requires, before July 1, 2020, the Office of Planning and Research to update the guidance document entitled "Fire Hazard Planning General Plan Technical Advice Series" and update not less than once every eight years;
- Authorizes the Board, within 15 days of receipt of notification that its fire prevention recommendations will not be accepted by the local government, to request a consultation, prior to approval of the draft element or amendment, conducted in person, electronically, or by phone;
- Requires on or before July 1, 2021, and every five years thereafter, the Board, in consultation with the SFM, to survey local governments to identify existing

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subdivisions in SRA or VHFHS zones without a secondary egress route that are at significant fire risk; and

- Authorizes owners of any electrical transmission or distribution line to traverse land as necessary, regardless of land ownership or permission from the owner, after providing notice and an opportunity to be heard to the land owner, to prune trees to maintain and to abate, by pruning or removal, any hazardous, dead, rotten, diseased, or structurally defective live trees.

SB 465 - Property Assessed Clean Energy Program. Wildfire Safety Improvements. Chapter 837, 2018

Measure expands, until January 1, 2029, Property Assessed Clean Energy (PACE) financing to allow cities and counties in very high fire hazard severity zones to authorize contractual assessments for property owners to finance wildfire safety improvements. Eligible wildfire safety improvements are improvements identified by CAL FIRE that can be fixed to an existing residential, commercial, industrial, agricultural or other building or structure, including ember-resistant roofs, dual-paned windows, driveways, and various ignition-resistant products such as walls, decks, and patio covers. This measure outlines a procedure to be taken by the local agency before PACE financing can be used for wildfire improvements.

SB 901 - Wildfires. Chapter 626, 2018

Measure provides numerous changes concerning wildfire prevention and recovery. These include changes to: forest management and fuel reduction; mutual aid; wildfire mitigation planning by electric utilities; cost recovery for wildfire-related damages; funding opportunities from the Greenhouse Gas Reduction Fund (GGRF) for forest health; fire prevention and fuel reduction projects; a $200 million annual appropriation for forest health and fire prevention programs; and comprehensive streamlining of landscape and forestry management practices to enhance fire prevention activities.

SB 1260 - Fire Prevention and Protection. Prescribed Burns. Chapter 624, 2018

This measure is an omnibus fire prevention and forestry management bill with the intent of promoting long-term forest health and wildfire resiliency. It makes various changes related to local fire planning, prescribed fire requirements, and broader fire prevention efforts.

AB 1877 - Office of Emergency Services. Communications. Notifications. Translation. Chapter 630, 2018

Measure requires the California Office of Emergency Services (CalOES) and the governing body of each political subdivision of the state to translate to the public any emergency communication into the most commonly spoken language other than English in the

impacted county or counties. The measure authorizes CalOES to require a city, county, or city and county to translate emergency notifications as a condition of approving its application to receive any voluntary grant funds in connection to emergency management performance.

AB 1956 - Fire Prevention Activities. Local Assistance Grant Program. Chapter 632, 2018

Measure establishes a local assistance grant program through CAL FIRE to improve fire prevention in California and ensure that fire prevention activities happen year-round. This bill also requires local agencies, resource conservation districts, fire safety councils, the California Conservation Corps, certified local conservation corps, University of California (UC) Cooperative Extension, Native American tribes, and qualified nonprofit organizations to be eligible for grants.

AB 836 -Wildfire Smoke Clean Air Centers for Vulnerable Populations Incentive Pilot Program. Chapter 393, 2019

Measure establishes the Wildfire Smoke Clean Air Centers for Vulnerable Populations Incentive Pilot Program. The grant program creates a network of clean air centers by providing funding to public facilities for smoke-protective filtration systems. The grant program prioritizes applications for projects located in a documented high smoke exposure area to mitigate the adverse public health impacts that result from wildfires and other smoke events. This measure sunsets on January 1, 2025.

SB 167 - Electrical Corporations. Wildfire Mitigation Plans. Chapter 403, 2019

Measure requires each electrical corporation, as part of submitting their wildfire mitigation plans to the CPUC, to additionally include the impacts on customers who are receiving medical baseline allowances as part of their protocols related to mitigating the public safety impacts of disabling reclosers and deenergizing portions of the electrical distribution system.

SB 560 - Wildfire Mitigation Plans. Deenergizing of Electrical Lines. Notifications. Mobile Telephony Service Providers. Chapter 410, 2019

Measure requires public and private utilities to notify all public safety offices, critical first responders, health care facilities, and operators of telecommunications infrastructure with premises within the footprint of potential deenergization for a given event. This measure also requires telecommunications providers to designate points of contact within the company to receive notifications from public and private utilities in anticipation of possible deenergization events and to notify stakeholders, such as public safety offices and emergency response offices, about the impacts to communications capabilities during such events.

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SB 160 - Emergency Services. Cultural Competence. Chapter 402, 2019

Measure requires cities and counties to integrate cultural competency in the next regular update to their emergency plan. It requires city and county local emergency managers to incorporate cultural competence into emergency plans, upon its next update, and at a minimum, describe how all cultural populations within its jurisdiction are served by emergency notifications, evacuations, sheltering, mitigation, prevention, planning, and preparedness. It requires cities and counties, when updating emergency plans, to provide a forum for community engagement in geographically diverse locations to engage with culturally diverse communities.

SB 190 - Fire Safety. Building Standards. Defensible Space Program. Chapter 404, 2019

Measure requires the SFM to develop both a model defensible space program and a WUI Fire Safety Building Standards Compliance training manual. It requires the SFM; to develop a model defensible space program for use by a city or county in the enforcement of existing defensible space provisions in law and consult with representatives from local, state, and federal fire services, local governments, building officials, utility companies, the building industry, and the environmental community. If a defensible space program is adopted, the local agency for enforcement of this program must have the authority to recover the actual cost of abatement and must have the authority to place it as a special assessment or lien on the property. In addition, it requires the SFM to develop, and update on a regular basis, a WUI products handbook listing products and construction systems that comply with the WUI Fire Safety building standards for: Exterior wall siding and sheathing; Exterior windows; Under eaves, including eave and cornice vents; Decking; Treated lumber and ignition-resistant materials; and Wood shakes and shingles roofing materials.

SB 670 -Telecommunications. Community Isolation Outage. Notification. Chapter 412, 2019

Measure requires telecommunications providers to notify the Governor's Office of Emergency Services (CalOES) whenever there is an outage limiting the ability for customers to make 911 calls or receive emergency notifications within 60 minutes of discovering the outage. It also requires CalOES to notify the affected county office(s) of emergency services, the sheriff of any county, and any public safety answering point affected by the outage.

<u>Sonoma County Level Policy and Regulations</u>

County of Sonoma, Multi-Jurisdictional Hazard Mitigation Plan (2017)

The Multi-Jurisdictional Hazard Mitigation Plan is a tool for stakeholders to increase public awareness of local natural and human-made hazards and risks, while providing information about options and resources available to reduce risks by hazard mitigation measures.

Sonoma Lake Napa Unit Fire Plan 2017

The California Department of Forestry and Fire Protection (CAL FIRE), Sonoma-Lake-Napa Unit (LNU) serves the county of Sonoma, as well as the counties of Lake, Napa, Solano, Yolo, and Colusa.

The LNU Fire Management Plan is a product of the implementation of the State Fire Plan. The State Fire Plan provides an analysis procedure to assess fire fuel hazards and risks in order to design and implement mitigating activities. The LNU Fire Management Plan provides background information, fuels and fire data, proposed projects, and individual Battalion reports outlining mitigating activities commonly carried out each year. The Plan is a local road map for the fire service and the public to create and maintain defensible landscapes to protect those assets vital to the state and its citizens.

Key Objectives of the Plan are to:

- Establish relationships, partnerships and councils necessary to reduce wildfire risks and losses by emphasizing community-level resources and solutions. Leverage partners with common interests/or motivations.
- Develop and sustain a portfolio of high-impact, least-cost, stakeholder-driven solutions for reducing wildfire risks and losses by creating and sustaining new solutions, eliminating low-impact solutions and streamlining high-cost solutions.
- Develop the Fire Plan, using the key elements identified by CAL FIRE and supporting smaller communities with the development of their local Community Wildfire Protection Plan (CWPP)
- Engage collaborative partners to lead and drive the effort to protect communities from wildfire. The CAL FIRE role is transitioned into a support-oriented role, focusing primarily on active participation, facilitation and evaluation of program results.
- Ensure the community understands, accepts responsibility and takes necessary action to mitigate wildfire risk, thereby preventing lives and property from being lost or damaged in wildfires.

County of Sonoma General Plan (2016)

The County of Sonoma Comprehensive Planning Department is currently in the process of updating their General Plan (2020 General Plan). It is a long-term plan mandated by California state planning law for the physical development of a city or county. Various

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elements of the plan are mandated, including land use, circulation, open space, conservation, housing, safety, and noise. The 2008 Sonoma County General Plan is the blueprint for land use in unincorporated Sonoma County. It includes maps that show where agricultural, residential, commercial and other land uses will be located, and a series of policies that guide future decisions about growth, development and conservation of resources.

Sonoma County Community Wildfire Protection Plan 2016

The Sonoma County CWPP was finalized in September 2016. It was collaboratively developed and meets the intent of the Healthy Forest Restoration Act (HFRA). It emphasizes the need for agencies within Sonoma County to work collaboratively with communities in developing hazardous fuel reduction projects, and places priority on treatment areas identified by communities themselves.

The CWPP identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will protect areas within Sonoma County. In addition, the CWPP recommends measures to reduce the ignitability of structures throughout the area addressed by the plan.

The CWPP is intended for use as a planning and assessment tool only, utilizing a compilation of community issues/goals and projected fire mitigation strategies. The CWPP does not commit any public agency to a specific course of action or conduct and is not a project subject to CEQA or NEPA review.

North Coast Regional Water Quality Board (NCRWQB)

The NCRWQB has authority under the California Regional Water Quality Board to develop and enforce water quality objectives and implement plans that will best protect the area's waters while recognizing our local differences in climate, topography, geology and hydrology.

Actions implemented from the CWPP may have the potential to effect water quality and may fall under the review of the NCRWQB.

City of Santa Rosa Level Policy

City of Santa Rosa - Local Hazard Mitigation Plan 2016 (LHMP)

States, tribes and local governments must have a current, FEMA-approved hazard mitigation plan as a condition for receiving certain types of non-emergency disaster assistance, including funding for mitigation projects. The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288), as amended by the Disaster Mitigation Act of 2000, provides the legal basis for undertaking a risk-based approach to

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reducing injury, loss of life, and property damage from natural hazards through mitigation planning.

The requirements and procedures for mitigation planning are found in the Code of Federal Regulations (CFR) at Title 44, Chapter 1, Part 201 (44 CFR Part 201).

FEMA manages the Hazard Mitigation Planning Program. The Program provides guidance, training, and technical assistance, including review of all LHMP's for Agency approval. FEMA coordinates its work through state emergency management agencies.

Community Wildfire Protection Plans (CWPP)

The Healthy Forests Restoration Act (HFRA) of 2003 provided communities with a tremendous opportunity to influence where and how federal agencies implement fuel reduction projects on federal lands. This landmark legislation includes the first meaningful statutory incentives for the US Forest Service (USFS) and the Bureau of Land Management (BLM) to consider the priorities of local communities as they develop and implement forest management and hazardous fuel reduction projects.

For a community to take full advantage of this opportunity, it must first prepare a CWPP. CWPP's can take a variety of forms, and may address wildfire response, hazard mitigation, community preparedness, structure protection, or all of these.

CWPP's are reviewed by state forestry agency staff.

Integration of Local Hazard Mitigation Plans (LHMP) & Community Wildfire Protection Plans (CWPP)

Both LHMP's and CWPP's benefit communities striving to reduce risk to natural hazards. Though CWPP's are focused on the wildfire hazard and LHMP's address multiple natural hazards, their process and content requirements are very similar. As a result, FEMA supports the integration of these two plans.

The legislation that supports this is documented through FEMA and is outlined above under City of Santa Rosa LHMP and the CWPP policies.

The City has chosen to integrate this CWPP into the 2016 LHMP as a "Wildfire Annex". Some of the benefits in doing this include;

- The City was able to use federal grant funding to complete this CWPP.
- Integration of the plans can maintain eligibility for both National Fire Plan funds and FEMA Hazard Mitigation Assistance grants.
- Because both plans require community dialogue integrating the plans ensures that all jurisdictions, organizations, and individuals who are championing mitigation are collaborating.

- The LHMP focuses on all-natural hazards and their interdependencies. The integration of the plans benefit by having an enhanced discussion and analysis on specifically the wildfire hazard that can increase the risk to future debris floods, flooding, or erosion.
- LHMP's are generally at a larger scale (entire City) and the CWPP is typically at a smaller scale (neighborhood). Integrating the plans can increase the opportunity to work with staff and influence change. In addition, the integration can provide an opportunity to better understand homeowner issues.
- The LHMP is required to be updated every 5 years. The CWPP project lists are required to be reviewed each year, but the planning process/development does not have a timeline. Integrating the CWPP with the LHMP means the CWPP will be updated within the past 5 years (or the life of the plan).

City of Santa Rosa General Plan 2035 (adopted 2009)

State law requires each California City and county to prepare a general plan. A general plan is defined as "a comprehensive, long-term plan for the physical development of the county or city, and any land outside its boundaries which in the planning agency's judgment bears relation to its planning." State requirements call for general plans that "comprise an integrated, internally consistent and compatible statement of policies for the adopting agency." State law further requires each jurisdiction to comply with the adopted GHG emission reduction strategies.

The General Plan addresses issues related to physical development, growth management, transportation services, public facilities, community design, energy efficiency, greenhouse gas reduction strategies, and conservation of resources in the Planning Area. https://srcity.org/392/General-Plan

City of Santa Rosa Emergency Operations Plan (EOP) 2017

This EOP outlines how the City of Santa Rosa—its government, stakeholder agencies, community-based organizations, business community and residents—coordinate their response to major emergencies and disasters. This plan is regularly updated by staff and approved by the City Council.

This plan also demonstrates how the City complies with and implements the requirement of the California Emergency Services Act, NIMS and the Americans with Disabilities Act (ADA) in order to protect the lives, property, and environment of the residents of Santa Rosa.

The EOP identifies operational strategies and plans for managing inherently complex and potentially catastrophic events. City assets, resources, and departments are potentially

vulnerable and may become overwhelmed. It addresses the four phases of emergency management; Preparedness, Response, Recovery and Mitigation.

City of Santa Rosa Continuity of Operations Plan (COOP) 2017

The purpose of the COOP is to provide the framework for City departments and divisions to restore mission essential functions to employees and City operations if an emergency disrupts operations. It provides the City departments and personnel a framework designed to minimize impact during an emergency. It establishes procedures that City leadership can use to strategically minimize risk to its employees, operations, and facilities. It also provides policy and guidance to implement actions to continue mission essential functions within the recovery priority time frames established by the COOP Planning Team and to maintain mission essential functions for up to 30 days.

Santa Rosa Citywide Creek Master Plan 2013

The Citywide Creek Master Plan presents a set of creek-related policies and recommendations for site-specific improvements to the nearly one hundred miles of creeks that flow through Santa Rosa. The plan was originally adopted in 2007 and was updated in 2013. The Citywide Creek Master Plan incorporates creek-related policies from several previous planning documents, including the Santa Rosa Creek Master Plan (1993), Santa Rosa Waterways Plan (1996), and the Santa Rosa 2035 General Plan (2009). The plan recommends habitat preservation, enhancement, and restoration projects, and improvements to the creek side trail system by watershed.

Pacific Gas and Electric Company - 2019 Wildfire Safety Plan (WSP)

The PG&E WSP was developed pursuant to Senate Bill (SB) 901 requiring all California electric utilities to prepare plans on constructing, maintaining, and operating their electrical lines and equipment to minimize the risk of catastrophic wildfire. The California Public Utilities Commission (CPUC) established a schedule for submission and review of the initial wildfire mitigation plans, and a process for review and implementation of plans to be filed in future years. PG&E provides this Plan consistent with the statutory requirements and direction provided by the CPUC in its Order Instituting Rulemaking to Implement Electric Utility Wildfire Mitigation Plans Pursuant to Senate Bill 901 (2018), Rulemaking (R.) 18-10-007 (Wildfire OIR).

The 2019 Wildfire Safety Plan (WSP or Plan) describes the enhanced, accelerated, and new programs that PG&E is and will continue to implement to prevent wildfires in 2019 and beyond.

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City of Santa Rosa - Fire Code

Ordinance No. ORD-2019-021 effective January 1, 2020 adopted the 2019 Edition of the California Fire Code with City additions, insertions, deletions and changes. The adoption and specific amendments in this ordinance are outlined in Chapter 18-44 of the Santa Rosa City Code. They outline requirements for fire response, hydrant systems, permitting, construction and requirements within the City. It also includes defensible space and other requirements within the WUI Fire Area.

City of Santa Rosa - Building, Residential, Existing Building, Green Building Standards and Referenced Standards Code

Ordinance No. ORD-2019-022 effective January 1, 2020 adopted the 2019 California Building Code, 2019 California Residential Code, 2019 California Electrical Code, 2019 California Existing Building Code, 2019 California Green Building Standards Code, and 2019 California Referenced Standards Code City with additions, insertions, deletions and changes. The adoption and specific amendments in this ordinance are outlined in Chapter 18 of the Santa Rosa City Code. They outline standards required for the protection of life and property, including wildland fire exposures. They address building construction to resist the intrusion of flames or burning embers projected by wildland fire to reduce structure loss (Chapter 7A of the Building Code) and include 'Material and Construction Methods for Exterior Wildfire Exposure ' (Section R337 of the Residential Code) for structures within the WUI Fire Area.

City of Santa Rosa, Fire Department Strategic Plan (FDSP) 2106 - 2021

The FDSP outlines the Fire Department's direction, the public's expectations, and the impact that limited resources have on the ability to ensure the capacity and capability necessary to accomplish its goals and objectives. The plan outlines strategic initiatives to fulfill the City of Santa Rosa, Fire Departments mission, vision and values to build policy priorities, goals, objectives, and recommend actions for the future.

The Plan utilized a Customer-Centered Strategic Planning (CCSP) process that involved considerable community and stakeholder input through Stakeholder interviews, citizen forums and survey and community and internal department interviews and dialogue.

City of Santa Rosa Planning Commission

The Planning Commission is responsible to implement plans, ordinances and policies relating to land use matters; assist in writing and implementing the General Plan and area plans; hold public hearings and act on proposed changes to the Zoning Code, Zoning Map, General Plan, tentative subdivision maps, and undertake any special planning studies as needed. The Planning Commission is ultimately charged with carrying out the California Planning and Zoning Laws in the City.

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City of Santa Rosa Design Review Board

The Design Review Board is the custodian of the City's design policies. The Board reviews both public and private development proposals to ensure that Santa Rosa remains attractive and maintains a "sense of place" which the General Plan sets forth as "unique to Santa Rosa." The Design Review Board reviews design proposals in light of adopted design review policies set forth in the City's Design Review Guidelines (PDF). The Board reviews development proposals that have neighborhood compatibility issues and major developments that may have significance to the City's aesthetic character.

Bay Area Air Quality Management District (Bay Area AQMD)

The Bay Area AQMD covers the City of Santa Rosa, as well as southern Sonoma County. It is responsible for regulating stationary sources of air pollution within its district area. In regards to wildland fire mitigation it regulates Open Burning regulations that specify when open burning is allowed in the Bay Area, acceptable burn types, and the process for notifying the Air District. This applies to any use of prescribed fire and pile burning treatments for wildland fire hazard mitigation.

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Appendix B –Existing Fuel Treatments Tables

Oakmont Compartments	Acres	Priority
Aspen Meadow – Compartment 1		
Moderate - 04-08 ft.	0.83	28
Low – 0 -04 ft.	0.06	
Urban Fuels	12.17	
Brookgreen – Compartment 2		
Moderate - 04-08 ft.	0.67	27
Low – 0 -04 ft.	0.20	
Urban Fuels	6.25	
Crestridge – Compartment 3		
Very High - > 11 ft.	0.82	4
High- 08-11 ft.	0.85	
Moderate – 04-08 ft.	8.83	
Urban Fuels	4.80	
Fairfield – Compartment 4		
Moderate – 04-08 ft.	0.16	26
Urban Fuels	4.96	
Fallgreen 1 and 2 – Compartment 5		
Moderate – 04-08 ft.	0.50	15
Urban Fuels	2.36	
Glengreen – Compartment 6		
Very High - > 11 ft.	0.20	3
High- 08-11 ft.	0.19	
Moderate – 04-08 ft.	0.11	

Urban Fuels	2.83	
Golf Court – Compartment 7		
Low – 0-04 ft.	0.04	30
Urban Fuels	3.85	
Meadowcreek – Compartment 8		
Moderate – 04-08 ft.	1.70	12
Urban Fuels	5.16	
Meadowgreen #1 – Compartment 10		
Moderate - 04-08 ft.	2.11	13
Low – 0-04 ft.	0.01	
Urban Fuels	6.82	
Meadowgreen #2 – Compartment 9		
Moderate – 04-08 ft.	1.31	21
Urban Fuels	9.30	
Meadowridge – Compartment 11		
Moderate - 04-08 ft.	3.47	10
Low – 0-04 ft.	1.07	
Urban Fuels	6.23	

Oakmont Compartments	Acres	Priority
Meadowstone – Compartment 12		
High- 08-11 ft.	0.10	5
Moderate – 04-08 ft.	8.60	
Low – 0-04 ft.	2.72	

Urban Fuels	23.18	
Mesa Oaks – Compartment 13		
Moderate – 04-08 ft.	6.17	8
Urban Fuels	9.37	
Mount Vista – Compartment 14		
Moderate - 04-08 ft.	0.84	24
Low – 0-04 ft.	0.78	
Urban Fuels	10.94	
Oak Forest – Compartment 15		
Moderate – 04-08 ft.	3.82	7
Urban Fuels	5.65	
Oak Island – Compartment 16		
Moderate - 04-08 ft.	1.57	20
Low – 0-04 ft.	0.01	
Urban Fuels	11.03	
Oak Leaf Island 1 and 2 – Compartment 17		
Moderate - 04-08 ft.	1.05	18
Low – 0-04 ft.	0.47	
Urban Fuels	6.40	
Oak Vista – Compartment 18		
Moderate – 04-08 ft.	1.50	14
Urban Fuels	5.73	
Oak Green – Compartment 19		
Urban Fuels	4.12	31
Overlook – Compartment 20		

Moderate – 04-08 ft.	0.56	23
Urban Fuels	6.98	
Pleasant Vista – Compartment 21		
Moderate - 04-08 ft.	7.75	6
Low – 0-04 ft.	0.88	
Urban Fuels	10.10	
Pythian Court – Compartment 22		
Very High - > 11 ft.	0.20	2
Moderate – 04-08 ft.	1.05	
Urban Fuels	1.69	
Quail Run – Compartment 23		
Urban Fuels	12.77	31
Riven Rock – Compartment 24		
Moderate - 04-08 ft.	0.01	29
Low – 0-04 ft.	0.10	
Urban Fuels	6.75	

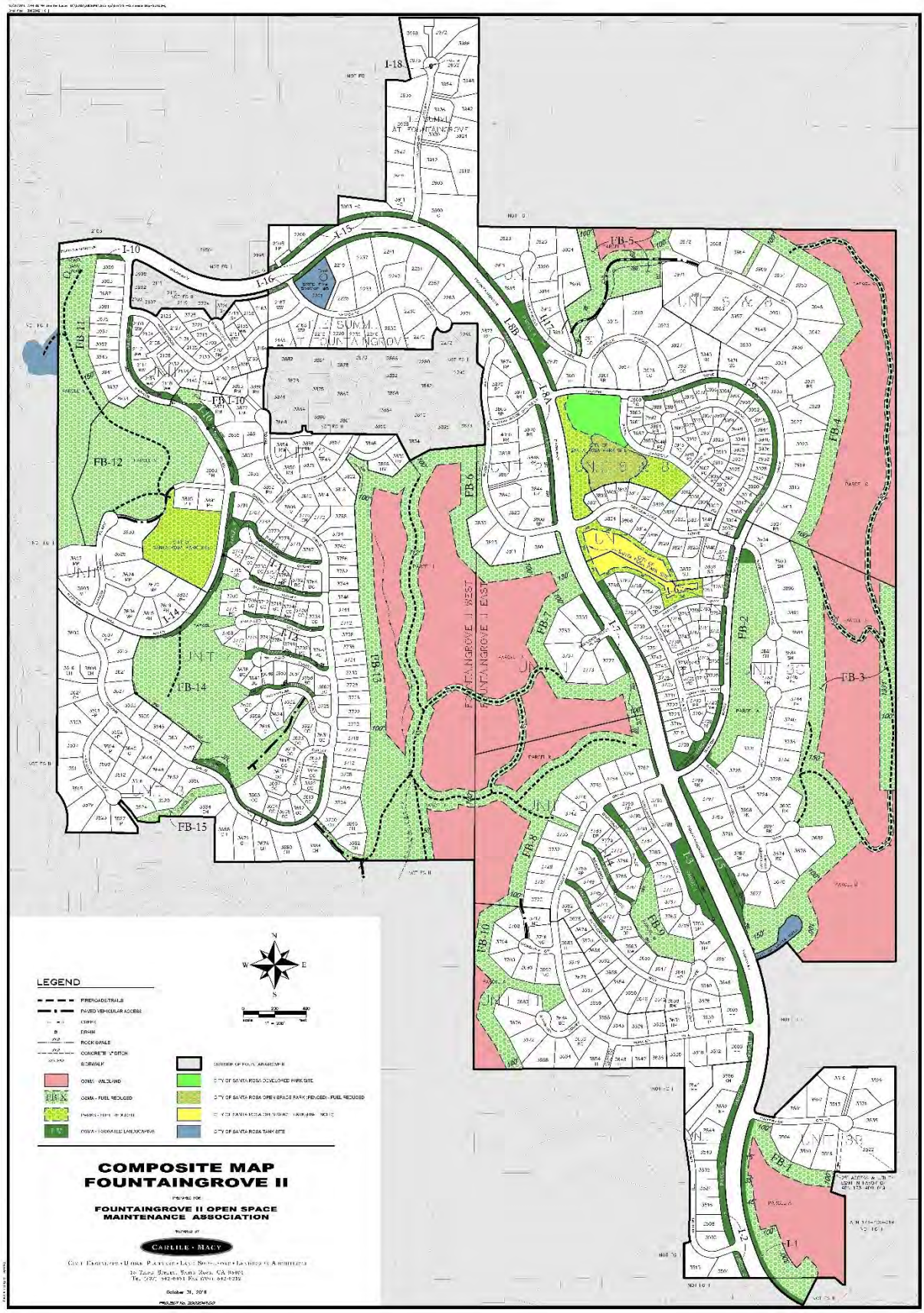
Oakmont Compartments	Acres	Priority
Rockgreen – Compartment 25		
Moderate - 04-08 ft.	1.01	16
Low – 0-04 ft.	0.21	
Urban Fuels	5.52	
Singing Brook – Compartment 26		
Moderate - 04-08 ft.	1.64	19
Low – 0-04 ft.	0.03	

Urban Fuels	11.22	
Singing Woods- Compartment 27		
Moderate - 04-08 ft.	5.66	9
Low – 0-04 ft.	0.40	
Urban Fuels	9.07	
Starry Knoll – Compartment 28		
Very High - > 11 ft	3.04	1
High – 08-11 ft.	3.34	
Moderate - 04-08 ft.	16.43	
Low – 0-04 ft.	8.87	
Urban Fuels	13.98	
Stonecreek – Compartment 29		
Moderate - 04-08 ft.	4.09	11
Urban Fuels	12.21	
Twin Lakes – Compartment 30		
Moderate - 04-08 ft.	1.59	22
Low – 0-04 ft.	0.11	
Urban Fuels	18.25	
Valley Green – Compartment 31		
Moderate - 04-08 ft.	0.14	25
Low – 0-04 ft.	0.04	
Urban Fuels	4.06	
Woodgreen – Compartment 32		
Moderate - 04-08 ft.	0.79	17
Urban Fuels	4.87	

Appendix C – Priority Fuel Treatment Tables

Fountaingrove Ranch Compartments	Acres	Priority
City of Santa Rosa		
Moderate – 04-08 ft.	2.6	10
Low – 0-04 ft.	0.24	
Urban Fuels	1.36	
Fuelbreaks 11 and 12		
Very High - > 11 ft.	0.22	5
High – 08-11 ft.	1.87	
Moderate – 04-08 ft.	6.08	
Low – 0-04 ft.	4.84	
Urban Fuels	3.65	
Open Space 1		
Very High - > 11 ft.	8.09	1
High – 08-11 ft.	0.39	
Moderate – 04-08 ft.	0.32	
Low – 0-04 ft.	0.02	
Open Space 2		
Very High - > 11 ft.	8.71	3
High – 08-11 ft.	4.78	
Moderate – 04-08 ft.	3.17	
Low – 0-04 ft.	3.22	
Urban Fuels	1.56	
Open Space 3		
Very High - > 11 ft.	10.72	2

High – 08-11 ft.	4.44	
Moderate – 04-08 ft.	2.64	
Low – 0-04 ft.	2.20	
Urban Fuels	0.60	
Open Space 4		
Urban Fuels	1.14	14
Open Space 5		
High – 08-11 ft.	1.21	7
Moderate – 04-08 ft.	1.70	
Low – 0-04 ft.	1.87	
Urban Fuels	5.28	
Open Space 6		
Very High - > 11 ft.	0.22	6
High – 08-11 ft.	1.01	
Moderate – 04-08 ft.	5.14	
Low – 0-04 ft.	3.51	
Urban Fuels	10.03	
Open Space 7		
Moderate – 04-08 ft.	0.05	11
Urban Fuels	0.13	


LEGEND
FIREROADS/TRAILS
PAVED VEHICULAR ACCESS
CREEK
DRAIN
ROCK SWALE
CONCRETE 'U' DITCH
SIDEWALK
OSMA - WILDLAND
OSMA - FUEL REDUCED
OSMA - FIREWALL LANDSCAPING
OUTSIDE OF FOUNTAINGROVE
CITY OF SANTA ROSA DEVELOPED PARK SITE
CITY OF SANTA ROSA OPEN SPACE PARK (FENCED) - FUEL REDUCED
CITY OF SANTA ROSA TANK SITE
COMPOSITE MAP
FOUNTAINGROVE II
FOUNTAINGROVE II OPEN SPACE
MAINTENANCE ASSOCIATION
CARLILE · MACY
October 31, 2018
FOUNTAINGROVE I WEST
FOUNTAINGROVE I EAST
FB-1
FB-2
FB-3
FB-4
FB-5
FB-6
FB-7
FB-8
FB-9
FB-10
FB-12
FB-13
FB-14
FB-15
I-1
I-10
I-12
I-14
I-15
I-16
I-17
I-18
I-8A
I-8B

Fountaingrove Ranch Compartments	Acres	Priority
Open Space 8		
Moderate – 04-08 ft.	0.75	9
Urban Fuels	0.22	
Open Space 9		
Moderate – 04-08 ft.	0.98	13
Low – 0-04 ft.	0.05	
Urban Fuels	2.66	
Open Space 10		
Very High - > 11 ft.	1.30	4
High – 08-11 ft.	3.39	
Moderate – 04-08 ft.	5.69	
Low – 0-04 ft.	1.02	
Urban Fuels	10.36	
Open Space 11		
High – 08-11 ft.	0.83	8
Moderate – 04-08 ft.	2.78	
Urban Fuels	5.87	
Open Space 12		
Moderate – 04-08 ft.	0.42	12
Low – 0-04 ft.	0.21	
Urban Fuels	0.81	

Fountaingrove II Compartments	Acres	Priority
Fuelbreak 1		
Moderate – 04-08 ft.	1.27	16
Low – 0-04 ft.	0.10	
Urban Fuels	1.51	
Fuelbreak 2		
Moderate – 04-08 ft.	1.69	17
Urban Fuels	4.50	
Fuelbreak 3		
Very High - > 11 ft.	0.12	5
High – 08-11 ft.	0.41	
Moderate – 04-08 ft.	1.05	
Low – 0-04 ft.	0.01	
Urban Fuels	1.04	
Fuelbreak 4		
Very High - > 11 ft.	1.70	2
High – 08-11 ft.	2.70	
Moderate – 04-08 ft.	7.54	
Low – 0-04 ft.	2.77	
Urban Fuels	0.99	
Fuelbreak 5		
Very High - > 11 ft.	0.37	3
High – 08-11 ft.	1.77	
Moderate – 04-08 ft.	2.37	
Low – 0-04 ft.	1.06	

Urban Fuels	0.29	
Fuelbreaks 6,7,8,10		
High – 08-11 ft.	9.82	9
Moderate – 04-08 ft.	11.65	
Low – 0-04 ft.	2.35	
Urban Fuels	5.37	
Fuelbreak 8a		
Moderate – 04-08 ft.	0.73	10
Low – 0-04 ft.	0.02	
Urban Fuels	0.52	
Fuelbreak 8b		
Moderate – 04-08 ft.	0.20	18
Urban Fuels	0.93	
Fuelbreak 9		
Moderate – 04-08 ft.	1.04	12
Urban Fuels	0.96	
Fuelbreak 13		
Very High - > 11 ft.	0.44	6
High – 08-11 ft.	4.83	
Moderate – 04-08 ft.	3.94	
Low – 0-04 ft.	4.76	
Urban Fuels	4.35	
Fuelbreak 14		
Very High - > 11 ft.	0.13	7
High – 08-11 ft.	1.56	

Moderate – 04-08 ft.	6.20	
Low – 0-04 ft.	1.86	
Urban Fuels	3.69	
Fuelbreak – City Park		
Moderate – 04-08 ft.	0.68	15
Urban Fuels	0.82	
Parcel A		
Moderate – 04-08 ft.	6.20	11
Low – 0-04 ft.	0.10	
Urban Fuels	4.42	
Parcel B		
Very High - > 11 ft.	0.37	4
High – 08-11 ft.	1.90	
Moderate – 04-08 ft.	2.40	
Low – 0-04 ft.	2.47	
Urban Fuels	0.28	
Parcel B and C		
Very High - > 11 ft.	8.37	1
High – 08-11 ft.	12.76	
Moderate – 04-08 ft.	18.90	
Low – 0-04 ft.	15.02	
Urban Fuels	2.88	
Parcel L and A		
Very High - > 11 ft.	0.44	8
High – 08-11 ft.	26.08	

Moderate – 04-08 ft.	27.02	
Low – 0-04 ft.	15.39	
Urban Fuels	10.81	
Units 6 and 8		
Moderate – 04-08 ft.	3.35	14
Low – 0-04 ft.	0.67	
Urban Fuels	3.04	
City of Santa Rosa Park		
Moderate – 04-08 ft.	1.92	13
Urban Fuels	2.00	

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