Sacramento Metropolitan Fire District Community Wildfire Protection Plan

June 2014

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Sacramento Metropolitan Fire District

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Sacramento Metropolitan Fire District
Community Wildfire Protection Plan

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Stakeholder Committee Members
(members listed in Section 2.7.1 of this document)

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1 INTRODUCTION

In 2008, a wildfire that injured Sacramento Metropolitan Fire District (Metro Fire) firefighters in a burnover, a fire in which personnel were overrun by a wildland fire, highlighted the need for Metro Fire to implement additional strategies to prevent and combat wildfire within Metro Fire's jurisdictional boundaries (District). In response to this fire, Metro Fire applied for and successfully obtained a grant from the Assistance to Firefighters Grants Program (Fire Prevention and Safety) of the Federal Emergency Management Agency (FEMA) to develop this community wildfire protection plans (CWPP) and to launch an integrated wildfire prevention program that would reduce wildfire risk and increase community resiliency within district boundaries.

The Healthy Forest Restoration Act (HFRA) was passed by Congress on November 21, 2003 and signed into law by President Bush on December 3, 2003. The HFRA encourages communities within the wildland urban interface (WUI) to create CWPPs. Preparation of a CWPP allows communities to clarify, refine, and establish priorities for protection of life, property, critical infrastructure, and natural resources within its jurisdiction. A CWPP contains an assessment of the hazards and risks facing the community and identifies treatments to protect the community. CWPPs are authorized and defined in Title I of the HFRA.

The HFRA places renewed emphasis on community planning by extending a variety of benefits to communities with a wildfire protection plan in place. Critical among these benefits are 1) the option to establish localized definitions and boundaries for areas having high risk potential, hazards (fuels), and values; and 2) the opportunity to help shape management priorities within the planning area.

The CWPP, as described in the HFRA, brings together diverse local interests to discuss their mutual concerns for public safety, community sustainability, and natural resources. It offers a positive, solution-oriented environment in which to address challenges such as local firefighting capacity, the need for defensible space around homes (and areas of value), and where and how to prioritize land management.

The purpose of the proposed CWPP is to provide stakeholders and those living in the Metro Fire boundaries with an overview of the wildland fire risks, hazards, and values within the planning area; recommend possible courses of action to reduce the impacts of wildfire in the planned area; and to share an action plan.

The three main components of a CWPP are 1) collaboration with all stakeholders throughout the CWPP process, 2) identification and prioritization of hazardous fuel reduction areas, and 3) addressing the treatment of structural ignitability within the CWPP area.

This draft CWPP:

1. Describes the four environments within the District: natural, built, response, and social environments;

2. Delineates the WUI within the District;

3. Assesses the risk posed by wildfire in the WUI;

4. Provides a community base map that provides a visual information baseline from which the community can assess and make recommendations regarding protection and risk-reduction priorities and depicts features that orient the user to valuable resources at risk from wildfire, emergency response facilities, important infrastructure, and possible sources of wildfire hazard.

5. Provides maps that show high fire hazard areas, as defined by federal, state, and local authorities;

6. Describes a suite of desired projects that span site-specific fuel treatments, recommendations for public education, changes to codes and ordinances, changes to development patterns for planning, and a framework for as yet-undefined projects;

7. Establishes prioritization of fuel management projects and treatment methods, as well as principles for selection of projects when funding is available;

8. Describes the measures communities and homeowners can take to reduce the ignitability of structures;

9. Establishes ways to evaluate progress through measurement and feedback; and

10. Identifies federal, state, and local resources, such as fire response agencies, wildlife and watershed regulatory agencies, open space management agencies, private landowners and homeowners, private vegetation management contractors, and hand crew suppliers.

It is Metro Fire's intent that this CWPP be a living document in that it provides a vision for fuel management over the next 10-15 years. However, it would be actively managed and monitored so that, as conditions change, it will be updated to reflect progress made towards implementing projects and to respond to the changing environments (e.g., new developments, changed fuels, recovery actions). The CWPP WUI and projects identified below describe those actions that are reasonably foreseeable based on the current environmental conditions within the District and available data and information.

2 OBJECTIVES

The overarching goal of this CWPP is to implement a comprehensive plan that results in the protection of human life and reduction of the loss of property, critical infrastructure, and natural resources due to wildfire. This CWPP is also intended to achieve the following primary objectives:

- assist agencies, communities, and local homeowners define, plan, and prioritize types of actions that would limit the damage associated with wildfire.
- reduce the risk of destructive fires through implementation of the following:
  - increased collaborative planning and cooperative actions that would build useful relationships between communities and agencies;
  - reduction of hazardous fuels in the wildland-urban interface (WUI);
  - creation and maintenance for defensible space for structures and properties;
  - reduction of structural ignitability hazards;
  - implementation of evacuation protocols and drills; and
  - improvement of response capabilities through enhanced training and pre-fire planning;
- increase community resiliency;
- foster a community-wide understanding of the risk of wildfire and the benefits of combined individual and community-level mitigation actions;
- establish a process to quantify improvements in community resiliency over time that include tracking, planned, and completed mitigation projects and the success of community outreach;
- form a stakeholder group that would serve as an advisory body to Metro Fire regarding the risks of fire in the WUI;
- increase awareness of the need to protect natural resources, as well as the methods for protecting these resources, both during vegetative treatments and fire response;
- bring the community together to collaborate with local, state, and federal partners to formally assess the risk;
- integrate pre-emergency mitigation planning and incident response in the event of a wildfire;
- coordinate wildfire planning and mitigation with community development and ongoing maintenance activities;
- provide a useful tool for decision support and situational awareness that will allow Metro Fire to assess the risk of wildfire at the community level, develop and monitor mitigation alternatives, and share data directly with homeowners and community managers; and
- fulfill a necessary prerequisite for future funding from federal agencies.

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3 DESIRED OUTCOMES

In addition to the objectives above, the CWPP is designed to support the following broad outcomes:

- Provide a community-wide understanding of the risk of wildfire and the benefits of combined individual and community-level mitigation actions.
- Implement a process to quantify improvements in community resiliency over time to include tracking planned and completed mitigation projects and the success of community outreach.
- Integrate pre-event mitigation planning and incident response in the event of a wildfire event.
- Implement Metro Fire's CWPP recommendations and form a stakeholder group that will serve as an advisory body to Metro Fire about the risks of fire in the WUI.
- Implement enhanced collaboration and partnerships to ensure greater efficiency throughout all phases of fire management within the District, including prevention, preparedness, response, and recovery.
- Provide increased awareness of the need and use of methods to protect natural resources during vegetative treatments and fire response.
- Fulfill a necessary prerequisite for future funding from many federal agencies.

During preparation of this CWPP, Metro Fire collected up-to-date environmental and community data to support Metro Fire operations from planning to response and recovery. During the process of developing the CWPP, several additional capabilities were added to Metro Fire's programs, including:

- A web-based portal that provides a shared awareness of the risk of wildfire between Metro Fire and members of the community. The portal provides a mechanism for Metro Fire and homeowners to communicate on specific fire mitigation actions that each can implement.
- A Wildfire Risk Assessment Framework that assesses parcel-based fire risks which are aggregated to support fire response, individual homeowner education, community planning, and development. This framework is being developed through a stakeholder engagement process bringing together diverse perspectives ranging from community development to emergency response.
- A large collection of data, including baseline community development information, natural resources information (including sensitive habitat and cultural resource areas), aerial imagery, and emergency response information.

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4 DELINEATION OF THE WILDLAND URBAN INTERFACE

CHARACTERISTICS OF THE WILDLAND URBAN INTERFACE

The WUI is the meeting point between wildland vegetation or fuels and structures (Figure 4-1). At this interface, the structure and vegetation are sufficiently close that a wildfire could spread to a structure or a structure fire could ignite vegetation. The proximity of vegetation and structures needed to spread fire varies with the vegetation (fuel) type, the siting of the structure, and the exterior characteristics (building material and design) of the structure itself. WUI is defined on a scale larger than one lot or neighborhood. The importance of spatial distribution of vegetation and structures in the WUI is discussed in more detail below.

In the past, the vast majority of wildfires occurred in remote locations and caused little damage to property or loss of human life. During the last 50 years, however, history is replete with examples of destructive fires in the WUI throughout California. Almost all of the wildfires within the District are caused by humans, and are closer to developed areas. Because of the increased values that accompany structures and other improvements, most losses from wildfire occur in the WUI.

Areas identified within a WUI are targeted for increased levels of fire prevention, preparedness, response, and recovery plans. Parcels in this designation are typically subject to more stringent regulations regarding ignition-resistant construction, defensible space creation and maintenance, and heightened levels of education regarding fire prevention.

METHODS OF DELINEATION

The federal HFRA enables communities to define their own WUI boundary. The WUI is defined within Metro Fire as parcels that have abundant wildlands fuel. More specifically, these are parcels with at least one half acre of wildland vegetation, as mapped by CAL FIRE, and parcels within 1,000 feet of large areas of wildland vegetation. In some cases, this WUI boundary can be difficult to discern due to a gradient of development that gradually transitions from small lots to larger parcels with plentiful vegetation. In other cases, the WUI includes an island of wildland inside a developed area or a small cluster of structures in a large open space area. The WUI delineation relied on two factors that make up the interface: the presence of wildland vegetation and structures.

Using a set of spatially defined data that characterizes vegetation and parcel boundaries, the following set of decision rules were established to determine which properties should be included within the WUI:

1. The boundary of the WUI will fall on the parcel boundary;
2. All parcels are greater or equal to one-half acre;
3. Any parcel where the total percentage of all fuel types is greater than one-half acre;
4. Any parcel where surface fuels are present;
5. Any parcel greater than 80 acres; and
6. Any parcel with a 1,000-ft buffer around wildlands that are greater than 80 acres.

Commercial properties were excluded except where they abut wildlands greater than 80 acres in size. Thus, the WUI delineation is a result of a geospatial analysis using the data sets of surface fuel models and parcel size. The approximate boundary was confirmed and refined during the public engagement process.

Neighborhoods where there are a mixture of parcels that meet the above criteria along with parcels that do not were considered in the WUI if the majority of the parcels are mapped as meeting the WUI criteria, using the above criteria. This avoided a “salt and pepper” distribution of designations of WUI, and resulted in larger blocks and more parcels being mapped as WUI.

Parcels larger than 80 acres were considered WUI parcels even if they did not contain structures because if a structure were to be built, it would become WUI.

Most of the area designated as WUI is located in the southeast portion of the District. Because a combination of characteristics cause lands to be considered WUI, the following discusses the distribution of those characteristics.

Vegetation

- Areas of most urban development within the District are in the cities of Citrus Heights and northern Rancho Cordova.
- More of the area south of Highway 50 is covered with wildland vegetation.
- The vegetation in the northeast corner of the District (Elverta and Rio Linda) is composed mostly of agricultural crops.
- Large areas in Florin, in the southwest portion of the District, are primarily urban with minimal vegetation, especially around the Florin Perkins Road from Gerber Road to Jackson Road.
- Other areas primarily devoid of vegetation are along Fair Oaks Boulevard from El Camino Avenue to Winding Way; and along Lincoln Highway; and Sunrise Boulevard from, just north of Madison Avenue to Greenback Lane. Similarly, the area west of Watt Avenue along Arden Way is largely devoid of vegetation until it intersects Del Paso Boulevard to the west, past the Erickson Industrial Park.
- Large areas of commercial property are found near the air force bases and in shopping centers.
- Natural areas along creeks form large vegetated strips that span many parcels. While the American River Parkway (ARP) is under one ownership (within the District boundaries), Arcade Creek forms a large vegetated area under numerous ownerships. Similarly, strands of natural vegetation string from Auburn Plaza shopping Center to Shadowcreek Park to Northbrook Way to Kilborn Drive south of Madison Ave.

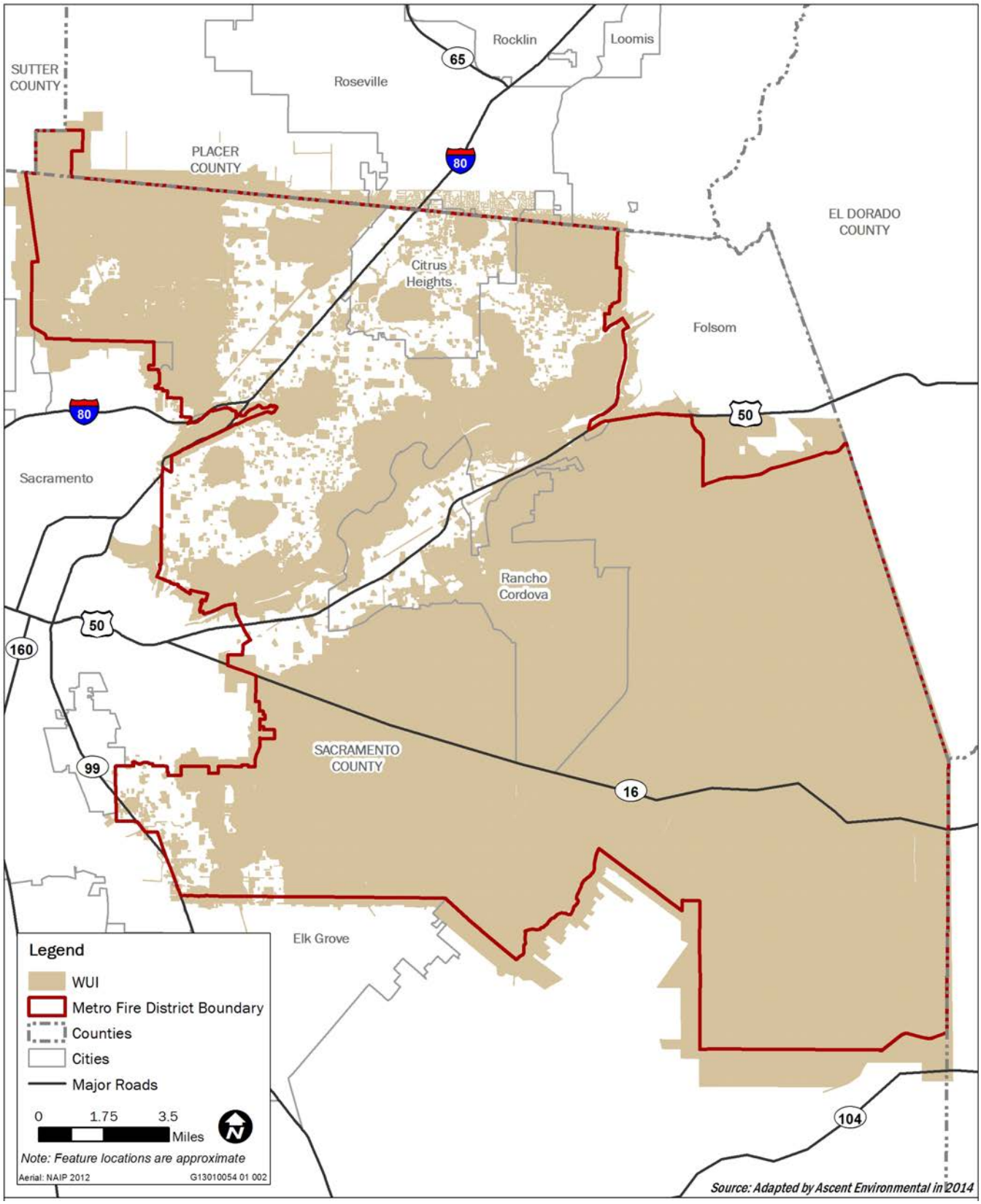
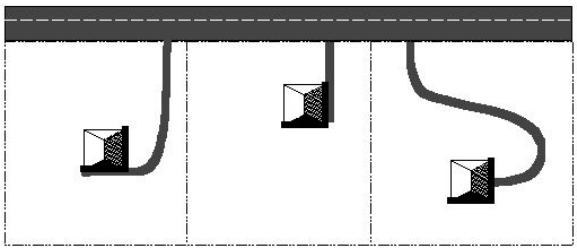


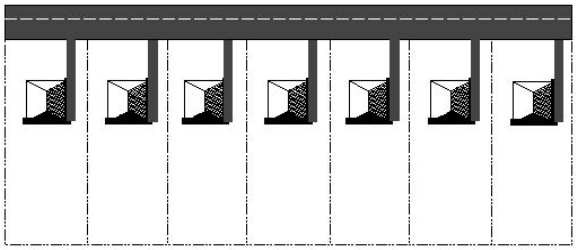
Figure 4-1 **Wildland Urban Interface**

STRUCTURE DENSITY AND ARRANGEMENT

Structure density, or the distance between structures, relates directly to horizontal fuel continuity. The closer structures are together the greater the likelihood of fire spreading from structure to structure, contributing heavy fuels and additional ignition sources. Structure density is usually measured in terms of the number of units (or homes) per acre. Whether it is wildland with limited development, or heavily developed urban areas with limited wildland, the form of the interface makes a difference. The presence of structures, even in low density, complicates wildfire suppression by requiring different tactics to protect homes than are used on the surrounding vegetation. This may limit the strategies available to restrict fire spread and contain the fire.



Low Structure Density
Large quantities of fuels left untreated
House-to-house ignition less likely
Inefficient suppression activities



High Structure Density
Fuels between homes are likely removed
House-to-house ignition less likely
Efficient suppression activities

5 COMMUNITY BASE MAP

The community base map is an important feature of the CWPP that serves to create a shared vision of the existing environments within the District and is required by the Healthy Forest Restoration Act (HFRA) in order to obtain approval by cooperating federal and state agencies. The Community Base Map for this CWPP is depicted in Figure 5-1 and also resides on the Metro Fire geoportal in a more interactive form. The map provides a visual information baseline from which the community can assess and make recommendations regarding protection and risk-reduction priorities and depicts features that orient the user to valuable resources at risk from wildfire, emergency response facilities, important infrastructure, and possible sources of wildfire hazard. Features depicted on the map include:

1. City and county boundaries
2. Land ownership
3. Fire station locations
4. Network of streets
5. Open spaces and parks
6. State-determined high hazard areas

A draft of the community base map was presented at stakeholder meetings in fall 2013 and was refined, as shown in Figure 5-1, based on comments received during those meetings.

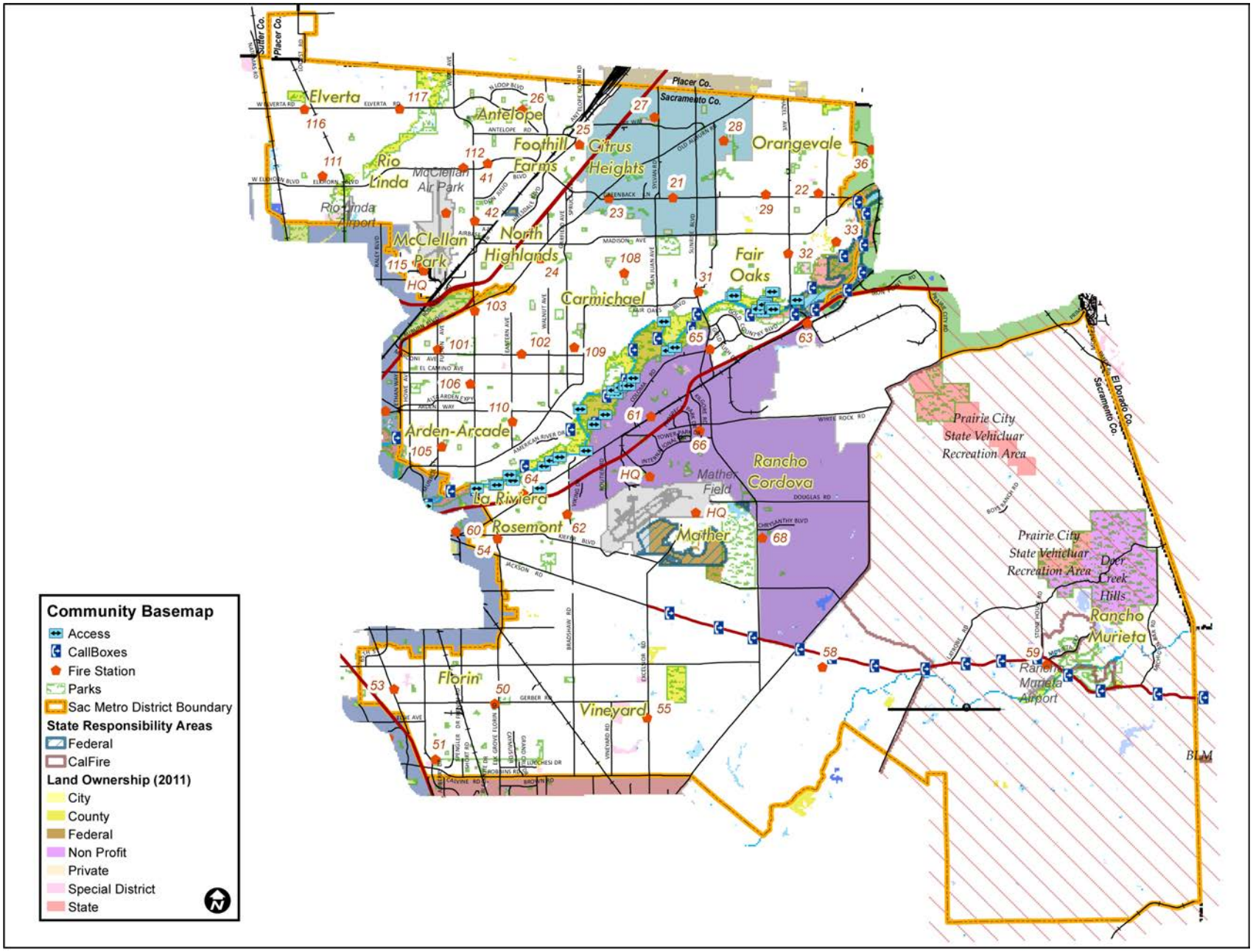


Figure 5-1 **Community Base Map**

6 DESCRIPTION OF METRO FIRE

Metro Fire is an independent, special fire district protecting California's state capitol region. Metro Fire's area of responsibility is located in the northern, unincorporated portion of Sacramento County, but it also includes a small part of Placer County (Figure 6-1). Metro Fire is located in the middle of the Central Valley and is bordered by Amador County and El Dorado County on the east, and Placer County and Sutter County on the north, and other parts of Sacramento County to the south and west. The District is bordered by—but does not include—the City of Sacramento to the west, the City of Folsom to the northeast, and the City of Elk Grove to the southwest. The Cities of Citrus Heights and Rancho Cordova are both located in the northern portion of the District. The other towns and communities within the District are unincorporated, and the County has land use jurisdiction over these communities.

Metro Fire formed as a result of the consolidation of 16 smaller fire departments, including Arcade, Arden, Carmichael, Citrus Heights, Elverta, Fair Oaks, Florin, Mather Field, McClellan Field, Michigan Bar, Mills, North Highlands, Orangevale, Rancho Cordova, Rio Linda, and Sloughhouse. Some of these fire agencies were founded in the early twenties to provide fire protection in remote parts of the County. The last merger was December 2000 when American River Fire and Sacramento County Fire merged into Metro Fire.

Metro Fire provides emergency and fire response services to nearly 600,000 people in a 417-square-mile area from 42 stations and the employment of 750 uniformed and support personnel. The varied demographics of the District provide opportunity for its personnel to respond to emergencies in rural, suburban, and urban settings. The wide diversity of emergency incidents require firefighters to be proficient in wildfire response, structural fire response, crash fire rescue, technical rescue, swift water rescue, hazardous material mitigation, and paramedic medical services.

Metro Fire continues to provide fire protection, fire prevention, fire safety education, emergency medical aid, and other emergency response services.

Table 6-1 Sacramento Metropolitan Fire District Profile

Established	2000
Total Staffing	750
Annual Calls	80,000 +
Daily shift staffing	165 per shift
Stations	42
Engines	36
Trucks	8
Heavy rescue vehicle (a type of specialty firefighting or emergency medical services apparatus)	1
Bulldozers	1
Helicopters	2
Fireboats	2
Emergency Medical Support Units	14
Medical Support Level	Advance Life Support

[1] Emergency Medical Support Units are staff vehicles dedicated to providing out-of-hospital acute medical care, and transport to medical facilities.
[2] Advanced Life Support is a designation that indicates a high level of training, equipment, (paramedic-level responders).

Source: Metro Fire http://www.sacmetrofire.ca.gov/

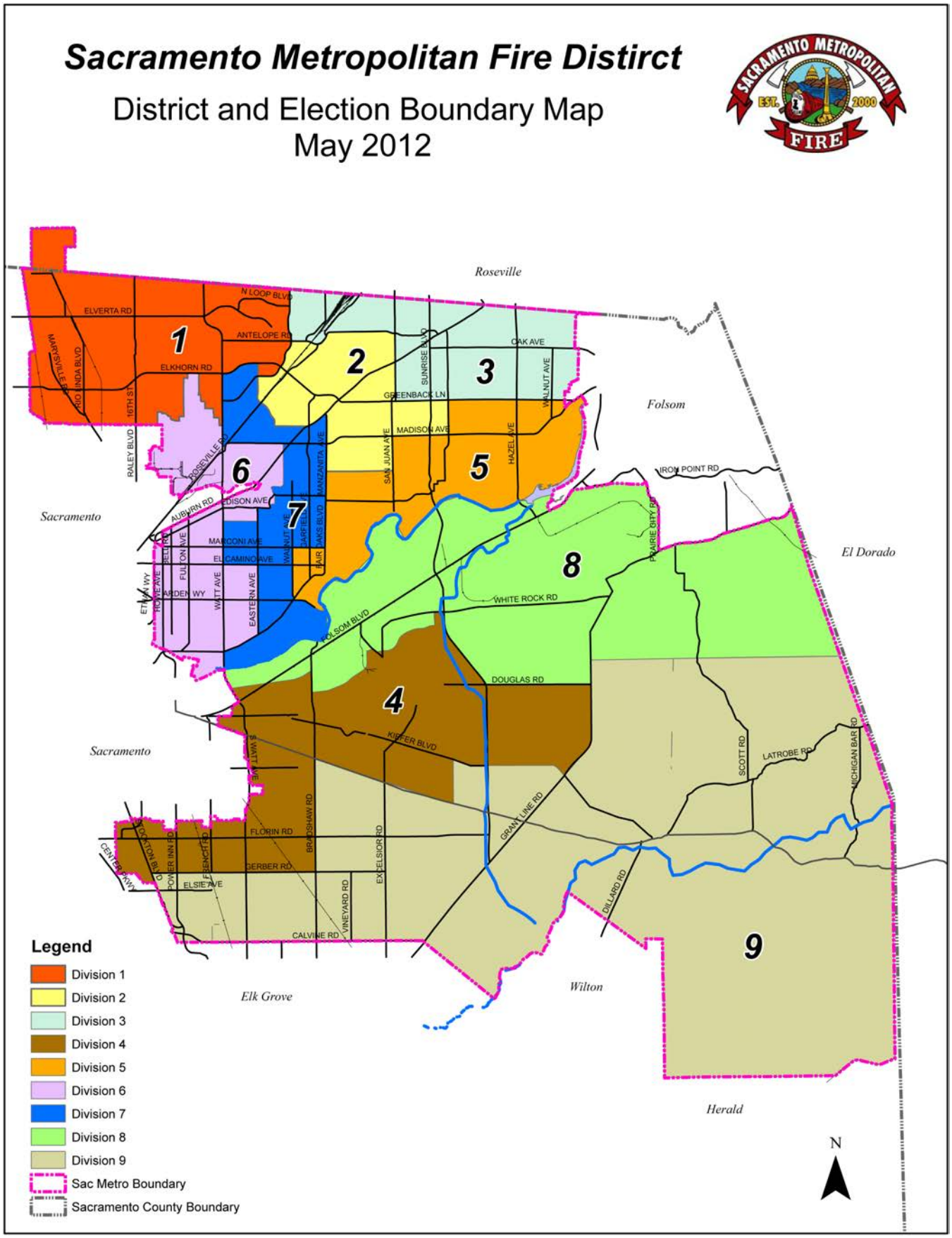


Figure 6-1 **Extent of Metro Fire Jurisdiction**

BOARD OF DIRECTORS

Metro Fire is a special district governed by a Board of Directors (Board). Each board member is elected by the voters within a geographical area, or division, of Metro Fire's operational area. There are nine Board Members representing the citizens within Metro Fire's jurisdiction (Figure 6-1).

The Board's regular meetings are held on the second and fourth Thursday of each month at 6:00 PM, with the exception of holidays and other recesses. The Board encourages attendance and input at Board meetings.

Division 1, Gary Monk

Division 2, Grant B. Goold

Division 3, Randy Orzalli

Division 4, Ted Wood

Division 5, Jack Scheidegger

Division 6, D'Elman Clark

Division 7, Matt Kelly

Division 8, Gay Jones

Division 9, Dave Pierson

NATURAL ENVIRONMENT

There are several factors within the natural environment that influence decisions made in the CWPP. For example, weather topography and fuels combine the determine fire behavior, and resulting fire hazards. Habitat types that are protected by law, or by best practices may constrain the type and extent of activities aimed at fire hazard reduction.

Local Weather

The Sacramento area features a Mediterranean climate that is generally sunny and often mild. Summers are extremely dry and virtually cloudless, and winters are generally only rainy for 10 days out of the month (NWS 2010). The nearby city of Sacramento has an average annual high of 74° F and a low of 48° F, with 74 days that are over 90° F, and 17 days that drop below freezing (WRCC undated). The average rainfall is 17.5 inches, with rain falling on 58 days out of the year (WRCC undated).

There are no weather stations in the District that monitor conditions in a manner compatible with national fire danger ratings, or with state-wide methods of monitoring fire weather. According to Metro Fire staff the most dangerous fire conditions for the region are when strong winds blow from the north. Normally these winds are dry, with a powerful desiccating effect. These winds most often occur in the fall, but can also be common in late spring. Other conditions where wildfires are more likely to occur and become damaging are when high temperatures have persisted for days; this results in more ignitions and fires of higher intensity.

Local Wildland Fuels

DESCRIPTION OF FUEL MODELS

Fuel models describe the characteristics of vegetation that influence the way they burn. Fuel models are used by all wildland fire response agencies because they are an important factor in predicting fire behavior, usually within the Fire Behavior Prediction System (FBPS). Fuel models can sometimes be related to vegetation, such as tall and short chaparral, tall and short grass, timber with and without an understory, and oak woodlands with and without understory vegetation. Fuel models are also known as fuel types. The structure (or arrangement) of the vegetation is just as important as the kinds of plants that grow in the vegetation. The various characteristics of each fuel model are detailed in Appendix B.

In determining the appropriate fuel model to apply to an area, it is critical to consider the fuel that will actually carry the fire. For example, a sparse stand of oaks, or an individual oak with a grass understory may be characterized as a grassland fuel model because the oak leaves and branches may not contribute much to the fire behavior because of the minor amount of leaf drop, or because the height at which the branches start is high.

An important source of data regarding wildland fuels comes from LandFire, a program to map fuels consistently throughout the nation. Figure 6-2 below depicts the spatial distribution of wildland fuel models within the District. Fuel models mapped in the District include annual grasslands, oak savannas, and oak woodlands, located primarily within the northern and central portion of the District and within the ARP. Shrubby fuels mapped as chaparral are located within the southeastern portion of the District. In almost all cases, the fuel models can be described in terms of vegetation types as well as the understory vegetation and presence of dead biomass. Refer to Section 6.2.4, below, for a summary description of habitat types located within District boundaries.

Topography and Land Use

Land uses within the District include urban, suburban, and undeveloped (natural or agricultural). The terrain throughout is primarily flat or composed of gently rolling hills, with the steepest terrain being located in the eastern portion of the District, where the Central Valley begins to transition into the Sierra Foothills, and along the American River.

The northern portion of the District is the most developed, and includes the urban and suburban development within the cities of Citrus Heights and Rancho Cordova, and surrounding unincorporated communities. Citrus Heights is located north of the American River, where it covers approximately 14 square miles immediately adjacent to Interstate 80. Rancho Cordova occupies nearly 34 square miles on the south side of the American River. A much larger area of urban and suburban development surrounds these communities, and is loosely circumscribed by Interstate 80 to the north and Highway 50 to the south. The American River runs between these two roadways, and forms a green belt through the developed area. (See the Community Base Map).

The southern portion of the District is occupied by scattered unincorporated communities, and extensive areas of grassland, pasture, and cropland. Other natural habitats include oak woodland, vernal pools, riparian habitat, and wetlands. There are numerous seasonal and perennial waterways within the District. The largest of the rivers is the American River, which traverses the northern portion of the District, and is bordered by riparian forest. It flows out of the man-made reservoir Folsom Lake, which is located just to the east of the District. The other primary river in the District is Cosumnes River, which flows across the southern portion, roughly between the communities of Wilton and Rancho Murieta. Most rivers and streams are ephemeral, and dewater during the dry season.

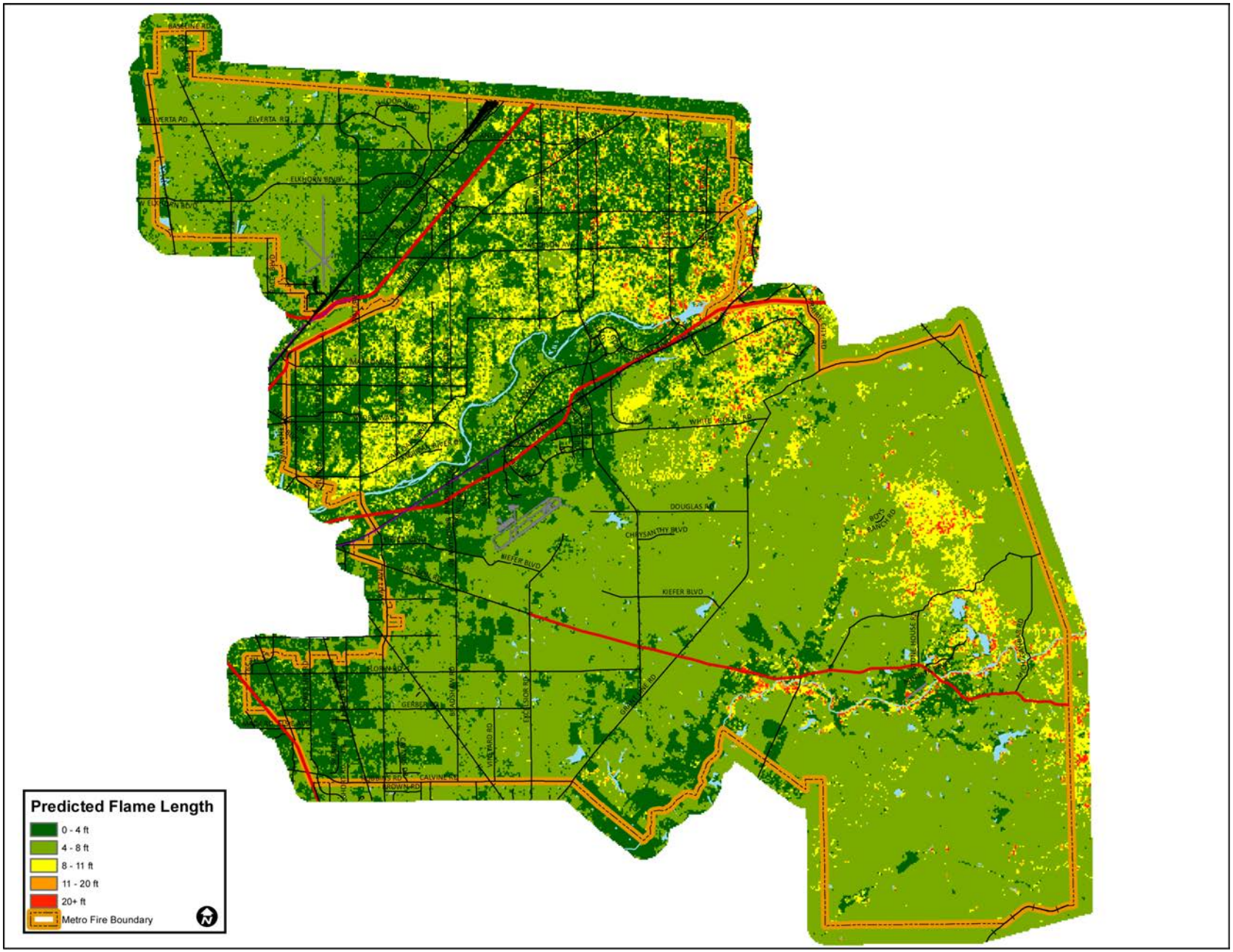


Figure 6-2 **Spatial Distribution of Predicted Flame Lengths**

Habitat Types

Metro Fire is located within the Sacramento Valley of California. The topography of Sacramento County is varied as elevations range from 14 feet above sea level in the southwest to approximately 670 feet above sea level in the east. Most of the District is dominated by relatively flat terrain and gentle slopes with natural drainage patterns being poorly defined as a result. The central and western part of the District is mainly at or near sea level and consists of relatively flat terrain. The eastern section of the District begins to rise in elevation as the terrain moves into the foothills of the Sierra Nevada.

There are three basic landforms within the District: river channel, alluvial plain, and upland ridge. River channel areas are found along the Sacramento River, lower American River, and lower Cosumnes River within Sacramento County. Alluvial plains cover the majority of the District and generally run from north to south between the Sacramento River and the Sierra Nevada foothills. Alluvial plains feature slopes that are gentle or nearly flat. The upland ridge area lies at the foot of the Sierra Nevada mountains in the eastern portion of the county. It rises from the alluvial plains to a maximum height of approximately 670 feet. Slopes in this area range from nearly flat or gently rolling to very steep.

DATA SOURCES FOR VEGETATION MAPPING

The primary data source for vegetation mapping in this chapter is the land cover mapping from Sacramento County (Sacramento County 2009). Vegetation mapping is based on California Wildlife Habitat Relationships (CWHR) mapping habitat types (CDFG 1988). CWHR classifies existing vegetation types important to wildlife. This system was developed to recognize and logically categorize major vegetative complexes at a scale sufficient to predict wildlife-habitat relationships.

The following sources of information were reviewed to prepare the biological resources chapter:

- California Department of Fish and Game's Natural Diversity Database (CNDDB) record search within a 5-mile radius of the District; (CNDDB 2014);
- California Native Plant Society (CNPS) Online *Inventory of Rare, Threatened, and Endangered Plants of California* (CNPS 2014);
- Sacramento County Geographic Information Systems Existing Vegetation Inventory (2009);
- Sacramento County General Plan and FEIR (2010, 2011), Draft South Sacramento Habitat Conservation Plan (2010), Rancho Cordova General Plan (2006), and the ARP General Plan (2008);
- Species Lists for the Carbondale, Sloughhouse, Elk Grove, Florin, Buffalo, Folsom SE, Citrus Heights, Rio Linda, Sacramento East, and Carmichael, 7.5-minute quadrangle created by the U.S. Fish and Wildlife Service (USFWS 2014);
- Sacramento County Vegetation Database (2009); and
- City of Ranch Cordova General Plan (2011).

VEGETATION COMMUNITIES

The following represents a brief description of the vegetation communities occurring within the District as defined by the CWHR classification system (CDFG 1988 and 1999; Parker and Maytas 1981). According to the County vegetation database (Sacramento County 2009), there are 18 vegetation communities within Sacramento County. This data was utilized for this analysis because there was no site specific data

available. It is a broad scale classification of vegetation based on satellite imagery and does have errors in classification. Therefore, data presented in the database and analysis does not necessarily reflect the type of vegetation that is on the ground. All treatment sites will have to be surveyed prior to treatment to determine the actual vegetation community present. Figure 6-3 and 6-4 show District-wide vegetation and ARP vegetation in relation to the proposed treatments.

The vegetation communities in the Sacramento County were further generalized into nine categories (agriculture, barren, lacustrine, oak woodland and savannah, riparian, riverine, urban, valley grassland, wetland) that provide 229,657 acres of habitat for common and special-status plants and animals. There are 1,147 acres of proposed fuel reduction treatment in these vegetation communities. Table 6-2 lists the acres of vegetation communities that are within the boundaries of CWPP proposed treatment areas.

Table 6-2 Vegetation Community Acreage within CWPP Proposed Treatments Boundaries

Land Cover Type	Treatment Categories							Total
	Fuel Reduction Area Maintenance/ Enhancement	Rossmoor Burn Areas Rehabilitation	New Unpaved Access Road	Sprinkler System Upgrades	Yellow-star Thistle Prescribed Burn Areas	Subdivisions	Horse Trails	
Agriculture	0	0	0	0	22	67	0	89
Barren	3	1	0	0	0	7	0	11
Lacustrine*	0	0	0	0	0	11	0	11
Oak Woodland and Savannah	20	0	0	0	0	30	0	50
Riparian	5	24	<1	55	3	8	2	97
Riverine*	0	0	0	1	0	5	0	5
Urban	121	15	<1	7	1	373	1	516
Valley Grassland	4	3	0	0	24	337	0	366
Total	**152**	**42**	**0.2**	**63**	**50**	**837**	**3**	**1,147**

*Note that riverine and lacustrine sites will not be treated and will have best management practices (BMPs) associated with vegetation treated near them. They are included in areas to be treated for simplicity of mapping. These might also be mapping errors.

Agriculture

Agriculture within the District includes cropland, pasture, and orchards and these lands are mainly located in the northwest by Rio Linda and in the southern portion of the District in Rancho Cordova, south of Jackson Road. Agriculture lands have greatly reduced the wildlife richness and diversity within California due to their removal of native habitat and monotypic vegetation. However, some wildlife is attracted to orchards and pasture because they provide forage at certain times of year.

Lacustrine

Lacustrine is defined as inland depressions or dammed riverine channels containing standing water and includes lakes and reservoirs. Lacustrine varies from small ponds (less than an acre) to large areas covering hundreds of acres, and depths can vary from a few inches to hundreds of feet. Typical lacustrine habitats include permanently flooded lakes and reservoirs, intermittent lakes (e.g., playa lakes) and ponds (including vernal pools) so shallow that rooted plants can grow over the bottom. Small ponds and lakes are scattered throughout the District (i.e. Lake Natoma).

Riverine

Riverine is defined as linear water features such as rivers, streams, creeks, and drainages with intermittent or continually running water. The major riverine habitats in the District include the American and Cosumnes

Rivers and their tributaries. The American River flows out of the man-made reservoir Folsom Lake, which is located just to the east of the District. The Cosumnes River flows across the southern portion of the District, between the communities of Wilton and Rancho Murieta. Most rivers and streams are ephemeral, and are dry during the summer. Folsom South Canal runs from the American River to the Cosumnes River and is also considered riverine habitat.

Oak Woodland and Savannah

Oak woodlands are found in the eastern portion of the District in moderate to dense stands comprising blue oak, interior live oak, and valley oak. Oak woodland communities are important as nesting, breeding, and migration habitat. Oaks are considered an important food and cover sources for many wildlife species. They provide forage such as acorns and browse for migrating and dispersing wildlife during fall and winter months.

Blue Oak-Foothill Pine Woodland

Blue oak-foothill pine woodland is composed of hardwoods, conifers, and shrubs. The shrub component is typically composed of several species that tend to be clumped, with interspersed patches of annual grassland. This community has small accumulations of dead and downed woody material and relatively few snags, compared with other tree habitats in California. Blue oak and foothill pine typically compose the overstory of this habitat, with blue oak usually most abundant. Interior live oak sometimes dominants these stand on north-facing and rocky slopes. Shrub species include ceanothus (*Ceanothus* spp.), manzanita (*Arctostaphylous* spp.), California coffeeberry (*Rhamnus californicus*), poison-oak (*Toxicodendron diversilobum*), silver lupine (*Lupinus albifrons*), blue elderberry (*Sambucus cerulean*), California yerbasanta (*Eriodictyon californicum*), and California redbud (*Cercis occidentalis*). The ground cover is typically composed of annuals, such as brome grass (*Bromus* spp.), wild oat (*Avena* spp.), foxtail (*Alopecurus spp*), needlegrass (*Nassella pulchra*), filaree (*Erodium* spp.), and fiddeneck (*Amsinckia* spp.). Blue oak-foothill pine woodlands are found in the southeastern portion of the District as the valley transitions into the Sierra Nevada foothills.

Blue Oak Woodland

Blue oak woodland is distinguished by a blue oak (*Quercus douglasii*)-dominated overstory and an understory dominated by annual grasses. Blue oak woodland is distinguished from blue oak savanna by the higher density of trees in the overstory canopy. Generally, blue oak woodlands have an overstory composed of scattered broad-leaved trees, although the canopy can be nearly closed on better-quality sites. Associated herbaceous and shrub species are similar to blue oak-foothill pine woodland. Blue oak woodland occurs throughout the District but it is concentrated on the eastern end of the American River portion in the District by Hazel Avenue, and in the south eastern section of the District east of Scott Road.

Valley Oak Woodland

This habitat varies from savanna-like to forest-like stands with partially closed canopies, comprised mostly of winter-deciduous, broad-leaved species. Canopies of these woodlands are dominated almost exclusively by valley oaks (*Quercus lobata*). Tree associates in the Central Valley include California sycamore (*Platanus racemosa*), northern California black walnut (*Juglans hindsii*), interior live oak (*Quercus wislizeni*), boxelder (*Acer negundo*), and blue oak. Valley oak stands with little or no grazing tend to develop a partial shrub layer of species that have their seeds are disseminated by birds, such as poison-oak, toyon (*Heteromeles arbutifolia*), and coffeeberry. Ground cover consists of a well-developed carpet of annual grasses and forbs. Valley oak woodland occurs mainly by the American River portion in the District by Hazel Avenue.

Montane Hardwood

Montane hardwood habitat is typically dominated by a hardwood tree layer with sparse shrub and herbaceous layers underneath. Associated trees at lower elevations are foothill pine (*Pinus sabiniana*), knobcone pine (*Pinus attenuate*), tanoak (*Lithocarpus densiflorus*), Pacific madrone (*Arbutus menziesii*), and scrubby California-laurel (*Umbellularia californica*). Associated understory vegetation includes Oregon-grape (*Mahonia aquifolium*), currant (*Ribes* spp.), wood rose (*Rosa californica*), snowberry (*Symphoricarpos albus*), manzanita, poison-oak, and a few forbs and grasses. Small acreages of montane hardwood occur in the District east of Scott's Road where the valley transitions into the Sierra Nevada foothills.

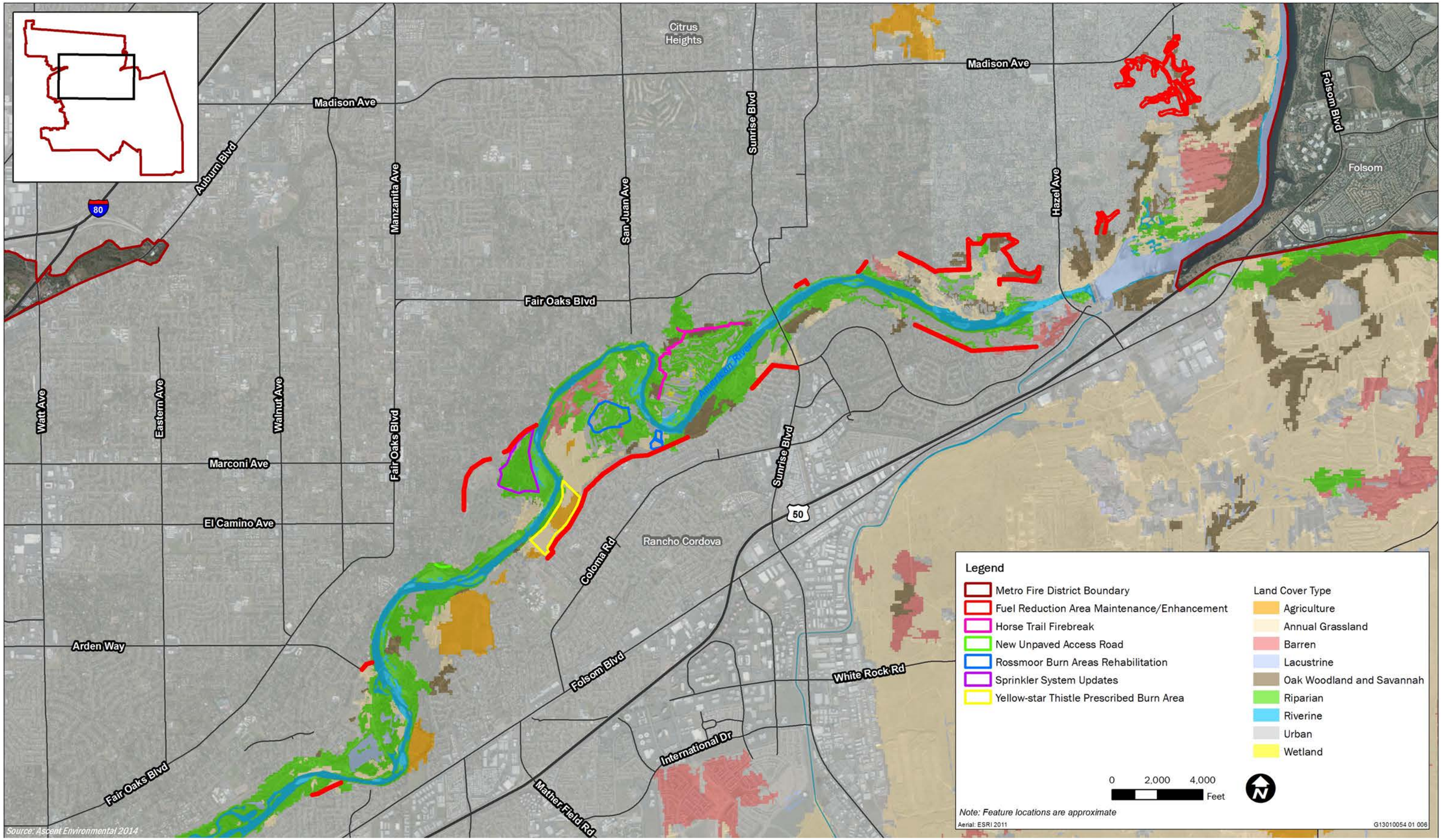


Figure 6-3 **Land Cover - American River Parkway**

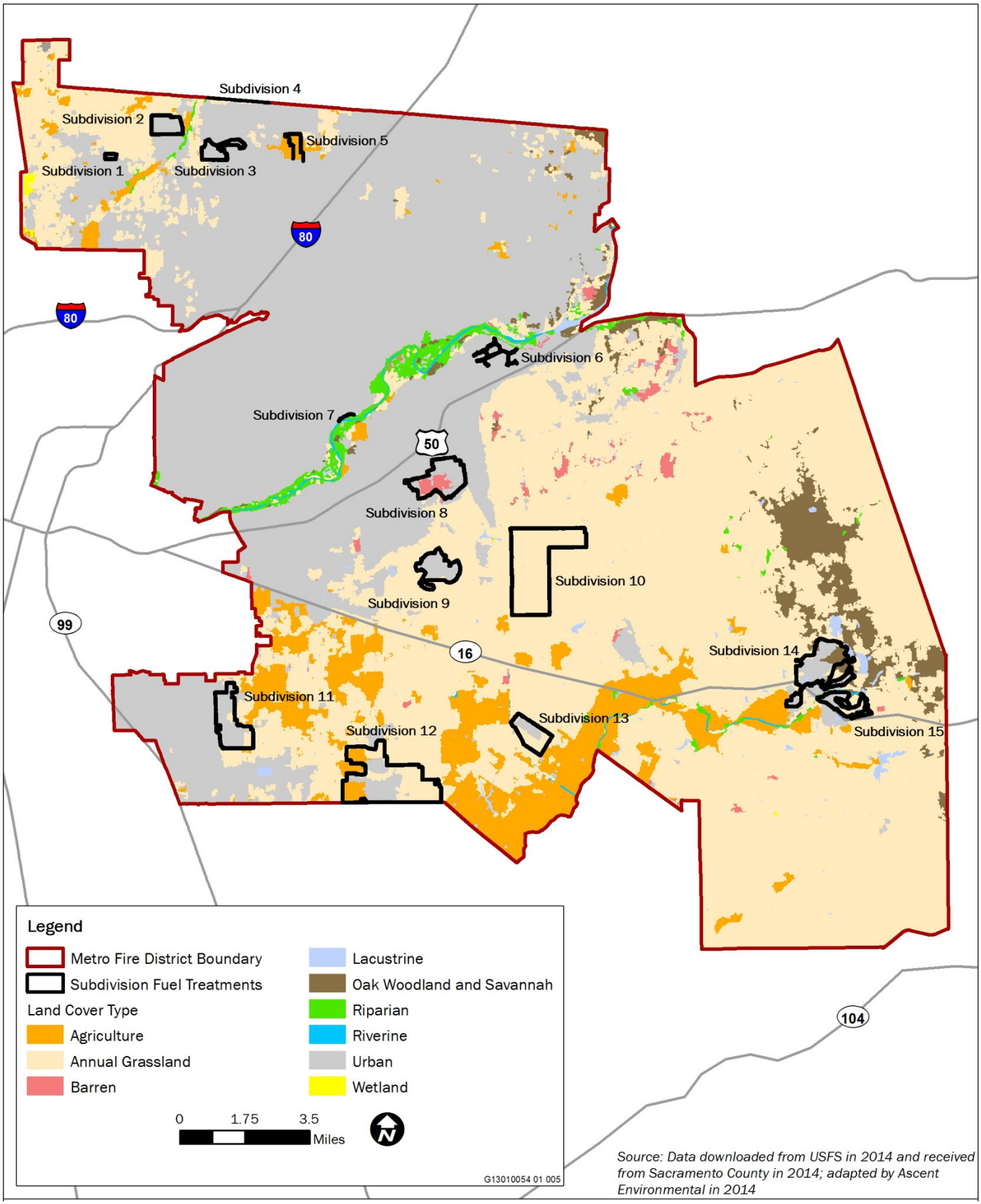


Figure 6-4 **Land Cover - Subdivision Fuel Treatments**

Riparian

Valley and foothill riparian systems are rich in species diversity and abundance due to their ability to provide food, water, cover and their use as migration corridors. In the Sacramento River Valley, only 25,000 acres of an estimated 500,000 acres existing in 1850 remain today (Sacramento County 2014). Mixed and valley foothill riparian habitat are mainly along the American and the lower Cosumnes. As the Cosumnes River reaches the eastern end of the District the montane riparian woodlands begin to emerge.

Mixed Riparian Woodland

Mixed riparian woodland is distinguishable by an open canopy layer dominated by tall Fremont cottonwood trees. Beneath this open layer, a moderately dense mid-canopy layer is composed of tree species such as Oregon ash (*Fraxinus latifolia*), Goodding's willow (*Salix gooddingii*), northern California black walnut, valley oak, and box elder. In some areas, a subcanopy of dense riparian scrub dominated by willow species including arroyo willow and sandbar willow is present.

Riparian scrub is interspersed with mixed riparian woodlands in the floodplains of waterways throughout Sacramento County. In the District, this habitat type consists of an open to dense shrubby thicket dominated by a mixture of sandbar willow (*Salix exigua*), Arroyo willow (*S. lasiolepis*), red willow (*S. laevigata*), and immature stands of mixed riparian woodland tree species.

Montane Riparian Woodland

Montane riparian zones are found at moderate to high elevation in the Sierra Nevada. This typing in the treatment units may be in error in classification as the elevation seems too low for this vegetation community. They are quite variable and often structurally diverse. Usually, the montane riparian zone occurs as a narrow, often dense grove of broad-leaved, winter deciduous trees up to 100 feet tall with a sparse understory. In the Sierra Nevada, characteristic species include thin leaf alder (*Alnus incana),* black cottonwood (*Populus balsalmifera trichocarpa*),dogwood (*Cornus sericea*), willow, and white alder(*Alnus rhombifolia*). Montane riparian habitats can occur as alder or willow stringers along streams of seeps. In other situations, an overstory of Fremont cottonwood, black cottonwood, and/or white alder may be present. As the Cosumnes River reaches the eastern end of the District, montane riparian woodlands begin to emerge.

Valley Foothill Riparian Woodland

Valley oak riparian woodland is the majority of riparian habitat in the District. It usually intergrades with the valley grassland land cover type and wooded borders along streams and agricultural fields in the District. Most trees are deciduous and include cottonwood, valley oak, California sycamore, California black walnut, and box elder. Typical understory shrub layer plants include wild grape (*Vitus californica*), wild rose, California blackberry (*Rubus ursinus*), blue elderberry, poison oak, and willows. The herbaceous layer consists of sedges, rushes, grasses, and other herbs. The understory vegetation is extremely dense and includes high amounts of down woody debris.

Urban

Urban habitat varies from heavily developed habitats such as downtown areas and urban residential areas to less developed areas of suburbia. Vegetation varies from street trees and shrubs to landscaping vegetation around homes to city parks with shrubs, trees, and lawns. The central portion of the District is considered urban habitat with a progression to the outer boundaries of the District toward more natural habitats.

Valley Grassland

The valley grassland land cover type is characterized by annual grasses and forbs, which are predominantly non-native species. It occurs on the flat floodplains of the valley into the foothills. Species composition is influenced by annual and seasonal weather patterns. Nonnative annual grasses that dominate this land cover type include wild oats (*Avena fatua*), soft chess *(Bromus hordeaceus*), ripgut brome (*B. diandrus*), red brome (*B. madritensis* ssp. *rubens*), wild barley (*Hordeum* spp.), and foxtail fescue (*Vulpia myuros*). Common forbs of this land cover type include broadleaf filaree (*Erodium botrys*), redstem filaree (*E. cicutarium*), turkey

mullein (*Eremocarpus setigerus*), true clovers (*Trifolium* spp.), bur clover (*Medicago polymorpha*), popcorn flower (*Plagiobothrys* spp.), and many others. Some perennial species such as purple needlegrass (*Nassella pulchra*) and Idaho fescue (*Festuca idahoensis*) may be present.

The valley grassland within the District is associated with vernal pools and other seasonal wetlands. See Figure 6-3 and 6-4 for location of wetlands in the District. Also refer to the Wetlands section below for more description.

Wetlands

Freshwater Emergent Wetlands

Freshwater emergent wetlands are generally defined by herbaceous vegetation dominated by emergent hydrophytic (water-loving) plants such as grasses, reeds, rushes and sedges. They occur along rivers, streams, lakes, wet meadows and other linear or open bodies of water. They are typically perennial wetlands, but may dry out for short periods. Fresh emergent wetlands are among the most productive wildlife habitats in California. Some of the largest acreages of fresh emergent wetlands are found in the Sacramento Valley. Wetlands in the District are associated with the American River, Cosumnes River, Mather Lake, Frye Creek, Alder Creek, an unnamed creek by Meiss Road, and a canal along East Levee Road.

Non-vernal Seasonal Wetlands

A seasonal wetland is defined as ephemeral wetlands that pond during the rainy season and are dry by summer. Seasonal wetlands are dominated by hydrophytic vegetation. Seasonal wetlands occur in isolated patches as well as within the banks of bodies of water such as streams and creeks, rivers, ponds, lakes, and reservoirs.

Vernal Pool Wetlands

Vernal pools are generally found in the grassland vegetation community within small depression composed of a hardpan soil layer. These pools support downingia (spp.), meadowfoam (*Limnanthes alba*) and other rare plant and invertebrate brachiopod species. Some areas may be utilized for livestock grazing. Valley grasslands cover the majority of the area south of Highway 50 with one large area of habitat located by Elverta Road in the northwest section of the District.

Special-Status Plant Species

A total of 18 special-status plant species that have been documented in the CNDDB within a 5-mile radius around the District and are also included a USFWS quad search encompassing the District. This is considered the Study Area. The California Department of Fish and Wildlife (CDFW) requests that special-status species data not be displayed in reports. Therefore, known locations of special-status species are described in this document only. Of these species, seven are not considered further in this document because they are not likely to occur in the District or no work will be implemented in or near their habitat. Parry's Horkelia (*Horkelia parryi*) is found in chaparral habitat in the foothills, a habitat not located in the District. Saline Clover (*Trifolium hydrophilum*) is generally located in salt water marsh, a habitat not located in the District. Woolly Rose-Mallow (*Hibiscus lasiocarpos* var. *occidentalis*) and Sanford's arrowhead (*Sagittaria sanfordii*) are limited to aquatic habitat and no work will be implemented within aquatic habitat or wetlands. Ione formation plants would not occur within or near treatment areas including Ione manzanita, (Arctostaphylos myrtifolia), Ione Buckwheat (*Eriogonum apricum* var. *apricum*), and Irish Hill Buckwheat (*Eriogonum apricum* var. *prostratum*). No protocol-level botanical surveys for any special-status species were conducted specifically for this Plan.

These 15 species that are considered for further review in this document are listed in Table 6-3 and discussed in more detail below.

Table 6-3 Special-Status Plants With Potential to Occur in the District

Species	Status[1]			Habitat	Blooming Period
	Federal	State	CRPR		
Balsalmorhiza macrolepis Big-scale balsamroot	—	—	1B.2	**Could Occur.** Found in valley grassland and foothill woodland on open, grassy and rocky slopes at elevations of 295-5,708 feet. Two occurrences in the five mile search area; no occurrences within the District. North of the District in Roseville east of Highway 65 just south of Blue Oaks Blvd.	May-June
Cuscuta obtusiflora var. *glandulosa* Peruvian Dodder	—	—	2B.2	**Could Occur.** A parasitic annual vine that is can infest crops, ornamentals, native plants and weeds. A native species that is classified as a noxious weed by CA Department of Food and Agriculture. One occurrence within five miles of the District. None in the District. Found 3 miles southwest of the District by Lagona Lake.	July-October
Downingia pusilla Dwarf downingia	—	—	2.2	**Could Occur.** Vernal pools and mesic sites within valley and foothill grasslands. Up to 1,591 feet in elevation. Occurs primarily on Laguna and Riverbank formations. Of the 16 occurrences recorded in the study area, only three current records are within the District. One record is in the southeast corner of the District at Howard Ranch by Michigan Bar Rd. Another record is by Phoenix Park near Lake Natoma. The third is in the northwest corner of the District by Elverta Blvd.	April-August
Eryngium pinnatisectum Tuolumne Button-celery	—	—	1B.2	**Could Occur.** Can be found in freshwater wetlands, vernal pools, wetland riparian and foothill woodland communities. Found between 100 and 5,610 feet in elevation. One record within the District from 1941 by Michigan Bar Road.	May-August
Gratiola heterosepala Boggs Lake hedge-hyssop	—	E	1B.2	**Could Occur.** Associated with vernal pools. It is found in freshwater wetlands and wetland riparian areas. Can be found on lake margins as well. Occurs between 50 and 5,905 feet. Eight known occurrences within the District.	May - October
Juncus leiospemus var. *ahartii* Ahart's dwarf rush	—	—	1B.2	**Could Occur.** Mesic valley and foothill grassland between 98-751 feet in elevation. Restricted to wetlands and vernal pools. Four occurrences of Ahart's dwarf rush in Sacramento County; only one current occurrence is in the District by Eagle's Nest Road.	March-May
Juglans hindsii Northern California Black Walnut	—	—	1B.1	**Could Occur.** Found along streams and disturbed slopes. Found up to 3,600 feet in elevation. No records found within five miles of the District.	April-May
Legenere limosa Legenere	—		1B.1	**Could Occur.** Vernal pool associated species. Occurs up to 2,887 feet in elevation. There are 18 occurrences within the District.	April-June

Table 6-3 Special-Status Plants With Potential to Occur in the District

Species	Status[1]			Habitat	Blooming Period
	Federal	State	CRPR		
Navarretia myserii ssp. *myersii* Pincushion navarretia	—	—	1B.1	**Could Occur.** Associated with vernal pools that are often acidic. Can be found between 65-1,082 feet in elevation. Four records were found within the District. Two occurrences are located in the southeast corner of the District on Howard Ranch. One occurrence is in Phoenix Park owned by CDFW.	April-May
Orcuttia tenuis Slender Orcutt grass	T	E	1B.1	**Could Occur.** Vernal pool associated species. Found in valley grassland, vernal pools, freshwater wetlands and wetland riparian habitats. Found from 147-3,904 feet in elevation. Three records were found within the District; all are south of Highway 50 within or near the USFWS Mather Core Recovery Area.	May-September
Orcuttia viscida Sacramento Orcutt grass	E	E	1B.1	**Could Occur.** Vernal pool associated species. Found from 114-279 feet in elevation. Nine occurrences are known within the District. The central population is located east of Mather Air Force Base in the vicinity of the Laguna Creek Watershed and within the USFWS Mather Core Recovery Area.	April-July

Note: CNDDB = California Natural Diversity Database; USFWS = U.S. Fish and Wildlife Service; CNPS= California Native Plant Society

[1] Legal Status Definitions

Federal:
E = Endangered (legally protected)
T = Threatened (legally protected)
— = no ESA listing

State:
E = Endangered (legally protected)
— = no State listing California Rare Plant Rank (CRPR)
1B = Rare, threatened, or endangered in California and elsewhere
2 = Rare, threatened, or endangered in California but more common elsewhere

CRPR Threat Ranks
0.1 = Seriously threatened in California (high degree/immediacy of threat)
0.2 = Fairly threatened in California (moderate degree/immediacy of threat)
0.3 = Not very threatened in California (low degree/immediacy of threats or no current threats known)

Sources: CNDDB 2014; USFWS 2014; CNPS 2014

Preserves and Habitat Conservation Plans

Precautions associated with specially designated preserves and habitat conservation plans may constrain fuel management. There are a few such locations in the District, including the Deer Creek Hills Preserve, South Sacramento Habitat Conservation Plan, and the ARP.

The Deer Creek Hills Preserve is located in the southeastern portion of the District, to the north of Highway 16 and the community of Rancho Murieta. Blue oak woodland is the signature vegetation community found within the Deer Creek Hills Preserve.

The County of Sacramento is preparing the South Sacramento Habitat Conservation Plan (HCP) to address regional issues relating to urban development, habitat conservation, and agricultural protection. The geographic scope of the HCP includes the area from U.S. Highway 50 to the north, Interstate 5 to the west, the Sacramento County line with El Dorado and Amador Counties to the east, and San Joaquin County to the south. Accordingly, it includes lands within the District lying south of U.S. Highway 50. The HCP area excludes the City of Sacramento, the City of Folsom and Folsom's Sphere of Influence, the Sacramento-San Joaquin

Delta, and the community of Rancho Murieta. Sacramento County is partnering with the incorporated cities of Rancho Cordova, Galt, and Elk Grove as well as the Sacramento Regional County Sanitation District and Sacramento County Water Agency to further advance the regional planning goals of the HCP.

Lands within the HCP are already developed with urban/suburban uses or are croplands, vineyards, grasslands, or mine tailings. The lands south and east of the HCP within the District are primarily pasturelands, grasslands, and vineyards. However the eastern part of this area contains substantial acreage of blue oak woodlands and blue oak savanna. The Conservation Strategy of the Draft Plan calls for preserving 69 acres of blue oak woodland and restoring an additional 69 acres; this acreage would preferably expand the existing Deer Creek Hills preserve.

The ARP, often called the "jewel" of the Sacramento Region," extends from Folsom Dam at the northeast to the confluence of the Sacramento River in the southwest. While the importance of recreation is acknowledged, preservation of natural ecosystems is considered essential.

The floodplain of the lower American River is bordered by high bluffs in its upper reaches, and by levees in its lower reaches. In the Folsom and Nimbus areas, large amounts of dredger tailings (possibly covered with sparse vegetation) are scattered throughout the terrain

There are six distinct vegetation units in the ARP: riparian, freshwater marsh, oak woodland, grassland, oak grassland and shrub grassland. There are several special-status floral and faunal species in the ARP, including the Valley Elderberry Longhorn Beetle, found only on blue elderberry, which occurs in several habitats in the Parkway.

Cottonwoods and willows dominate the riparian habitat in the Parkway. Cottonwoods are especially prized because they are the largest and fastest growing tree species and dominate the forest canopy. Shrub species include various types of willows, alder, mugwort and herbaceous weedy species.

Freshwater marsh is associated with cattails, rush and sedges, with water primrose.

The oak woodland habitat in the Parkway is covered with valley oak, blue oak and interior live oak, with California black walnut and cottonwood on wetter sites. Grasses are often found under the tree canopy, however valley oak riparian often has a dense understory of California grape, California rose, Dutchman's pipevine and other shrubs and small trees that may include buckeye, black walnut, blue elderberry, toyon, coffeeberry and poison oak.

Grasslands and shrub grasslands cover about 1200 acres of the Parkway, almost half of which is dominated by the weed yellow star thistle. Grasslands are comprised of non-native annual grasses which dry every year, and scattered coyote brush and California brickellia (on sandy beaches).

Five land use designations have been assigned to lands in and around the ARP: Open Space Preserve, Nature Study Area, Protected Area, Limited Recreation, and Developed Recreation. These categories identify the type of human use that may be permitted.

Fire Behavior and Local Fire History

FIRE BEHAVIOR

There are many ways to assess fire hazard; most utilize fuels, weather and topography, with possible inclusions of elevation, or fire history. Fire behavior modeling was used to assess the potential hazards within the District because it:

- integrates the effects of fuels, weather, and topography;

- denotes where containment may be easiest as well as where access may be precluded during a time of fire; and
- warns where natural resources may be unduly harmed by a wildfire as well as where fire may be inconsequential to natural resources.

The U.S. Forest Service developed a series of computerized fire behavior prediction models that integrate factors such as topography, fuel models, and weather parameters to derive fire behavior outputs based on heat transfer algorithms. One of the most well-used fire behavior model is FlamMap. FlamMap is a geographic based software program used in the wildfire protection community to predict fire behavior across the landscape. FlamMap3 predicts fire behavior across an entire landscape with static weather parameters as input. Thus, FlamMap can compare fire outputs uniformly across a landscape. Details regarding inputs used for this fire behavior analysis appear in Appendix B.

The resulting prediction outputs include:

- flame length,
- rate of spread,
- fireline intensity,
- heat per unit area, and
- crown fire potential.

Of these, two are especially pertinent for identifying areas of high fire hazard: flame length and crown fire potential. Flame length closely corresponds to fire intensity, and it is this factor that most influences probability of structure damage and ease of fire control. Crown fire potential indicates locations where fire is expected to travel into and possibly consume the crowns of trees. A fire can burn exclusively along the forest floor (called a surface fire), or it can climb and consume the tree crown of an individual tree (torching), or it can reach into and spread through tree canopy to tree canopy (crown fire). When a fire burns tree crowns, countless embers are produced and are distributed, sometimes at long distances. These embers can start new fires, which can each grow and confound the finest fire suppression forces. This assessment focuses on flame length and crown fire to describe wildfire hazard.

Much of the land within the District is not predicted to have the capacity to burn under a wildfire, due to a lack of vegetation. Areas where surface fire can spread are located north of the American River, near Mather Air Field and the southeastern portion of the District. These generally coincide with lands mapped as WUI.

FLAME LENGTHS AND RATE OF FIRE SPREAD

Flame lengths are closely related to the fuel model. Based on outputs from the FlamMap3 model prepared for Metro Fire, the longest predicted flame lengths (greater than 20 feet) within the District are found in areas of shrubs, and the lowest are found in oak woodlands where understory grass carries the fire. The modeling indicates that flame lengths throughout the majority of the District would burn with flame lengths less than four (4) feet. Predicted flame lengths under this height can generally be fought on the ground with hand crews. However, there are isolated areas scattered throughout the District where modeled flame lengths are predicted to be over 20 feet; together, these areas comprise approximately one-third of the District. Fire exhibiting flame lengths over 12 feet can generally be fought only with heavy equipment and/or air support.

The distribution of flame lengths mirrors the type and abundance of vegetation within the WUI. For example, where oak woodlands occur, the flame length is typically short. The area north of the American River, and near Mather Air Field is largely uniform in flame length, around eight feet, and associated with large areas of grass vegetation.

As illustrated in Figure 6-2, fire behavior modeling indicates that the largest area within the District predicted to burn with long flame lengths (greater than 20 feet) is located in the southeast portion near Rancho Murieta and the wooded hills surrounding that community (north and all the way to Highway 50). Small pockets of areas where long flame lengths are predicted are generally located east of Sunrise Boulevard in Fair Oaks and in Citrus Heights north of Old Auburn Road in the northeast corner of the District, Small areas of riparian woodland and other scattered wildlands north of the American River (south of Winding Way) are another area where a concentration of long flame lengths are predicted if a wildfire were to occur.

Based on the fire behavior modeling conducted for the CWPP, there is a difference in the rate of fire spread between the northern and southern portions of the District, with high fire spread rates common in the south, associated with grasslands, and slow rates of spread north of communities along Highway 50 and north of the American River, associated with oak woodlands. Fast-spreading fires are also expected in the northwest portion of the District, Rio Linda, and Elverta. See Figure 6-5 below for details regarding the predicted locations of fast-moving fires, should an ignition occur.

CROWN FIRE POTENTIAL

Figure 6-6 indicates where torching is predicted to occur within the District. Despite not having large areas within the District where long flame lengths are predicted to occur, a significant area within the District is predicted to torch trees, largely due to low-hanging branches close to the flames of the surface fire. The greatest concentration of areas where trees are expected to torch lies in the communities north of the American River, up to Interstate 80. In the southeast portion of the District many areas are predicted to burn with long flame lengths, however, because there are no or few trees, torching is not possible.

Modeling fire behavior to determine the potential for crown fire can be helpful to delineate areas that are in need of actions to reduce “fuel ladders”[1]. By removing or reducing the paths a fire can take to reach the crowns of trees, extreme fire behavior can be effectively mitigated to a less damaging fire.

FIRE HISTORY

Metro Fire responds to an average of 869 wildfires per year (based on records from 2008-2013). This comprises 37 percent of all fires, even though wildlands cover only 15 percent of the District’s 417 square mile jurisdictional area.

The number of wildfires in the District is rising, with a 5 percent increase in 2012 alone (Sacramento Metropolitan Fire District 2013). Simultaneously, major residential development has begun throughout the District, with a forecasted population increase of 200,000. Because most wildfires are human-caused, this higher population may well translate into more wildfires.

The risk of wildfire is especially concerning because the wildland areas in these communities are not restricted to the outskirts of the District’s jurisdictional area, but rather are interspersed amongst residential and commercial areas, creating a large wildland urban interface area.

Additional risk factors for Metro Fire include topographical challenges in the ARP area that could impact fire suppression efforts, environmental considerations in the community, diversity of terrain, and increased residential development and population growth within WUI areas.

[1] Fuel ladders are comprised of vegetation that connects the surface fuels near the ground with tree canopies, such that the fire can climb from the ground to involve the tree crown through torching or crown fires.

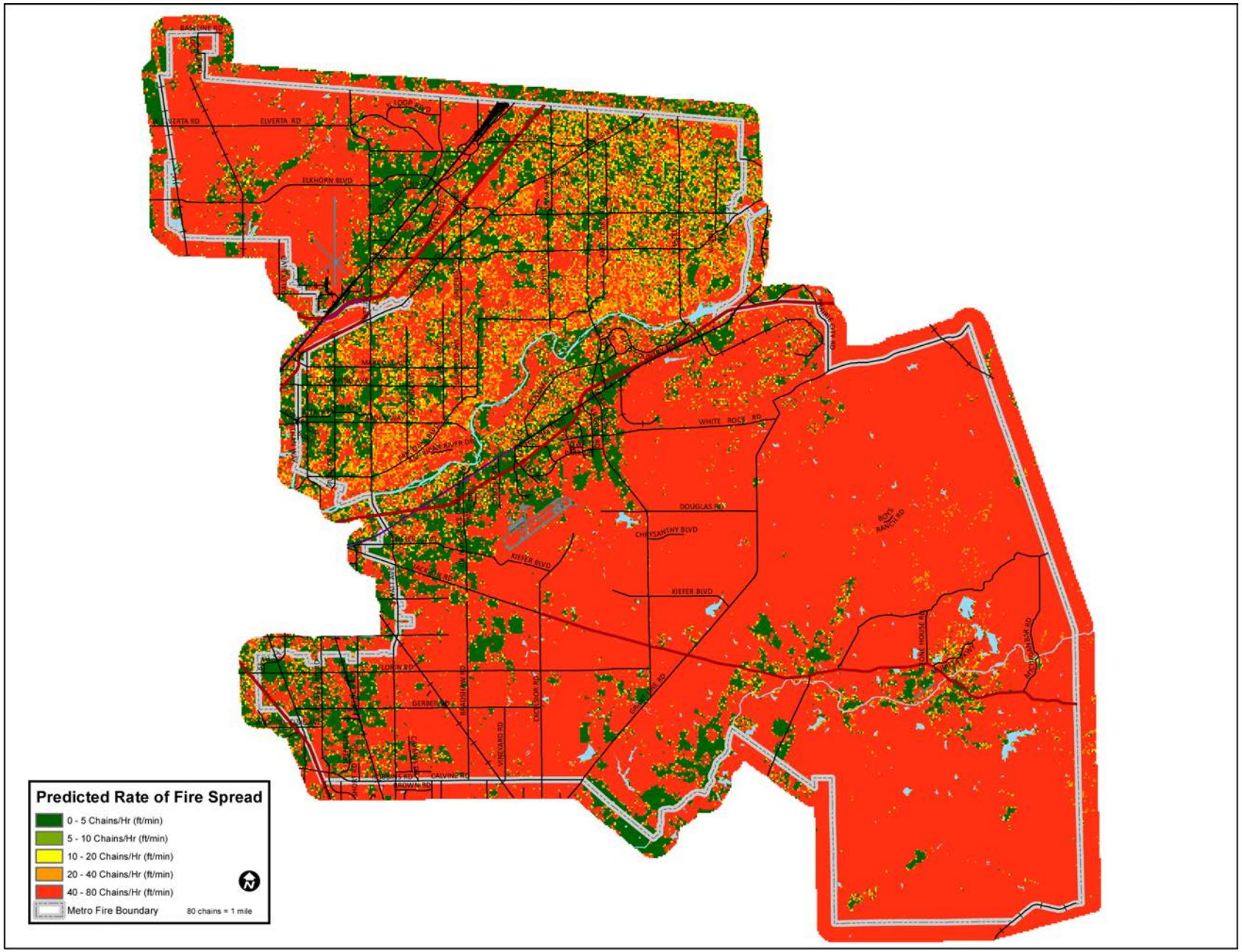


Figure 6-5 **Predicted Rate of Fire Spread**

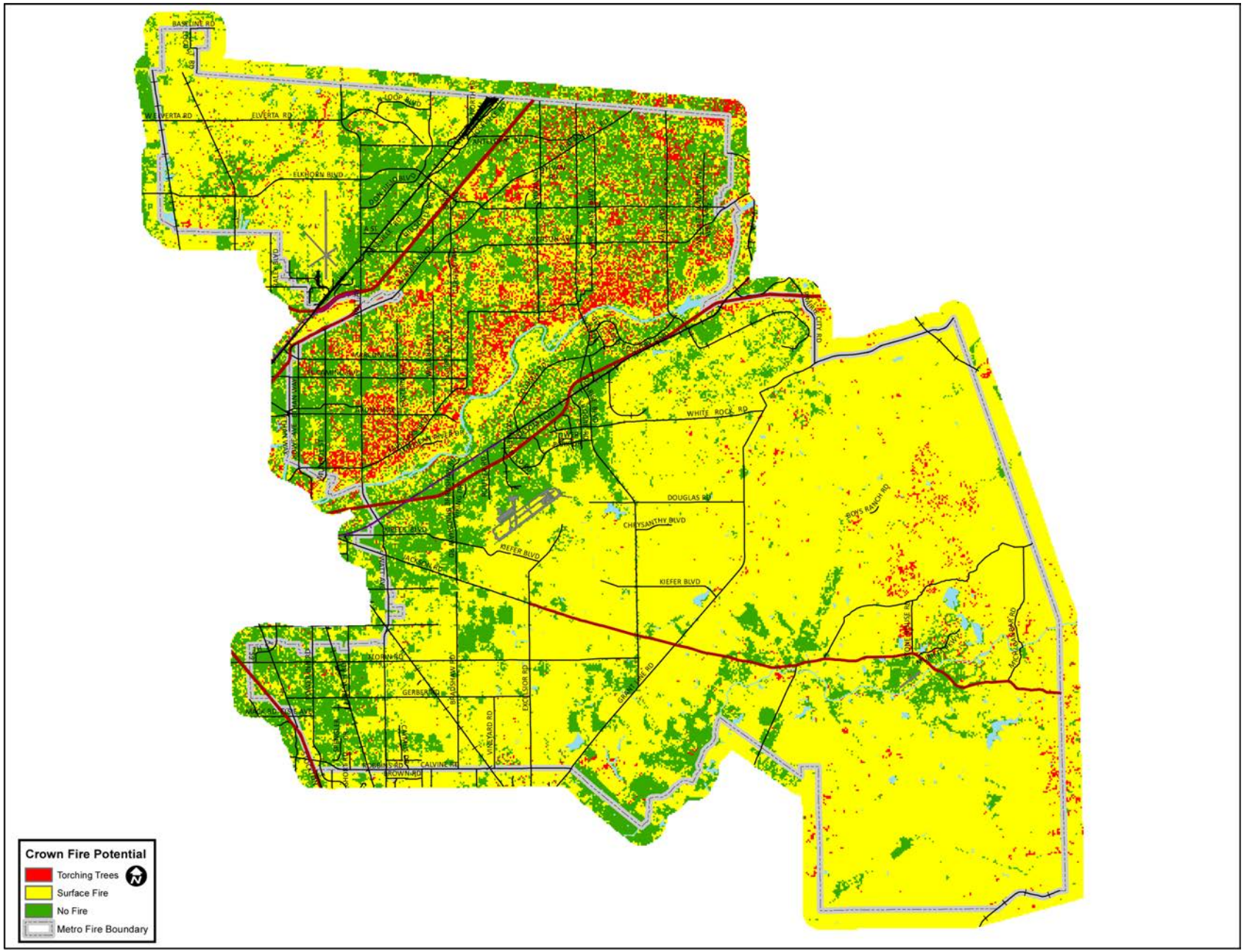


Figure 6-6 **Crown Fire Potential**

BUILT ENVIRONMENT

While structures are very valuable to communities and the people that work and reside within them, they can contribute to fire risk. The more easily a structure can ignite, the more it contributes to the overall hazard. Structure ignitability can be related to density (and pattern of development) (as described above in Section 4, Delineation of The Wildland Urban Interface), construction type, and siting. The following describes how construction type and the siting of structures can influence fire risk.

Building Construction

Building construction includes both materials and design. Both interior structural and exterior finish materials determine a structure's flammability and ease of ignition. These features may be the distinguishing reasons why two adjacent houses might emerge from a fire with different damage levels. Frame construction with numerous small wood members is easier to ignite than a wood homemade of large timbers. A timber or log structure is more flammable than a masonry structure of brick or stone.

Roofing material and assembly has been determined to be key to a structure's survival in a WUI fire. A Class "A" roof assembly can be made of tile, composite shingle, or other material, and usually contributes little to fire spread. However, studies of house survival (Foote 1991) in wildfires indicate that roof related components such as eaves, soffits, and especially vents often undermine a Class A roof. Exterior sheathing material is also important. Wall sheathing and openings can be susceptible to ignition; however, windows play a larger role in house loss. A stucco finish is more flame resistant than a shingle or board finish, but even relatively flame-resistant brick structures are vulnerable if the vent and window openings allow embers to enter into the structure. As more structures become involved in a fire, local fire behavior becomes more erratic, with heavier convection columns and greater fire-generated wind patterns.

A structure's design can be as important as the choice of materials in determining whether a structure will ignite and add to the threat. Detrimental design elements include deep roof overhangs, projections, inside corners, and crevices that can harbor flaming embers, making it easier for a structure to ignite. The design components that can make a difference range from a simple screen on a chimney to prevent embers' access, to more technologically advanced fire sprinklers, barriers, and other fire suppression systems.

Whether the structure has interior fire sprinklers or smoke detectors to allow for early response can also change the character of a single-fire event.

Structure Siting

Structure siting or "setback" refers to the location of a structure in relation to nearby slopes, property boundary, and the edge of a wildland area. The location of structures relative to wildland fuels and to adjacent steep slopes, saddles, or chimneys relates to the ease of fire spread. It is generally accepted that a house sited within 30 feet of a slope greater than 30 percent with wildland brush below is in greater danger than one sited the same distance from the wildland fuel, but not on the top of a slope. Fuels on the top of a slope are pre-heated by the fire beneath it, so both vegetative and structural fuels are easier to ignite and burn with greater intensity. Siting ties directly back to basic fire behavior in steep environments. Placement of a structure near the property boundary also results in inadequate defensible space when the adjacent property owner does not maintain that portion of his/her lot. [2] Siting of a structure also impacts access, which can greatly affect a fire responder's ability to protect the structure. For example, structures placed in the rear of a lot will tend to have longer driveways, which can limit fire response access.

[2] Requirements for defensible space do not extend beyond the property boundary. Thus if the structure is located 20 ft from the property line, width of defensible space is constrained to 20 ft on that portion of the lot.

Patterns of Development by Community

There are two cities located within the District (the Cities of Citrus Heights and Rancho Cordova) and most of the unincorporated area is composed of census-designated communities. The boundaries of all are indicated on the Community Base Map (see Figure 5-1 above).

CITY OF CITRUS HEIGHTS

The City of Citrus Heights is a mostly built-out suburban city surrounded by similar development in unincorporated areas. A variety of commercial and office uses line the historic Auburn Boulevard commercial corridor and occupy small centers along a number of arterials including: Antelope Road, Fair Oaks Boulevard, Madison Avenue and San Juan Avenue. Although some of the older commercial centers along these arterials are beginning to show signs of deterioration, retail development has shifted over the past decades to the Sunrise MarketPlace, where Sunrise Mall and Marketplace at Birdcage serve as regional shopping centers.

The older residential area of the north-central city is comprised of primarily large lots and has retained a more rural setting, with large parcels accommodating hobby farming and livestock grazing. Smaller subdivisions and multi-family developments form the majority of the residential areas, with many of the denser multi-family neighborhoods surrounding the Sunrise MarketPlace.

Approximately 97 percent of the city is currently developed. Development of the remaining 3 percent of vacant land under the City of Citrus Heights General Plan could result in an increase of approximately 149 acres of residential development and 46 acres of commercial development. Future land uses consistent with the General Plan could result in an increase of approximately 3,577 residential dwelling units by 2035, which is an increase of approximately 10 percent over 2010 levels. Development of future land uses consistent with the General Plan could also result in an increase in population of approximately 15,880 or 18 percent from 2010 to 2035 (AECOM 2011).

The city was incorporated in 1997 with 88 percent of the homes built before 1989 and 36 percent were built in the 1970s. The majority of these homes were constructed as tract homes associated with the building boom of that decade. The majority of these homes were built quickly with inconsistent construction quality. Many of these homes are now experiencing failing roofs and HVAC systems. In addition, 861 homes were built prior to 1939, some of which lack complete plumbing and may be dilapidated. Most of these homes utilize electronic wiring and plumbing that can pose potential fire risk.

Size:	14 square miles
2010 population:	83,000
2010 dwelling units (DU):	35,000
DU per square mile:	2,500

CITY OF RANCHO CORDOVA

The City of Rancho Cordova grew substantially after World War II, fueled by employment demand at Aerojet and Mather Air Force Base. The city contains relatively large amounts of undeveloped land, with even more undeveloped land within its planning area. Between 2003 and 2013, 5,000 new homes were built in the city. The city was incorporated in 2003. The City is currently working on four specific plans to guide development is several large undeveloped areas within the city, including: the Sunridge Specific Plan (10,000 dwelling units on 2,600 acres); Westborough Specific Plan (6,000 dwelling units on 1,700 acres); the Arboretum-Waegell Specific Plan (5,000 dwelling units on 1.350 acres); and the Mather Field Specific Plan. In addition, the completed Rio Del Oro Specific Plan allows 11,600 new dwelling units on 3,800 acres.

Size:	34 square miles
2010 population:	65,000
2010 dwelling units (DU):	25,500
DU per square mile:	750

UNINCORPORATED COMMUNITIES

The following provides information about the unincorporated communities within the District.[3] See Figure 5-1, Community Base Map for the location of the communities.

Antelope

Antelope is a residential community bounded by the Sacramento-Placer County line to the north, Antelope Road to the south, the Southern Pacific Railroad line to the east, and Dry Creek to the west. Antelope was established in the mid-1800s. Planning policies that have guided growth include the Antelope Community Plan, adopted in 1985 and the subsequent East Antelope Specific Plan, adopted in 1995. The community is nearly built out. One large vacant property remains undeveloped at the northwest intersection of Don Julio and Elverta Roads. The County's Housing Element projects construction of about 2,700 new dwelling units between 2005 and 2025.

Size:	7 square miles
2010 population:	46,000
2010 dwelling units (DU):	14,800
DU per square mile:	2,200

Arden-Arcade

The Arden-Arcade community is located at the heart of Sacramento County and is marked by the convergence of several major freeways and thoroughfares. Arden-Arcade is bound by the American River to the south, Interstate 80 to the north, Ethan Avenue to the west and Mission Avenue on the east. Arden-Arcade includes nearly 40 distinct neighborhood areas and a number of shopping areas. The Arden-Arcade Community offers a range of housing options, everything from apartments to mansions. California State University, Sacramento (CSUS) is located just west of the Arden-Arcade boundary. Much of Arden-Arcade began to develop in the 1940s with the Town and Country Village shopping center (the first suburban shopping center in Northern California). Most of the population growth in Arden-Arcade occurred up through the 1960s and 1970, when it is estimated that 75-80 percent of the community was developed with urban uses, and it is now one of the most fully developed areas of urban Sacramento. The County's Housing Element projects construction of about 200 new dwelling units between 2005 and 2025 in this community.

Size:	16 square miles
2010 population:	82,000
2010 dwelling units (DU):	44,800
DU per square mile:	2,500

Carmichael and Old Foothill Farms

Carmichael and Old Foothill Farms is a fully developed community located 10 miles northeast of downtown Sacramento. It is bounded by Mission Avenue on the west, the American River on the south, San Juan Avenue on the east, and by the City of Citrus Heights on the north. The first settlers of Carmichael lived on 10-acre parcels, but following World War II, the community experienced rapid growth and its rural character began changing to a more suburban nature. Carmichael maintains its village feel, featuring a number of small shops, restaurants, and recreational activities. The community offers a complete range of homes, from

[3] Much of the narrative description of the unincorporated communities was taken from the 2011 County General Plan.

apartments and townhouses to beautiful residences overlooking the American River and its parkway. Fair Oaks Boulevard is one of the community's major commercial corridors featuring shops, restaurants and services. A corridor plan was created for the boulevard (as well as a portion of Manzanita Avenue) that designates distinct local planning districts, including the creation of a SPA for the "Main Street District" that functions as the community's town center. The County's Housing Element projects construction of about 300 new dwelling units between 2005 and 2025 in this community.

Size:	14 square miles
2010 population:	61,700
2010 dwelling units (DU):	28,200
DU per square mile:	2,040

Rancho Murieta

Rancho Murieta is a gated master planned community begun in the 1970s consisting of single family dwellings and townhouses. Rancho Murieta is surrounded by commonly-held open space and contains a small lake, golf course, and a few community services buildings (such as churches). It is located on eastern boundary of the District, and straddles the Jackson Highway (Highway 16). While Rancho Murieta itself is almost built to capacity, the Sacramento County Housing Element projects construction of about 3,000 new dwelling units between 2005 and 2025.

Size:	12 square miles
2010 population:	5,500
2010 dwelling units (DU):	2,400
DU per square mile:	200

Fair Oaks

Fair Oaks is a well-established community of nearly 31,000 residents. The Fair Oaks community is bounded by the American River on the south, San Juan Avenue on the west, Madison Avenue on the north, and Blue Ravine on the east. It consists of a mix of small business district, suburban and semi-rural neighborhoods spanning over 11 square miles. The area is home to rolling hills and numerous native oaks. The County's Housing Element projects construction of about 300 new dwelling units between 2005 and 2025 in this community.

Size:	11 square miles
2010 population:	31,000
2010 dwelling units (DU):	13,600
DU per square mile:	1,200

North Highlands - Foothill Farms

North Highlands is a diverse suburban community of 43,000 residents that is located approximately 10 miles northeast of downtown Sacramento. The North Highlands – Foothill Farms area is bounded by Antelope Road to the north, the city of Citrus Heights to the east, Arcade Creek and the city of Sacramento to the south, and on the west by Sacramento and McClellan Park, 28th Street, and Dry Creek. The community was formally established in 1952 and grew with the development of the McClellan Air Force Base (now known as McClellan Business Park). McClellan Business Park is one of the largest business parks in California and will ultimately employ up to 34,000 individuals. The County's Housing Element projects construction of about 300 new dwelling units between 2005 and 2025.

Size:	9 square miles
2010 population:	43,000
2010 dwelling units (DU):	16,100
DU per square mile:	1,800

Orangevale

Orangevale is a well-established community in northeastern Sacramento County. The Orangevale community is bounded by the Sacramento-Placer County line to the north, Madison Avenue to the south, Folsom to the east, and Kenneth Avenue and Fair Oaks Boulevard to the west. Most of the commercial property is in the southern portion of the community, along Greenback Lane. The northern portion of Orangevale is a rural and wildland island in the more densely developed portion of Sacramento County. This area also contains oak-covered Orangevale Community Park. Some residential properties are zoned to accommodate horses and orchards. The County's Housing Element projects construction of about 500 new dwelling units between 2005 and 2025 in this community.

Size:	12 square miles
2010 population:	34,000
2010 dwelling units (DU):	13,600
DU per square mile:	1,200

Rio Linda and Elverta

The Rio Linda and Elverta community is located in the north-central section of Sacramento County and is bounded on the north by the Sutter and Placer County boundaries, on the west by the Western Pacific Railroad and Steelhead Creek, on the south by the City of Sacramento, and on the east by McClellan Park, 28th Street and Dry Creek. In addition to typical suburban and multi-family housing types, these two communities have large rural residential areas. The County's Housing Element projects construction of about 3,000 new dwelling units between 2005 and 2025.

Size:	19 square miles
2010 population:	20,000
2010 dwelling units (DU):	7,000
DU per square mile:	370

Vineyard

The Vineyard area is located ten miles from downtown Sacramento in the geographic center of Sacramento County. It is bounded by Jackson Highway and Kiefer Boulevard on the north, Calvine Road on the south, Grantline Road on the east, Elk Grove-Florin Road on the west. Vineyard is currently home to over 24,000 residents, with many more expected once several planned new communities are built out. The northern border of the Vineyard area is shared with the former Mather Air Force Base. The Sacramento County General Plan Housing Element projects construction of about 16,000 new dwelling units between 2005 and 2025.

Size:	17 square miles
2010 population:	24,000
2010 dwelling units (DU):	7,800
DU per square mile:	450

PROJECTED URBANIZATION

Future Growth Areas within the Urban Service Boundary

The County's General Plan contains objectives to encourage sustainability and accessibility while protecting valuable and sensitive environmental resources. To further these objectives, the plan has sustainable growth management policies including policies to limit new development to areas inside the Urban Service

Boundary (USB) as shown on Figure 6-7. The General Plan also contains commercial corridor plans that will be implemented to provide multi-modal access along certain main corridors and revitalize some of the existing unincorporated communities. Future growth will occur as infill within the existing communities and development of currently undeveloped or lightly developed areas within the adopted Urban Services Boundary (area as designated as Urban Service Areas). New Growth Areas identified by the County in 2012 include the Cordova Hills Master Plan area; the Mather Specific Plan area; New Bridge Master Plan area; Jackson Township Master Plan area. In addition, new development would continue in the other approved Master Plan areas shown on the attached figure showing Master Plan areas (e.g. Elverta Specific Plan area). As described previously, the County Housing Element projects substantial growth by 2025 in the community Vineyard (which likely includes the community of Cordova), moderate growth (2,500-3,000 new units) in Antelope and Rio Linda/Elverta. Little growth is projected in Arden-Arcade, Carmichael/Old Foothill Farms, Orangevale, North Highlands – Foothill Farms, and Fair Oaks.

Development Potential Outside the Urban Services Boundary

There is some potential for new development outside the USB. One of these potential growth areas is the eastern part of the county between Highway 50 and Rancho Murieta. This is the area that supports almost all the oak woodland in the District. Accordingly, it is the part of the District most at risk from wildfire. Other than the Rancho Murieta community area, this area is designated in the General Plan as Agriculture, 80-acre minimum parcel size. Future 80-acre ranchettes in or adjacent to the woodland areas could experience relatively high wildfire risk. It is noted that despite the General Plan land use designations for this area, the County Housing Element projects substantial growth (20,000 new dwelling units) in the Cosumnes and Rancho Murieta communities between 2005 and 2025.

In 2012, the City of Folsom annexed 3,585 acres for the Folsom South of U.S. Highway 50 Specific Plan, located between Highway 50 and White Road, Prairie City Road, and El Dorado County. Up to 11,000 residential units may eventually be developed in this area. The EIR/EIS prepared for that project noted that the land was within a State Responsibility Area and that the State has mapped the area as having a "moderate" fire hazard rating. On that basis, the EIR/EIS found that future development in the area would not be exposed to a substantial risk from wildfires.[4] There are current plans to begin development of the area with one developer proposing in 2013 to build 900 new homes on 441 acres by 2015.

EXISTING RESPONSE ENVIRONMENT

Metro Fire is comprised of three branches - Operations, Administration, and Support Services. While all three branches are vital to the efficient emergency response, the rest of this section will focus on the Operations Branch. The Operations Branch includes several Divisions, including Fire & Rescue, Emergency Medical, Training & Safety, Special Operations, Homeland Security, Fire Investigation, and Health & Wellness Divisions.

Operations

The Operations Branch of Metro Fire is responsible for protecting life and property for over 640,000 citizens within the District. All emergency response operations are supervised by the Deputy Chief of Operations, who reports directly to the Fire Chief. The Operations Branch include divisions with responsibilities for suppression; emergency medical support (EMS); special operations (air operations, hazardous materials, swiftwater rescue, homeland security, and technical rescue); and training, safety, and health and wellness. The Deputy Chief of Operations supervises five Assistant Chiefs; one each assigned to EMS and training, safety, health and wellness, and one each assigned to each shift.

[4] The County General Plan does not provide population or size statistics for the Cosumnes area, so these have been estimated by removing the known size and population of Rancho Murieta.

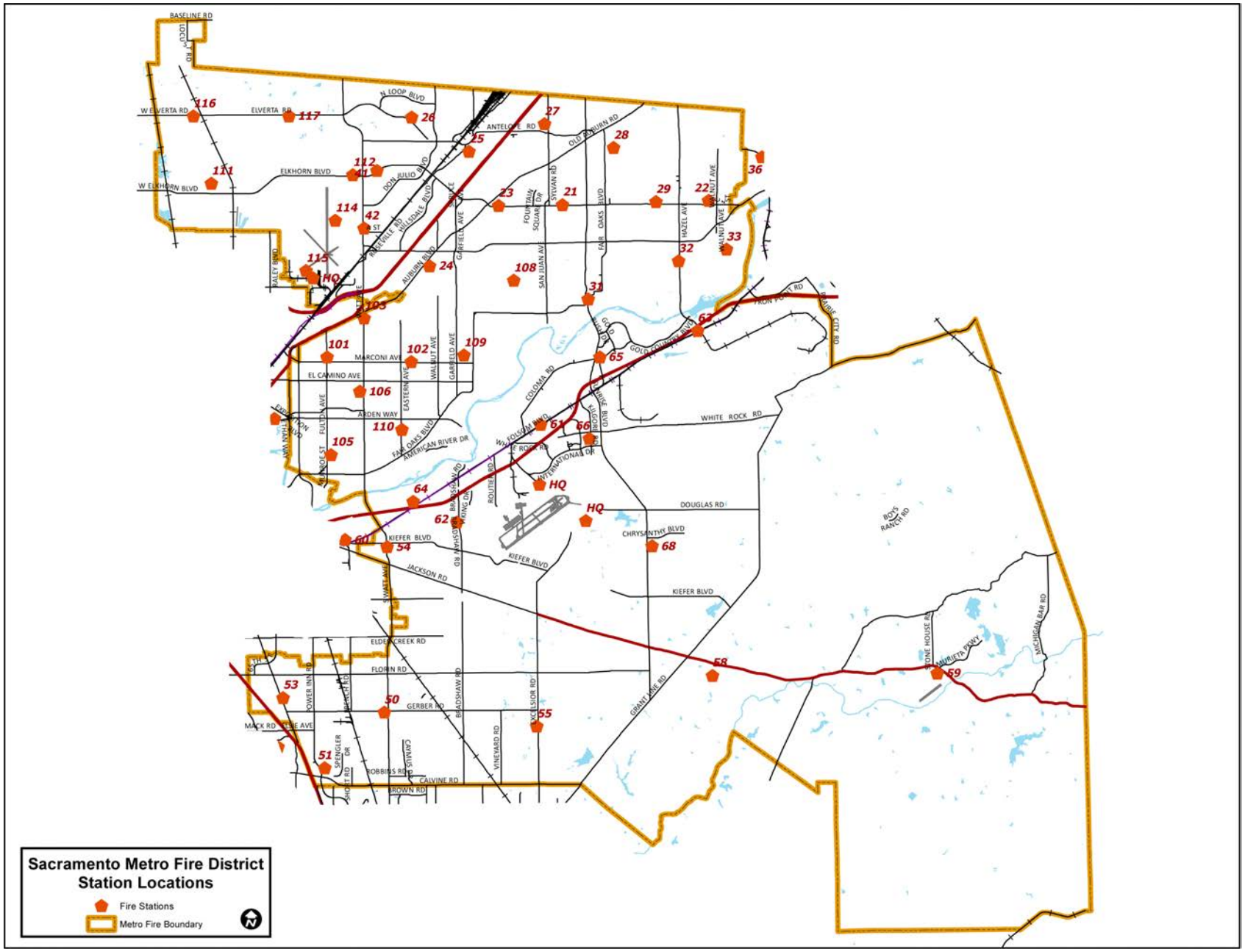


Figure 6-7 **Metro Fire Station Locations**

The Operations Branch oversees all aspects of Metro Fire's all-hazard emergency services delivered from 40 stations with daily shift staffing of 160 personnel. The Operations Branch answered over 80,000 calls for service in 2012, a number that has steadily increased each. The all-hazard nature of Metro Fire's emergency services is exemplified by the Special Operations Division, staffed by over a hundred discipline-specific, highly trained, qualified, and experienced personnel.

The Divisions and programs that operate under the Operations Branch of Metro Fire include:

Operations and Special Operations Division

Metro Fire has 27 wildland units, supported by six water tenders, 38 engines, six trucks, and one dozer. Air support is provided by two helicopters, each with sling/bucket capabilities. Metro Fire is able to utilize foam technologies to suppress fires with a specialized foam unit. Metro Fire is unusual in that it is also able to provide aquatic response with two "fireboats." Metro Fire also owns a hazardous material unit and a rescue unit. In addition, Metro Fire has access to additional response resources from the California Office of Emergency Services through mutual aid agreements and the Master Fire Response Agreements.

All units are located to the most probable risks and in places to maximize their effectiveness. For example, the wildland units and water tenders are positioned in places closest to grassy fuels, and the fire boats are located on the American River.

Table 6-4 Sacramento Metropolitan Fire District - Fire Stations

Station	Location
Station 21	7641 Greenback Lane, Citrus Heights, CA 95610
Station 22	6248 Chestnut Avenue, Orangevale, CA 95662
Station 23	6421 Greenback Lane, Citrus Heights, CA 95621
Station 24	4942 College Oak Drive, Sacramento, CA 95841
Station 25	7352 Roseville Road, Sacramento, CA 95842
Station 26	8000 Palmerson Drive, Antelope, CA 95843
Station 27	7474 Grand Oaks Boulevard, Citrus Heights, CA 95621
Station 28	8189 Oak Avenue, Citrus Heights, CA 95610
Station 29	8681 Greenback Lane, Orangevale, CA 95662
Station 31	7950 California Avenue, Fair Oaks, CA 95628
Station 32	8890 Roediger Lane, Fair Oaks, CA 95628
Station 33 (Out of Service)	5148 Main Avenue, Orangevale, CA 95662
Station 41	6900 Thomas Drive, North Highlands, CA 95660
Station 42	5608 North Haven, North Highlands, CA 95660
Station 50	8880 Gerber Road, Sacramento, CA 95828
Station 51	8210 Meadowhaven, Sacramento, CA 95828
Station 53	6722 Fleming Avenue, Sacramento, CA 95828
Station 54	8900 Fredric Avenue, Sacramento, CA 95826
Station 55	7776 Excelsior Road, Sacramento, CA 95829
Station 58	7250 Sloughhouse Road, Rancho Murieta, CA 95624
Station 59	7210 Murieta Drive, Rancho Murieta, CA 95683
Station 61	10595 Folsom Boulevard, Rancho Cordova, CA 95670
Station 62	3646 Bradshaw Road, Sacramento, CA 95827

Table 6-4 Sacramento Metropolitan Fire District - Fire Stations

Station	Location
Station 63	12395 Folsom Boulevard, Rancho Cordova, CA 95670
Station 64	9116 Vancouver Drive, Sacramento, CA 95826
Station 65	11201 Coloma Road, Rancho Cordova, CA 95670
Station 66	3180 Kilgore Road, Rancho Cordova, CA 95670
Station 68 (Out of Service)	4381 Anatolia Drive, Rancho Cordova, CA 95742
Station 101	3000 Fulton Avenue, Sacramento, CA 95821
Station 102 (Out of Service)	4501 Marconi Avenue, Sacramento, CA 95821
Station 103	3824 Watt Avenue, Sacramento, CA 95821
Station 105	2691 Northrop Avenue, Sacramento, CA 95864
Station 106 (Engine Out of Service)	2200 Park Towne Circle, Sacramento, CA 95825
Station 108	6701 Winding Way, Fair Oaks, CA 95628
Station 109	5634 Robertson Avenue, Carmichael, CA 95608
Station 110	1432 Eastern Avenue, Sacramento, CA 95864
Station 111	6609 Rio Linda Boulevard, Rio Linda, CA 95673
Station 112 Reserve Station	6801 34th Street, North Highlands, CA 95660
Station 114	5824 Kelly Way, McClellan, CA 95652
Station 115 (Air Operations)	4727 Kilzer Avenue, McClellan, CA 95652
Station 116 Reserve Station	7995 Elwyn Avenue, Elverta, CA 95626
Station 117	7961 Cherry Brook Drive, Elverta, CA 95626
Administration	10545 Armstrong Way, Sacramento, California 95645

Emergency Medical Services Division

The EMS Division is responsible for the management of the department's emergency medical system which ensures that EMT and Paramedic personnel are trained and equipped to serve the public at the highest levels. EMS currently deploys 13, 24-hour advanced life support (ALS) ambulances, six reserve ambulances and 37 ALS engine companies. Metro Fire employs over 250 paramedics who are deployed on ambulances, engines, trucks, water craft, and a helicopter. Metro Fire also deploys two peak time ALS ambulances to augment the EMS system during busier times. On a daily basis, all of the ambulances and engines are staffed with paramedics. As the need arises, additional ALS ambulances are added to the system to ensure the public continues to receive the best care possible.

Training, Health and Wellness, and Safety Division

The Training, Health and Wellness and Safety Division's mission is to improve service delivery to the community by providing realistic, ongoing, and verifiable training to district personnel and assisting them to develop and strengthen essential job skills. The Division strives to ensure all-risk operational readiness and enhance the ability of members to perform quality public service. They promote teamwork, and service in a safe, effective, and efficient manner. There are many Federal, State, and locally mandated requirements which must be addressed, and as new information becomes available, it is imperative that we introduce new tools, technology, or equipment to train our fire personnel

EXISTING SOCIAL ENVIRONMENT

The social environment describes public education programs, outreach programs, as well as the regulatory context for the plan.

Metro Fire Community Risk Reduction Division

The Support Services Branch oversees the Community Risk Reduction Division (CRR), and within CRR, the Community Services Division. The Community Risk Reduction Division (formerly Fire Prevention Bureau) is responsible for protecting the public through coordinated efforts in fire prevention code enforcement and fire protection engineering. As the first step in providing our community members safe living and working environments Metro Fire provides services in Code Enforcement, Inspections, and New Construction plan review. Fire Inspectors responsible for code enforcement inspect existing buildings and properties for fire code violations, assist fire suppression personnel, respond to complaints, and review and approve licensed care facilities. Fire Inspectors are responsible for fire protection engineering review plans for all construction projects and fire protection systems, and conduct the testing and inspections for those projects. The Community Risk Reduction Division also manages the weed abatement program, and reviews, approves and inspects special events, and fireworks displays. Through the Community Services Division, Metro Fire coordinates a variety of community services, including but not limited to: CWPP, Community Emergency Response Team (CERT), fire station tours, school visits, fire extinguisher training, life jacket loan out program, and attendance at community events. This Division also provides safety tips (injury prevention, home, holiday, and seasonal tips) and car and water safety lessons for children. The Community Services Division is served by two staff members that oversee one of two Metro Fire service areas (see Table 6-5 below for areas included in each service area of Metro Fire's Community Service Division).

Table 6-5 Metro Fire Service Areas

Northern Service Area	Southern Service Area
Antelope	Cosumnes
Arden	Fair Oaks
Carmichael	Orangevale
Citrus Heights	Rancho Cordova
North Highlands	Rancho Murieta
McClellan	South Sacramento
Placer	Vineyard
Rio Linda	

EXTERIOR HAZARD MITIGATION

Under the direction of the Fire Marshal, the Community Risk Reduction Division of Metro Fire sees fire prevention as a team effort. Metro Fire works with developers and homeowners to make the community safer for everyone. The constant "risk reduction" is managed through the responsibilities such as: Plan Review, Inspections, Code Enforcement, Fire Investigation and Exterior Hazard Mitigation.

Metro Fire Prevention Standard (FPS) Number 11 (see Appendix G) is an adopted standard that requires that a clear firebreak of a minimum 30-foot width shall be created and maintained in all areas designated by Metro Fire. Clear firebreaks shall be provided and maintained around all buildings, fences constructed primarily of wood, areas containing vehicles, near structures, or near storage located on a parcel or on adjacent properties. This standard forms the regulatory basis for the need for defensible space. Defensible space is an important factor in structure loss due to wildfire, and a cornerstone to most Community Wildfire Protection Plans.

Under Metro Fire FPS Number 11, the firebreak shall be made using one of the following methods:

- **Discing:** The discs shall be set at an angle sufficient to cut the sod loose and adequately bury the growth of weeds, grass or other vegetation. Discing shall include rototilling or cultivating.

- **Scraping:** The blade shall be set at an angle sufficient to cut the growth of weeds, grass or other vegetation down to bare ground. Exception: Weed abatement on residential property, less than one-half acre in size may be done by mowing or weed eating. Weeds shall be no more than one (1) inch in height after cutting. All cuttings shall be removed.

A parcel can be considered non-compliant because an Exterior Hazard Mitigation Complaint Form has been filed with Metro Fire or an inspection has occurred.

Once notified by Metro Fire's initial correspondence, immediate abatement is required and must be maintained. Failure to comply may result in a citation being issued or the hazard being abated under authority of the County and the costs of such abatement may incur a legal charge against the owner or owners of the property. A potential lien on the property can occur and subject to collection with property taxes as specified under Section 25845 of the Government Code.

Upon receipt of Metro Fire's second notice, the occupying property persons will have fifteen (15) days to abate their property upon the first notice being sent and approximately two (2) more weeks to abate if a second notice is issued.

All foreclosed or vacant homes are handled by the Sacramento County Code Enforcement Division.

PROPERTY INSPECTIONS

The Community Risk Reduction Division is committed to the safety and security of our local businesses. The California Fire Code requires periodic inspections of all businesses to ensure the safety of business owners, employees, visitors, and customers. Customarily, this would require Metro Fire to visit a business and inspect the property to ensure compliance.

Due to the large number of businesses within the District, Metro Fire has developed low cost options for low risk businesses to choose from.

1. Standard Inspection
2. Inspection is completed by Metro Fire personnel.
3. "Opt Out" of the Self Inspection Program is required.
4. Self-Inspection by Mail
5. Inspection is completed by the business owner.
6. Self-Inspection Online
7. Inspection is completed by the business owner

When inspections are due, those businesses identified as low fire and occupancy risk and that qualify for the Self Inspection Program receive notification by mail with further instructions, including account & inspection numbers for the Online process.

LAND USE PLANNING AND FIRE HAZARD

One of the principal ways that local jurisdictions and agencies can reduce the risk of wildfire damage in their community is to require to the maximum extent feasible that new development within the WUI be capable of withstanding a wildfire burning in the area. Land use planning represents a shift in traditional thinking from trying to eliminate wildfires, or even increasing resilience to them, toward avoiding exposure to them through

the informed placement of new residential structures. For land use planning to be effective, it needs to be based on solid understanding of where and how to locate and arrange new homes.

Typically, a county or city that includes WUI within its boundary regulates land use within the WUI to ensure that new development: 1) maintains defensible space around the new structures; 2) has sufficient water and access; 3) is able to be served with adequate fire suppression staff and equipment available; and 4) is addressed by a fire plan that coordinates the above with a wider area system of fuel reduction zones and access routes that allow fire suppression agencies to take a stand to reduce fire spread. In cases where county or city review of a new development application shows that all these resources are not available, it may be necessary to restrict the amount or location of development in high hazard zones or provide additional measures to provide the desired level of protection.

The requirements to assess project and the specific conditions that must be met in order to approve new development in high hazard zones are typically codified in a county's or city's general plan and municipal code. The general plan land use plan typically provides the overall direction to guide new development within hazardous development areas.

SACRAMENTO COUNTY

The Sacramento County General Plan Safety Element recognizes the need for land use controls in high fire hazard zones as well as the need for other hazard reduction actions. That plan contains a goal to "Minimize the loss of life, injury, and property damage due to fire hazards." The plan includes the following policies to fulfill that goal:

- **Policy SA-23:** The County shall require that all new development meets the local fire district standards for adequate water supply and pressure, fire hydrants, and access to structures by firefighting equipment and personnel.
- **Policy SA-24:** The County shall require, unless it is deemed infeasible to do so, the use of both natural and mechanical vegetation control in lieu of burning or the use of chemicals in areas where hazards from natural cover must be eliminated, such as levees and vacant lots.
- **Policy SA-25:** The County shall work with local fire districts to develop high visibility fire prevention programs, including those which provide voluntary home inspections and awareness of home fire prevention measures.
- **Policy SA-26:** The County and fire districts shall develop programs to provide citizens with self-preparedness and community readiness skills for large or extended accidental, natural, and terrorist emergencies/incidents.
- **Policy SA-27:** The County shall require, where appropriate, the use of fire resistant landscaping and building materials for new construction developments that are cost effective.
- **Policy SA-28:** The County shall encourage and require, to the maximum extent feasible, automatic fire sprinkler systems for all new commercial and industrial development to reduce the dependence on fire department equipment and personnel.
- **Policy SA-29:** The County and fire districts will work together to regulate hazardous materials to mitigate emergency responses.
- **Policy SA-30:** The County, medical community, and fire districts shall work to improve EMS response system that includes first responder emergency care and transportation services.
  - Properly locating resources to provide timely response
  - Paramedic services from every fire station

The County's Municipal Code contains specific regulations to implement these policies. Title 17 Fire Prevention includes Chapter 17.04 – International Fire Code, and Chapter 17.12 – Weed Control. The latter chapter contains requirements for a 30-foot zone around structures to be kept free of flammable vegetation; and the fire district can require additional clearance where topographical or geographical conditions warrant.

RANCHO CORDOVA

The Rancho Cordova General Plan also contains land use policies to reduce fire hazard including:

- **Policy ISF.2.1** Ensure the development of public infrastructure that meet the long-term needs of residents and ensure infrastructure is available at the time such facilities are needed
- **Policy ISF.2.2** Coordinate with independent public service providers, including schools, parks and recreation, utility, transit, and other service districts, in developing service and financial planning strategies.
- **Policy ISF.2.4** Ensure that water supply and delivery systems are available in time to meet the demand created by new development, or are guaranteed to be built by bonds or sureties.
- **Policy ISF.2.5** Ensure that water flow and pressure are provided at sufficient levels to meet domestic, commercial, industrial, and firefighting needs.
- **Policy S.9.1** Cooperate with the Sacramento Metropolitan Fire Department (SMFD) to reduce fire hazards, assist in fire suppression, and ensure efficient emergency medical response.
  - **Action S.9.1.1** Continue to review new development for adequate water supply and pressure, fire hydrants, and access to structures by fire fighting equipment and personnel.
  - **Action S.9.1.2** Continue to review projects for compliance with the Fire Code as part of the building permit process
  - **Action S.9.1.2** Work with SMFD to develop high visibility fire prevention programs, including those that provide voluntary home inspections and awareness of home fire prevention measures.
  - **Action S.9.1.3** Require on-site fire suppression systems for all new commercial and industrial development, as well as multi-family residential development with five or more units, to reduce the dependence on fire department equipment and personnel.
  - **Action S.9.1.4** Continue to maintain, periodically update, and test the effectiveness of its Emergency Response Plan.
  - **Action S.9.1.5** Require the installation of earthquake-triggered automatic gas shut-off sensors in high-occupancy facilities and in industrial and commercial structures.
  - **Action S.9.1.7** Continue to enforce all existing codes and ordinances regarding fire protection, including building inspection and vegetation management.
  - **Action S.9.1.8** Coordinate the design and installation of traffic control and calming measures to minimize impacts on emergency vehicle responses.
- **Policy S.9.2** Provide infill development with adequate off-site improvements to meet on- site fire flow requirements.

- **Policy S.9.3** Consider establishing mitigation fees to fund adequate fire protection and emergency medical response facilities, if such fees are critical and necessary to meet the facility funding needs of SMFD and existing methods of financing are inadequate.

The City's Municipal Code adopts the Fire Code and contains the same requirements for vegetation clearance, as the County requires.

CITRUS HEIGHTS

The City of Citrus Heights General Plan also contains policies to minimize the risk of fire. Specifically, it contains the following:

GOAL 58: Ensure excellent public safety services and rapid and effective emergency response

- **Policy 58.7:** Continue working with Sacramento Metropolitan Fire District to ensure coordination of fire and emergency medical services in the City and surrounding areas.
- **Policy 58.8:** Provide fire/emergency staffing as necessary in proportion to population or other appropriate workload indicators.
- **Policy 58.9:** Maintain mutual aid agreements with other fire protection agencies in the region to obtain additional emergency resources as necessary.
- **Policy 58.10:** Provide ongoing fire prevention and public education programs
- **Policy 58.11:** Ensure that new development is constructed, at a minimum, to the fire safety standards contained in the Citrus Heights Fire and Building Codes.
- **Policy 58.12:** Ensure that anticipated fire response times and fire flows are taken into consideration as a part of the development review process.
- **Policy 58.13:** Provide adequate access for emergency vehicles, particularly fire fighting equipment, in all new development.

IGNITION RESISTANT BUILDING STANDARDS

Many life safety requirements for building and development are located within the building code as adopted by municipalities. The municipalities within Metro Fire adopted the 2010 California Building Code (CBC). Chapter 7a of the CBC requires exterior structural design and construction become ignition resistant, with building assemblies to include exterior walls, structure projections, including, but not limited to, porches, decks, balconies, and eaves, and structure openings, including, but not limited to, eave vents and windows. Chapter 47 of the California Fire Code mirrors Chapter 7A of the CBC. Both codes require municipalities to use these codes as a minimum standard.

As a way to prevent structures from ignited from wildfires, the California Building Code contains a chapter dedicated to building in the WUI. Areas in designated very high fire hazard severity zones, or other areas designated as WUI must also comply with this chapter. The code addresses several exterior building assemblies: roofs, vents, windows and other openings, decks and siding.

7 EXISTING RISKS OF THE WILDLAND URBAN INTERFACE

The CWPP Wildfire Risk Assessment Framework is a performance-based, risk assessment model that is used as a wildfire risk assessment and decision-support system. The primary function of the Risk Assessment Framework is to promote a shared awareness of the risk of wildfire and the value and impact of mitigation actions. The framework focuses on three objective areas:

1. Fuels mitigation,
2. Public outreach and engagement, and
3. Structure fire prevention.

The Wildfire Risk Assessment Framework is a tool to allow fire prevention personnel and members of the community to translate the hazard posed by wildfire into a risk assessment tailored to specific values at risk within the community. The model used for the framework allows the community to assess the positive and negative impacts of specific environmental, physical, and social actions. For example, the model can be used to depict the positive impacts of vegetation management as a mitigation action that can reduce the exposure of a structure to the impacts of a wildfire.

The Wildfire Risk Assessment Framework has been scaled to address parcel-level risk assessments in order to support community and homeowner actions. In addition, the program supports reassessments based on seasonal, periodic, and episodic natural and man-made environmental changes (i.e., fuel modification changes, development progress, and local fire history). As a 'dynamic model', the Wildfire Risk Assessment Framework will support 'what if' scenarios for mitigation planning. For example, the risk framework can identify a base level of risk posed to new structures based on building characteristics, site conditions, and lot layout, The impact of changing any of those components can be ascertained using this risk framework. It can answer the question, "What benefit will result by conducting fuel treatments on a portion of the development?" (i.e., development review, fuel modifications, etc.). Finally, the Wildfire Risk Assessment Framework provides a structured foundation to capture and provide feedback to stakeholders on community-scale changes in hazard or area designations.

The development of the Wildfire Risk Assessment Framework included the following steps:

1. **Identification of Values at Risk:** Identification and description of the community valued assets that may be exposed to the base hazard.

2. **Identification and Weighting of Contributing and Mitigating Factors:** Identification and description of factors that can increase or decrease the exposure of a value at risk to the base hazard.

RISK ASSESSMENT OBJECTIVES

The Wildfire Risk Assessment Framework supports the following objectives:

- Provide a common, shared view of the wildfire risk

- Support fuels mitigation
  - Create shared awareness and acceptance of fuel mitigation efforts
  - Portray changes in wildfire hazard due to fuel mitigation efforts
  - Provide a mechanism for planning future projects

- Encourage public outreach and engagement
  - Share information on participation, contact, and status of program
  - Depict the value of preparation actions on wildfire risk reduction

- Improve structure fire prevention
  - Depict the value of various mitigation actions available for the homeowner and community
  - Provide a mechanism to share mitigation actions with response personnel

DEFINITION OF HAZARD AND RISK

Although the definitions of 'hazard' and 'risk' are relatively standardized, variations in the definition for a community-risk assessment can result in diverging perceptions across stakeholders. For the purposes of the Wildfire Risk Assessment Framework, the following definitions were adopted:

1. **Hazard:** a condition or element that provides a source of ignition or contributes to spread and severity of fire. In this CWPP, "hazard" is defined specifically as the "potential for and characteristics of wildfire as a source to inflict damage to the people, insurable property, and the environment within the Wildland Urban Interface Zone."

2. **Risk:** the exposure to possible loss or injury from a hazard. This will include the effects of mitigation to reduce the hazard and the values associated with any potential damage.

3. **Risk Assessment:** involves identifying the risk impact and risk perception in order to support decision making and planning.

COMMUNITY "VALUES AT RISK"

Metro Fire designated the following as specific values-at-risk for the Wildfire Risk Assessment Framework:

1. Life safety
2. Insurable properties and developed areas
3. Critical infrastructure
4. Environmental resources

Contributing and Mitigating Risk Factors

The Wildfire Risk Assessment Framework allows Metro Fire and the affected communities to translate the hazard of wildfire into a risk assessment for values at risk that describes their level of exposure to the wildfire hazard. To accomplish this, Metro Fire and the project team described a variety of contributing and mitigating factors (selected based on data availability) that can increase or decrease the exposure of a value at risk to the impact of wildfire. The following specific attributes were identified to support this assessment and develop working model. The goal of the CWPP is to encourage a broad, community-based effort to implement positive mitigation strategies across the attributes to decrease the impact and effects of wildfire – particularly in areas with a high or very high base hazard.

Table 7-1 below describes the attributes for each contributing and mitigating factor.

Table 7-1 Wildfire Risk: Contributing and Mitigating Factors

Built Environment	Natural Environment	Response Environment	Social Environment
Roof Material	Slope/Aspect	Water Sources/Hydrants	Homeowner participation in Education/Mitigation
Defensible Space	Proximity to Wildland Vegetation	Road width	Cultural resource Areas
Position of Structure on Slope	Fire History (from 2000+)	Response times	
Year of Construction	Vegetation Types	Fire Breaks	
Balcony and decks	Wildfire behavior rating	Wildfire Pre-Plan	
Siding			
Windows and doors			
Eaves, overhangs, vents			

NATURAL ENVIRONMENT

The natural environment can modify the wildfire hazard by increasing or decreasing the exposure of structures or valued property based on changes in vegetation growth, local weather, or fire history. The following are factors selected to characterize the risk facing parcels within the District.

1. Fire behavior rating of parcel
2. Fire history (year 2000 to present)
3. Slope aspect of parcel
4. Proximity to large parcel of wildland vegetation
5. Potential future addition
6. Modifications to environment (i.e., fuel mitigation, fire history, building development). In support of the future addition of an attribute supporting fuel mitigation projects, a decision support tool was introduced into the web-based portal to provide a 'what if' analysis capability to depict changes in risk based on fuel mitigation project areas.

CLIMATE CHANGE AND FIRE RISK

Breakdown of Historic Wildfire Seasonality

Traditionally, wildfire risks have elevated on a seasonal basis. "Fire season" has been a staple in fire response planning and firefighting resource deployment during the late spring, summer, and early fall. California has had a relatively predictable cycle of wildfire occurrence (with some exceptions). As Northern California dries out, fires have consumed the parched vegetation, typically beginning in mid-summer. Southern California risks have historically been highest during the later fire season with the potential for Santa Ana wind-driven fires in the late summer and fall.

As noted in the 2013 public draft of the state's Climate Adaptation Update (Safeguarding California), with climate change, the "fire season" cycle appears to be changing or potentially breaking down. Predictability has diminished in recent years. More large and damaging wildfires are occurring outside of historic fire season, i.e., deep into the beginning of winter or earlier at the start of the spring. Altered weather is the primary reason for this change. More precipitation has historically fallen in the form of snow than is

predicted in the future. Deep snow slowly charges water supply facilities and keeps fire threats in the high country and along riparian corridors to a minimum until well into the summer months because of the gradual release of snowmelt moisture. With a greater proportion of rain, instead of snow, and a diminished snow pack, runoff immediately follows winter rainstorms and the volume of spring melt water from gradually melting snow is decreased. Vegetation drying occurs sooner and more rapidly under these conditions (CNRA 2013: p. 77).

Reduced Dead Fuel Moisture and Increased Fire Risk

Based on downscaled data from the Cal-Adapt webpage, using the Rancho Cordova area as a representative indicator location for the Metro Fire district, temperature increases between now and late in this century are predicted to rise an average of 3.7 to 6.4 degrees depending on the greenhouse gas emission scenario (Cal-Adapt 2014). Higher temperatures lasting even only one day will affect small-diameter fuels, such as grass. The amount of time (both the number of days, and the length of time in each day) in which there is a probability of ignition that reaches 90 percent or greater will also increase. This results in the prediction of an expected greater number of wildfire ignitions.

For each wildfire, a higher average air temperature will also correlate to lower dead fuel moisture. Fuel moisture is a principal component determining rate of fire spread. Fires are likely to spread faster under hotter conditions. This will challenge firefighters in trying to contain fires, because accelerated fire spread stresses the ability to create fire lines in time. If containment is less effective because of more rapid fire spread, it can result in greater number of larger fires. The larger fires can result in greater damages, both to natural ecosystems and property. Eleven of the 20 largest fires in California have occurred in the last decade and eight in just the last four-and-a-half years (CNRA 2013; p. 84).

As higher temperatures last for longer periods of time, dead fuels of wider diameter (including twigs, sticks and branches up to an inch in diameter) will also become drier. Fuel moisture is a major factor in determining fire intensity; a higher proportion of fires are likely to burn with greater fire intensity, if larger diameter dead fuels dry more quickly and over a wider area. More fires that burn with higher intensity are likely to result in greater damage. Greater fire intensity is linked to more tree mortality, and possibly greater soil damage and erosion potential. Fires with higher intensity are more apt to reach tree canopies and produce and distribute embers that spread longer distances ahead of the fire front and create new fires. Fire intensity is also linked to a greater change for structure ignition, especially in locations with single-paned windows.

Predicted Future Increase in Wildfire Risk

Modeling performed by the State of California and reported on the Cal-Adapt website includes mapping of wildfire risk increases by late in the century. The area projected to be burnt by wildfire toward the end of the century will increase substantially, especially in mountainous and foothill areas. Wildfire risks are also projected to increase, but to a lesser extent, along the margins of the Central Valley, including the eastern portion of the Metro Fire District. These predictions are modeled solely on climate projections and do not take landscape and fuel sources into account, so they represent a general picture of wildfire risk increases. Figure 7-1 illustrates the Cal-Adapt wildfire risk mapping for the Metro Fire District (Cal-Adapt 2014).

BUILT/DEVELOPED ENVIRONMENT

The physical attributes of structures, surrounding landscaping, and building codes can reduce or increase the exposure of a value-at-risk to a wildfire hazard. These attributes include:

1. Roof material
2. Other structure features (external walls, eaves, windows, vents, deck, underside of deck)
3. Defensible space presence
4. Position of structure on slope

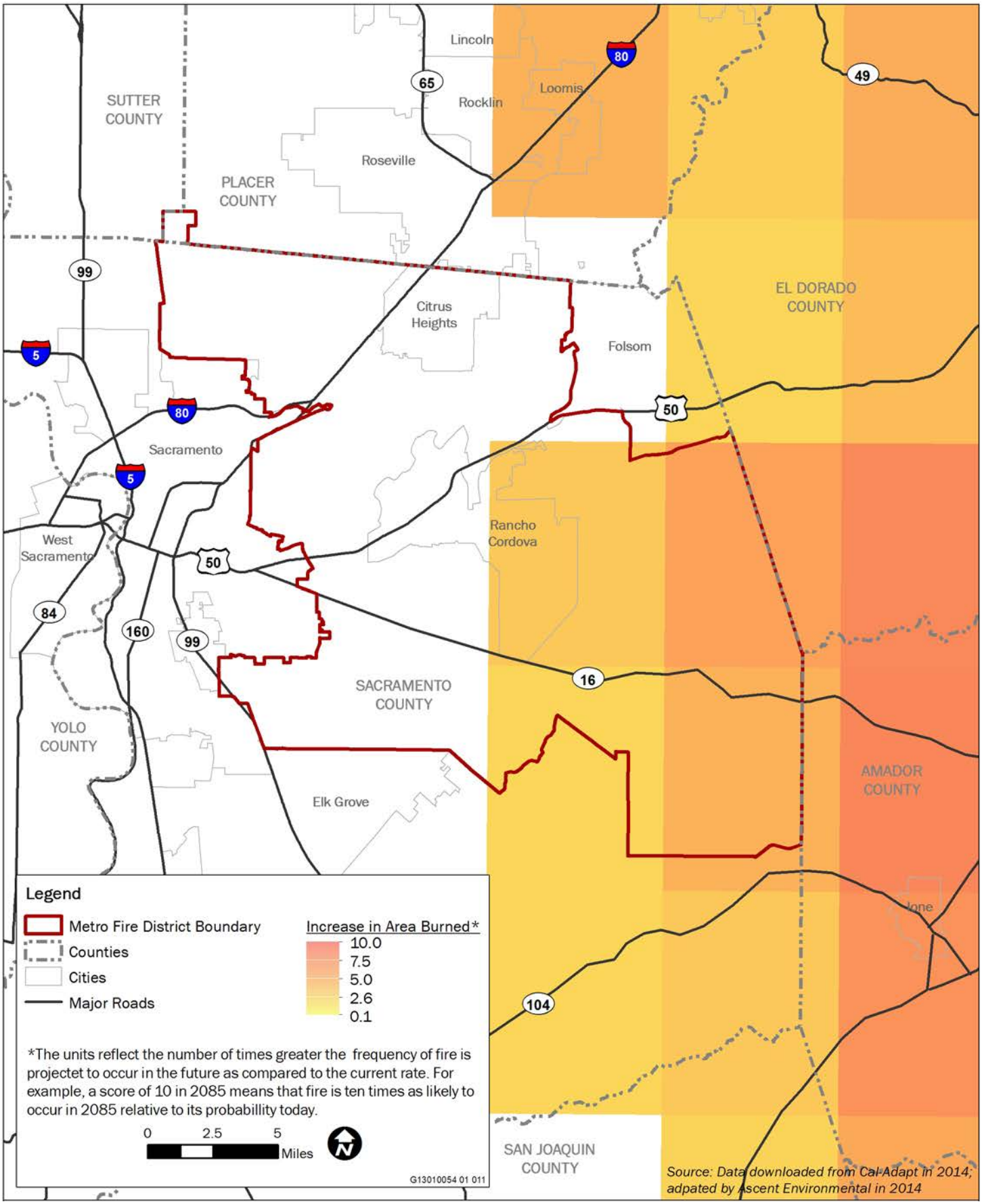


Figure 7-1 **Wildfire Risk**

EMERGENCY RESPONSE ENVIRONMENT

Fire response planning, capabilities, and resources can limit the impact of a wildfire hazard on a value-at-risk. The selected factors associated with wildfire response are:

1. Access road width
2. Response attributes (Metro Fire drive time compliance with its own standards)
3. Water sources (fire hydrant access)
4. Pre-fire plans

Social Systems

The reactions and values of the community may increase or decrease the impact of a wildfire. For the current model, social systems do not directly change the wildfire risk assessment. However, these social actions can be captured in a participation database which could be used by Metro Fire to help engage communities and individuals to prepare for a wildfire event. In order to track and display this information for public engagement, these attributes would be depicted in a participation score which will be calculated as a percentage of full participation (1 of 6, 4 of 6, etc.). The factors that can affect the risk of a parcel were selected as follows:

- Wildfire Preparedness Program. Risk was reduced if the participant:
  - Created a family disaster plan
  - Prepared an emergency kit
  - Identified escape/evacuation routes
  - Participated in community wildfire education program
  - Completed a home checklist
  - Participated in evacuation drill
  - Expressed interest in joining a FireSafe Council
  - Expressed interest in leading a FireSafe Council

DESCRIPTION OF THE RISK FACTORS

The following are the risk factors that can be mapped within the District. The description of each risk factor includes examples of how each can influence the possible damage from wildfire. The descriptions offer background so that stakeholders could weigh the relative importance of each factor.

Year of Construction

The year of construction can influence the design and construction type of structures. Structures built prior to the passage of the new building code generally have more features that make them more ignitable: overhanging wood decks, single-paned windows, wood roofs, wood siding, unprotected eaves and open vents, for example.

Roof Material

This is usually considered one of the most important risk factors. Wood roofs are associated with ignition and structure loss, while structures with non-flammable roofs usually have higher survival rates during a wildfire exposure.

Defensible Space

Having defensible space is usually associated with high structure survival rates during a wildfire. Firefighters are provided opportunities to position resources around the structure and heat output is reduced when defensible space is present.

Position of Structure on Slope
Because fires pre-heat fuels above it, structures on the top of slopes often are more apt to ignite than those at the bottom of a slope. Access is also influenced by a structure's position on the slope since structures at the top of a slope may be harder to access.

Sensitivity to Special/Valued Habitat
Fuel management may be hindered in areas where extra precautions increase management costs or regulations prohibit work. Unmanaged fuels may be areas of increased fuel accumulation and hazard.

Slope/Aspect
Steeper slopes pose challenges for containment because travel is hindered, and more preheating occurs with steeper slopes. The orientation of the slope to the sun also affects the fuel moisture and heat; westerner and southern aspects are generally hotter and drier.

Proximity to Wildland Vegetation
Areas farther away from wildland are much less likely to incur damage, unless airborne burning embers, or firebrands, are part of the fire behavior.

Fire Behavior
The way wildfire burns, especially the intensity of a fire is an important risk factor. Fire intensity (as measured by flame length) is closely linked to damage. Fires with longer flames are hotter and more apt to ignite structures or become lethal to living things. The faster fire spreads, the harder it is to contain. When fires torch tree canopies, embers are produced and distributed well ahead of the main fire, and which can easily start new fires, both in vegetation and in structures.

Vegetation Types
Vegetation type influences fire behavior, because some, such as dry grass, burn more quickly, and some, such as brush, burn hotter. Different vegetation types also are easy or hard to manage. Unmanaged vegetation is often more hazardous.

Cultural Resource and Sensitive Habitat Areas
Fuel management may be hindered in areas of cultural resources or sensitivity habitats require where extra precautions that increase management costs or where protective regulations prohibit work. Because of a lack of treatments, these unmanaged fuels can comprise increased fuel accumulation and fire hazard.

Homeowner Participation in Education/Mitigation
Informed and involved homeowners typically have a property that is at less risk due to the increased knowledge they have and heightened sense of responsibility.

Water Sources/Hydrants
The use of water greatly aids the extinguishments of a fire, thereby containing it and limiting damage. The total abundance and proximity to the fire are important factors.

Road Width
Road widths generally aid fire response by allowing faster travel, and by providing a wider firebreak.

Response Time
Shorter response times are associated with reduced damage because containment and suppression can start earlier, when the fire is smaller.

Fire Breaks

The presence of firebreaks typically aids fire response by offering a safer location to position resources, and is a place where fire behavior is calmed.

Wildland Pre-Plan

Fire response may be more efficient in locations that have a pre-plan for wildfire due to increased knowledge regarding firebreaks, water sources, access, and communications.

RISK FACTOR PRIORITY

Stakeholders were asked to weight the relative importance of each of these 16 factors using an online survey, or by completing the form during stakeholder meetings. The 16 factors include the following:

- Year of Construction
- Roof Material
- Defensible Space
- Position of Structure on Slope
- Sensitivity to Special/Valued Habitat
- Slope/Aspect
- Proximity to Wildland Vegetation
- Fire Behavior
- Vegetation Types
- Cultural Resource Areas
- Homeowner Participation in Education/Mitigation
- Water Sources/Hydrants
- Road Width
- Response Time
- Fire Breaks
- Wildland Pre-Plan

Risk Results

Approximately one-third of the stakeholders offered their perspective on the relative importance of the risk factors. They generally gave high level of importance to roof covering, defensible space, and fire response. The response was quite variable, which prevented the team from exactly incorporating the weights provided by the stakeholders. The consulting team considered the input from the stakeholders and determined the relative importance of the factors into Table 7-2.

Table 7-2 Risk Factors: Community Survey Results

	Risk Factor - Metro Fire	Condition	Weight/ score (bad = high)
Fire = 25% *add flame length, crown fire, proximity to wildlands*	Fire Behavior - FL	flame length high	15
		flame length medium	10
		flame length low	0
	Fire Behavior - Crown	crown fire med or high	5
		no crown fire potential	0
	Proximity to Wildland Vegetation	Wildlands abut parcel	5
		Wildlands between 100-500 ft from parcel	3
		Wildlands greater than 500 ft from parcel	0
Veg Condition = 20% *add d space and veg type*	Defensible Space	not compliant/no	15
		Compliant/yes	0

Table 7-2 Risk Factors: Community Survey Results

	Risk Factor - Metro Fire	Condition	Weight/ score (bad = high)
	Vegetation Types within 200ft	shrubs	5
		annual grass	3
		oak woodland	2
		riparian vegetation	1
		irrigated landscaping	0
Roof = 20%	Roof Material	Wood or Ember Intrusion	20
		Non-combustible	0
Construction Other = 10% *add siding, eaves, windows, vents, deck, underdeck*	Year of Construction - siding	before 2010/wood, combustible	1
		after 2010/non-combustible	0
	Year of Construction - eaves	before 2010/not boxed or treated	1
		after 2010/boxed or of treated wood	0
	Year of Construction - windows	before 1975/single paned	2
		after 1975/double+paned	0
	Year of Construction - vents	before 2010/unprotected, no screen	2
		after 2010/1/4 " screened/protected/baffled	1
		after 2010/1/8" screened/protected/baffled	0
	Year of Construction - Deck/balcony/patio	before 2010/Combustible Material, not sheathed in	4
		before 2010/combustible Material, sheathed in	2
		after 2010/None or fire resistant material, sheathed in	0
Water =4%	Water Sources/Hydrants	Pressurized Hydrant	4
		Tank or Dry Hydrant	1
		Accessible Swimming Pool	2
		None/Insufficient	4
Response time = 5%	Response time	Greater than 5 mins	5
		Less then 5 mins	0
Road quality = 5%	Road Width	Does not meet MF codes	5
		Meets MF code	0
	Wildland Pre-Plan		0
Topography = 10% *add position of structure on slope, aspect and slope steepness*	Position of Structure on Slope	Ridgetop/Chimney/Box Canyon/Top of Slope	4
		Mid-slope with Setback	2
		Flat/Base of Slope	0
	Aspect	South or west facing slope	2
		Flat	0
		East or north facing slope	0
	Slope Steepness of Yard	greater than 30% steepness	4
		10 - 30% steepness	3
		Less the 10%	0
	Cultural Resource Areas		0
	Sensitivity to Special/Valued Habitat		0
Firebreaks = 1%	Fire Breaks	No firebreaks within 500 ft	1
		Firebreaks within 500ft	0
	Homeowner Participation in Education/Mitigation		0
TOTAL			**100**

RED = HIGH [45 or above]
ORANGE = MEDIUM [between 25 and 45]
GREEN = LOW [25 or below]

After the characteristics of each risk factor are assigned to each parcel, the parcel will fall into a risk category of Low, Moderate, Moderate-High or High Risk. These categories are described in Table 7-3 below.

Table 7-3 Risk Results

Risk Category	Description of Risk Category
High Fire Risk	Your home has been identified as a HIGH RISK. The survivability of your home is low. Your home may be in extreme danger during a hostile wildfire. Recommendations indicated within your home evaluation are strongly encouraged to be completed.
High-Moderate Fire Risk	Your home has been identified as a MODERATE RISK. Survivability of your home will be an issue during a hostile wildfire. Recommendations indicated within your home evaluation should be completed.
Moderate Fire Risk	Your home has been identified as a MODERATE RISK. Survivability of your home will be an issue during a hostile wildfire. Recommendations indicated within your home evaluation should be completed.
Reduced Fire Risk	Your home has been identified as a LOW RISK. Recommendations indicated within your home evaluation should be addressed to increase the survivability of your home during a hostile wildfire.
Low Fire Risk	Your home has the greatest potential for survivability during a hostile wildfire.

8 PROJECTS THAT IMPROVE EXISTING CONDITIONS

PROJECTS

The following section summarizes the projects that Metro Fire proposes to implement under this CWPP. This list of projects included under the CWPP was developed by soliciting input from stakeholders at public meetings and through individual contacts with stakeholders. Some projects were suggested by the consultant team and affirmed by the stakeholder group.

The projects are listed using the three headings required for CWPPs in the FHFRA: community collaboration, fuels reduction projects, and treatment of structural ignitability. Another way to classify these actions is whether the actions are related to fire prevention, preparedness for fire, fire response, or recovery from a fire. Accordingly, the actions are classified whether they address Prevention, Preparedness, Response, or Recovery. Currently, no projects have been identified that might assist in post-fire recovery; however, such projects are being solicited through the stakeholder outreach process and would continue to be solicited as the CWPP is implemented over time.

Community Collaboration

Implementing projects to reduce wildfire risk can occur only if the community at risk and the agencies responsible for land use planning and fire response are fully involved in the planning and implementation process. Together, the people and entities at risk and those responsible for managing and responding to that risk are called the stakeholders in the plan. It is the goal of Metro Fire to collaborate with as many stakeholders in the delineated WUI as possible to reduce the fire risk. Stakeholders that participated in the process include:

- Matt Ocho, ARP Foundation
- Dianna Poggetto, ARP Foundation
- James Morgan, Butterfield-Riviera East Community Association (BRECA) and Save the American River Association (SARA)
- Nate Gogna, Bureau of Land Management
- Mike Webb, California Department of Forestry and Fire Protection (CAL FIRE)
- Thomas Tinsley, CAL FIRE
- Mike Okivarria, CAL FIRE
- Edith Hannigan, California Board of Forestry and Fire Protection
- Steve Cantelme, California State Office of Emergency Services
- George Avila, California Department of Transportation (CalTrans)
- Daman Christensen, City of Citrus Heights Police Department
- Dan Haverty, City of Sacramento Fire Department
- Michelle Basurto, City of Sacramento Fire Department

- Scott Williams, City of Sacramento Fire Department
- Lon Gay, City of Sacramento Fire Department
- Diana Yates, City of Sacramento Fire Department
- Mary Maret, County of Sacramento Dept. of Regional Parks
- Michael Winter, County of Sacramento Community Development
- Sheryl Lenzie, County of Sacramento Planning & Environmental Review Divison
- Dave Reed, Riverwood Home Owners Association (HOA)
- Candace Krumpe, Riverwood HOA
- Donald Burns, Riverwood HOA
- Vince Jacobs, Riverwood HOA
- Baldeo Singh, Sacramento Regional Conservation Corps
- Dwight Washabaugh, Sacramento Regional Conservation Corps
- David Cheek, Sacramento Regional Conservation Corps

Metro Fire proposes to work collaboratively with stakeholders to develop and implement practices and actions to mitigate the risk factors occurring in the WUI. The following actions are recommended in this CWPP:

1. Establish a framework for Metro Fire staff and staff of other stakeholder agencies to collaborate on implementing the plan. (Preparedness)
2. Add the CWPP to the Amador/Eldorado Cal Fire Unit Fire Plan. (Preparedness)
3. Conduct joint training with cooperating agencies.
    a. Foster the relationship between the Sheriff's Department, cities of Rancho Cordova and Citrus Heights Police Departments, and Metro Fire to jointly address evacuation routes and procedures. (Response)
    b. Collaborate and participate with California State Parks and Sacramento County Regional Parks in their existing and planned prescribed burn activities with the intention of increasing Metro Fire's familiarity with prescribed burn techniques and overall increased collaboration between these entities. (Prevention and Response)
    c. Include Minimum Impact Suppression Techniques in the training curriculum. (Preparedness)
4. Work with citizen-based response organizations (i.e., Neighborhood Watch, Community Emergency Response Team (CERT)) to supplement law enforcement and fire department efforts. Encourage the linkage between crime prevention and fuel reduction near homes. (Preparedness and Response)
5. Encourage the formation of a countywide Fire Safe Council. This entity could serve as an "umbrella" organization under which smaller, community-based fire safe councils could be formed when and where

there is interest. The countywide fire safe council would assist in organizing and finding funding for the community-based fire safe councils. (Preparedness)

6. Facilitate the formation of an agency-to-agency organization to foster resource sharing, establish common best practices, and consistent media messages. (Preparedness)

7. Continue to hold community meetings to educate residents about their fire environment and measures they can take to minimize their risk and prepare for a wildfire (Preparedness). These meetings could include:

   a. A description of practices to reduce structural ignitability and to limit ignitions;
   b. An explanation of how common architectural features respond when ignited;
   c. A description of evacuation protocols and drills; and
   d. Information about defensible space and fire-resistant landscaping.

8. Seek grant funding to fund projects, and involve stakeholders to maximize community support for projects when prioritizing projects. (Preparedness)

9. Inform citizens of details of this CWPP through a Community Education Program. Topics would include provisions for evacuation; shelter in place; safety zones; fuels reduction; and the neighborhood provisions for fire safety, prevention, and public safety. The education program would include a Metro Fire library of information on fire safety, fire-wise landscaping, defensible space, first-aid, and other literature for distribution to citizens upon request. (Preparedness)

10. Recommend the amendment of general plans, building codes, and zoning ordinances to strengthen and to provide additional protections for wildfire while still allowing property owners to develop their land. Goals, policies and implementing actions are listed in Appendix K. (Prevention, Preparedness, Response, Recovery).

Fuel Reduction Projects

Fuel management is the practice of removing or modifying vegetation in order to reduce wildfire ignitions, rate of fire spread, and fire intensity. Changing the continuity of the vegetation, and reducing its volume are the two primary actions in fuel management. Typically grass is mowed, shrubs are reduced in height and/or removed (especially when under trees), and the lower branches of trees are cut and removed.

Methods to modify vegetative fuels encompass the use of hand labor to cut, pull, and or move vegetation; mechanical mowing, cutting or masticating; prescribed grazing; targeted herbicide application; and prescribed burning. Refer to Section 9 below and Appendix J of this CWPP for a detailed description of proposed treatment methods. Given the variability of conditions, a single type of treatment is typically not effective. Figure 8-1 and 8-2 of this document provide location of proposed CWPP fuel reduction treatment areas. In general, fuel management practices vary with the vegetation type, location of treatment, terrain, condition of the vegetation, and its configuration. Typically, fuel reduction treatment priorities are established based on the site conditions (such as fire hazard, access, and development pattern) and can generally be organized based on the location of treatment from structures and infrastructure as follows.

1. 0-100 feet from a structure,

2. 10-300 feet from critical infrastructure (e.g., fire hydrants, other water supplies, etc.),

3. 0-30 feet from emergency access roads, and

4. 100-300 feet within community protection zones (a community protection zone overlaps with home ignition zones [i.e., the home itself and everything around it up to 100-200 feet] and can provide opportunities for firefighters to protect other flammable features of a community) [NFPA 2014]. This zone is further defined below under Section 2.8.3, Vegetation Treatments.

The location of fuel management projects recommended in the CWPP is shown in Figure 8-1 and 8-2 and would include the following:

1. Gather more information about existing fire conditions and hazards in the WUI in order to better direct and prioritize fuel reduction projects. This would include the following actions:

    a. Install remote automatic weather stations (RAWs) to determine fire conditions and conditions requiring red flag warnings. The automatic weather stations would be installed on existing poles or structures, or within existing developed areas, and would not be placed in areas that are highly visible. (Preparedness and Response)

    b. Train Metro Fire staff how to use and interpret RAWs data. (Preparedness and Response)

    c. Establish and adopt a mechanism to notify stakeholders when a red flag warning is issued. (Response)

    d. Evaluate and, as warranted, revise dispatch protocol for red flag warnings. (Response)

    e. Hire an intern to map the WUI fire history to portray the locations, times, and causes of wildfire ignitions. (Preparedness)

    f. Develop a fire prevention plan for areas of frequent ignitions. The plan would include fire prevention goals and strategies based on the area's fire history (i.e., children playing with matches, unattended barbecues, or warming fires), community education needs, enforcement of regulations, and/or modification of fuels to ensure they are less ignition-prone. (Prevention)

2. Work with partner agencies to conduct fuel management and augment response and/or reestablish Metro Fire work crews to treat vegetation in projects identified in this CWPP. (Prevention and Response);

3. Use established governmental work programs such as the Sacramento Regional Conservation Corps to conduct fuel reduction projects (as detailed in the following pages) and to bolster response capabilities. (Preparation and Response);

4. Use community groups, such as Neighborhood Watch and CERT volunteers, to help with advisory inspections and to educate homeowners about defensible space and how it reduces their exposure to wildfire damage. (Prevention);

5. Where feasible, use California Department of Correction and Rehabilitation (CDCR) work crews to treat vegetative fuels at CWPP project sites (as detailed in the following pages). (Prevention);

6. Develop pre-fire plans for communities within the WUI to speed emergency response and make it more effective. These plans will identify available water supply, alternative access points, structure footprints, location of locked gates, contingency zone locations, areas sensitive to dozer operations, and communication protocols. (Prevention, Preparedness, and Response);

7. Support targeted compatible vegetation management in the ARP that reduces fire hazard through funding and cooperative operations. Work to minimize impacts to sensitive habitats through establishment of best management practices and be consistent with the 2008 ARP Master Plan. (Prevention);

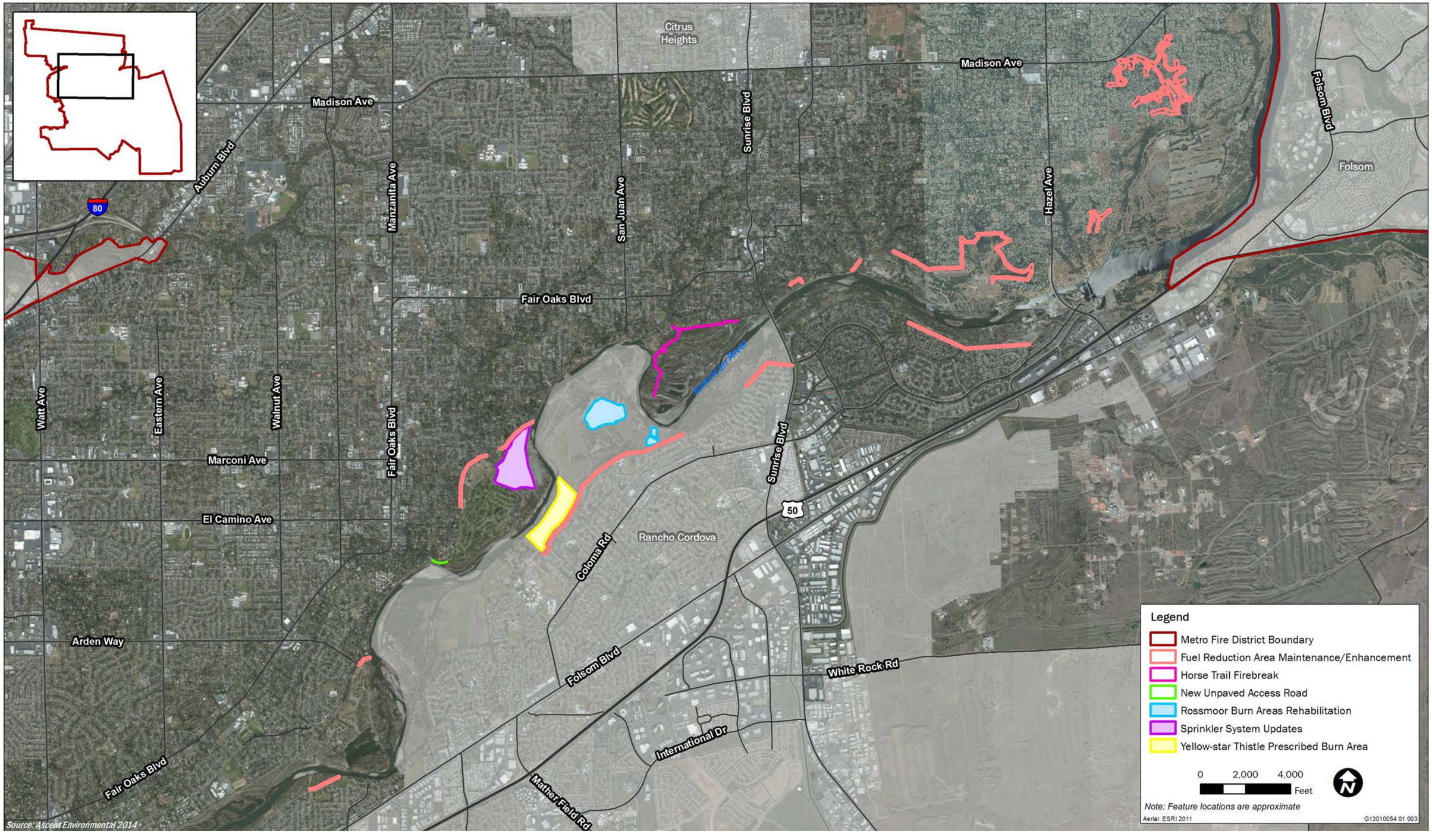


Figure 8-1 **Fuel Reduction in the American River Parkway**

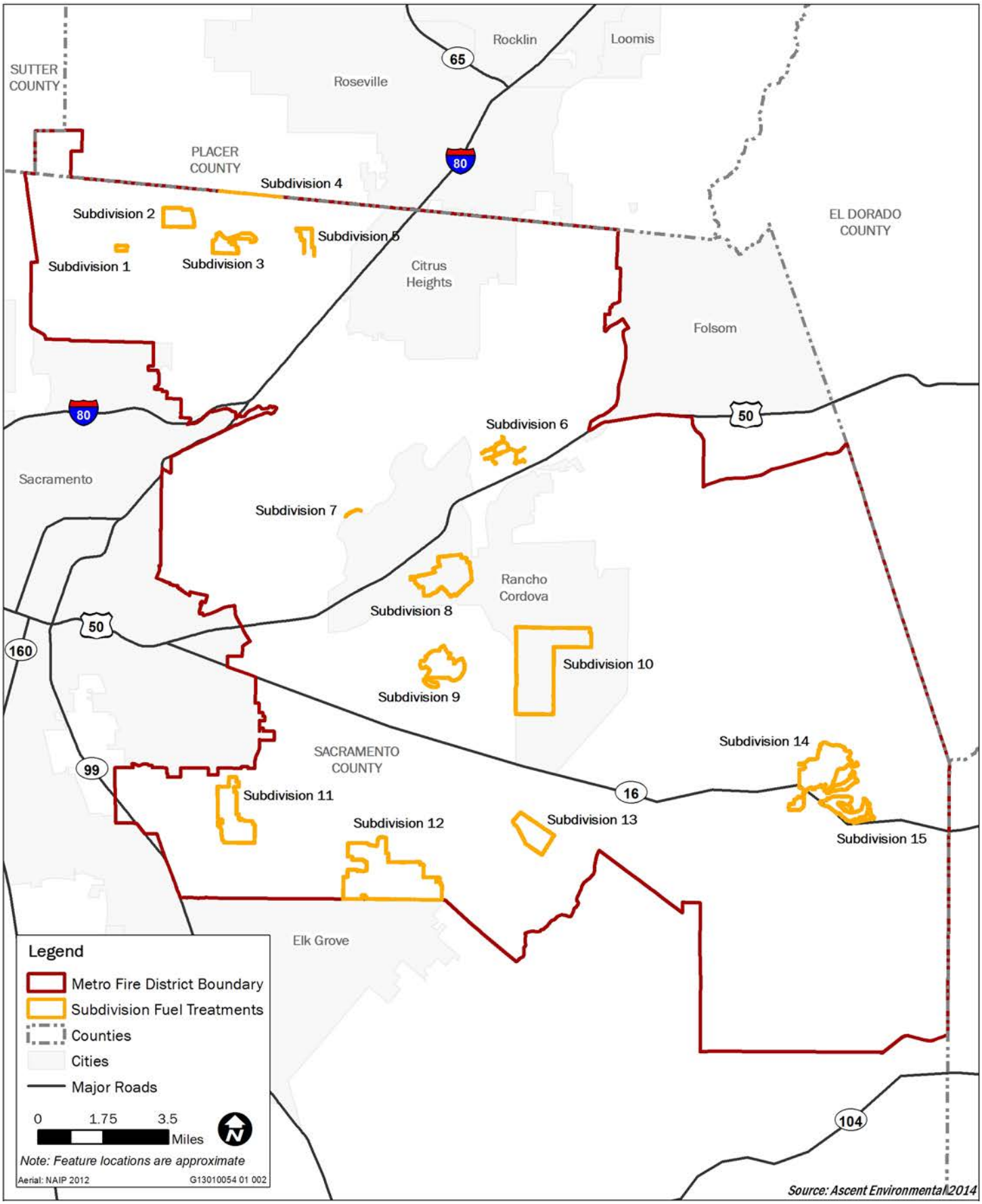


Figure 8-2 **Fuel Reduction around Subdivisions Adjacent to the Wildlands**

a. Manage vegetative fuels for fire hazard reduction through maintenance of existing fuel reduction areas (i.e., 100-feet of mowed area within Defensible Space Zone) located around structures adjacent to WUI areas within the ARP (see areas identified in Figure 8-1 as 'fuel reduction area maintenance/enhancement). CDCR crews or SCC crews may be utilized to reduce fuel loading in areas with heavy vegetation. Seek grant funding for this work. (Prevention);

8. Expand area of fuel treatment adjacent to equestrian trails by 10 feet in selected locations and rehabilitate burn areas in Rossmoor Bar (see areas identified in Figure 8-1 as 'Fuel Reduction Area Maintenance/Enhancement, 'Horse Trail Fire Break', and ' 'Rossmoor Burn Areas Rehabilitation') to protect sensitive resources from the spread of fire. CDCR crews or SCC crews may be utilized to reduce fuel loading in heavy vegetation. Metro Fire would seek grant funding for this work. Activities under this fuel reduction project would include:

    a. Expand the area of fuel treatment along horse trails near Bannister Park. Treatments would include mowing or discing a strip to prevent fire spread and pruning of lower branches of trees to prevent torching and remove understory shrubs to minimize fire intensity.

    b. Use SCC crews to rehabilitate the fire area in Rossmoor Bar. This would include pruning lower dead branches of oak trees, removal and piling of dead material away from trees, and weed-whip/mow the grass under the trees so fire cannot carry and create further damage.

    c. Increase the firebreak width (mow or blade an area up to 30-feet wide, including the disced width) outside areas where mitigation trees were planted. (Prevention).

9. Encourage the American River Coalition to establish a volunteer program to focus on activities that remove or prune vegetation in the area behind residences within the ARP, especially those residences south of the river. (Prevention and Preparedness);

10. Renew and update the fuel reduction work done in 2010 and 2012 in Ed Levy area and elsewhere in the ARP (Figure 8-1);'

11. Coordinate with Caltrans and County Public Works on implementing currently authorized roadside fuel reduction treatment projects that would include mowing grass, shrub removal, and tree pruning within road right-of-ways. (Preparedness); and

12. Treat high fire hazard areas (determined by estimated flame length) near structures with establishment of a community protection zone with associated firebreaks. Figure 8-2 identifies approximate location of proposed subdivision fuel treatment areas. (Preparedness). Give the highest priority to projects that:

    a. Reduce hazardous fuels, which if left untreated, would generate high intensity fire adjacent to structures or communities at risk, or produce large quantities of burning embers that would threaten communities;

    b. Reduce hazards along strategic emergency access and evacuation routes, or other critical infrastructure; and

    c. Reduce impacts of wildfire to sensitive high value ecosystems and high use recreational areas by reducing fire intensity and or increasing chances of fire containment before reaching the area

Treatment of Structural Ignitability

The presence of structures within the WUI exposes both the natural and the developed environment to increased risk of destruction by wildfire. Where flammable vegetation occurs near homes, an ignition can

result in a damaging fire. Reducing the ignitability of structures can reduce loss to the treated structure and reduce fire spread in the area.

Structure ignitability can be reduced by using fire-resistant roofing, installing or retrofitting ignition resistant decks, installing double-paned windows (and otherwise building and remodeling in a manner consistent with Chapter 7a of the California Building Code), reducing the amount of flammable vegetation near the structure, and enhancing firefighter's access to the structure and a water supply.

The decision where to build and the materials used has a direct relationship to the ability of the structure to survive a wildfire. Adoption and enforcement of fire and building codes is an essential part of managing risk within the WUI. The following are CWPP-recommended projects that will improve the ability of structures in the WUI to survive a wildfire.

1. Develop a means to enforce defensible space on private property in the WUI, as required by Public Resources Codes 4291. (Preparedness)

    a. Revise the fire codes for the area within the WUI throughout the District. The code would identify defensible space and construction requirements for different site conditions, formalize inspection schedules, and identify the responsibility for fulfilling the defensible space requirements. Revisions to the code could be implemented over several years, beginning with the areas of highest risk. (Prevention)

2. Gather more information about existing structural conditions and risks in the WUI in order to better direct and prioritize projects addressing structural ignitability. (Preparedness)

    a. Seek funding to support staff collection of structural data to support parcel-based risk assessment[5] (Preparedness)

3. Hire additional staff to conduct defensible space inspections and inventory of wildfire risk Inspectors would determine whether the vegetation on the parcel is in compliance with the adopted weed abatement ordinance and the presence of risk factors such as vegetation condition, structure characteristics and parcel attributes (See Section 7 for a detailed discussion of risk factors). (Prevention)

4. As grant funding becomes available, administer a program that funds replacement of wood shake roofs with non-combustible roofing in the areas most at risk. (Prevention)

5. As grant funding becomes available, retrofit the structural components, building materials, and landscaping of older Metro Fire stations. (Prevention)

FUEL TREATMENT MECHANISMS

Fuels within the District would be treated through a variety of mechanisms. Treatment mechanisms include hand labor, mechanical treatment, targeted grazing, herbicide, and broadcast prescribed burning. Assumptions being analyzed for the fuel treatment types are listed in Appendix J of this CWPP and are summarized as follows:

Hand Labor

Hand labor involves pruning, cutting, or removal of weeds or shrubs either by hand or with hand-held equipment. Hand labor includes pruning, weed-whipping (weed-eating), and mowing. Hand labor encompasses the operations of pruning and use of a string cutter, tree removal, bark pulling, removal of dead wood within the tree/shrub canopy, litter removal and mulching, and establishing new plant material.

[5] Parcel-based risk assessment is a rating for each parcel of the conditions that influence the potential damage from wildfire.

All herbaceous material will remain on the site after treatment. Soil disturbance should be minimal. Density of shrubs and small trees will decrease, but total removal of vegetation from a site would not occur.

Mechanical Treatments

Mechanical treatments include discing, mechanical pruning, mowing, and brushing. Discing will remove vegetation and disturb the top soil layer with a tractor blade and leave bare mineral soil in an 8-12 foot swath. Other heavy machinery (like a mower or brusher) could disturb the top soil layer due to the weight the machinery, the grade of the slope and the type of soil. Machinery may contain mechanical arms to reach out and prune or cut vegetation. While this type of machinery can be maneuvered to certain areas, it has little control over which plants it cuts within the area it is cutting. Mowers are attached to tractors and produce mulch that remains on the ground after treatment. Percentage of vegetation removal will vary by treatment type and vegetation community. Grassland areas may see almost total removal of vegetation while woodland areas would see understory vegetation removed.

Mowing would cut vegetation down to one-inch height (Fire Breaks) or less than four inches in Defensible Space Zones so that vegetation roots will remain intact and hold soil.

Mowing of plants would leave herbaceous debris on the ground that will likely decay within a year or two.

Targeted Grazing

Grazing with 200-300 sheep and goats on an acre can be used to target for specific areas. However, goats and sheep would remove any vegetation that is edible to them. Sheep tend to prefer herbaceous material such as forbs, while goats will eat practically anything including forbs, grasses and browse (shrubs). The hoof action of the animals will compact or disturb the soil within the areas grazed. Most likely treatments would likely occur in August through April timeframe due to the high demand during the late spring and summer months. Percent vegetation removal by targeted grazing can depend on vegetation type, timing and intensity of grazing. Grassland or weedy areas could be reduced completely, while shrublands or tree stands would have understory removal to remove ladder fuel.

Herbicide

Herbicide treatments would remove targeted species. These are generally used for weedy species such as star thistle or mustard. Vegetation, if dense, would be completely removed. Vegetation not sprayed would remain and continue to hold soil onsite.

Prescribed Burns

Prescribed burning would include broadcast burning in specified areas for yellow star thistle reduction (see Figure 8-1). They usually include some dozer work or hand work to line the burn unit with a small fire break. This line would remove all vegetation and leave bare mineral soil; as well as disturbing the top layer of soil. Pile burning consists of piling vegetation debris and burning the pile. If piles are not lined and attended to, they can escape and be used as a broadcast burn Prescribed burning can remove most of the vegetation if the burn is very intense and hot, or leave a mosaic of burn and unburned vegetation if the burn is less intense.

Fuel burns more intensively during the fall season and fires are hotter. This heat intensity causes more vegetation to burn that in the springtime. Springtime burns are cooler due to the moisture in the fuels and tend to leave more vegetation remaining on a treatment site.

Environmental Commitments

The following Environmental Commitments have been identified by Metro Fire and would be implemented with implementation of fuel treatment activities. Metro Fire has committed to the implementation of these measures; therefore, they are included as an element of this CWPP:

- Any Construction or Other Activities Using Motorized or Noisy Equipment

- All activity will take place between 6:00 a.m. and 8:00 p.m. within the County and between 7:00 a.m. and 6:00 p.m. within Rancho Cordova consistent with their Noise Ordinances.

- Hand Labor and Mechanical Treatments
  - Treatments actions will be avoided during conditions that may affect water or run-off including during storms or severe weather or immediately following severe weather.
  - Metro Fire will avoid herbicide treatment in areas adjacent to water bodies, riparian areas, and primary drainage access per requirements set forth by the California Department of Pesticide Regulation. Metro Fire will follow all herbicide labels and directions in determining applications near water resources or riparian habitats and will limit aerial application to greater than 100 feet from water resources and ground and hand application to greater than 50 feet.
  - Metro Fire will not use mechanized equipment within 50 feet of waterbodies or designated riparian areas.
  - Design criteria for fuel treatments will include prevention of soil erosion and canopy cover changes within riparian or oak woodland stream bank habitat.
  - All pruning will take place between November and April due to insect infestation dangers from pruning.
  - No heavy mechanical fuels treatments (discing, dozer use) would occur in drainage channels, run-off areas, or dry streambeds.
  - Metro Fire will install and manage runoff barriers for rainwater in all treatment and operating areas.
  - Metro Fire will restrict mechanical removal of trees to more than 50 feet from drainage channels.
  - Metro Fire will limit heavy equipment on slopes greater than 30 percent.
  - Metro Fire will ensure that all equipment is cleaned prior to movement into sensitive habitat areas to prevent the spread of invasive or non-native plants.

- Herbicides

  Metro Fire will require the implementation of the following Best Management Practices (BMPs) for application of herbicides:

  - Applicators will follow all herbicide label requirements and refer to all other local, state, and federal regulations (including OSHA requirements) to protect sensitive resources and employee and public health during herbicide application.
  - Herbicide applicators will have or work under the direction of a person with a Qualified Applicator License or Qualified Applicator Certificate.
  - All storage, loading and mixing of herbicides will be set back at least 300 feet from any aquatic feature or special-status species or their habitat or sensitive natural communities. All mixing and transferring will occur within a contained area. Any transfer or mixing on the ground will be within containment pans or over protective tarps.
  - Appropriate non-toxic colorants or dyes will be added to the herbicide mixture where needed to determine treated areas and prevent over-spraying.
  - Application will cease when weather parameters exceed label specifications, when wind at site of application exceeds 7 miles per hour, or when precipitation (rain) occurs or is forecasted with greater

than a 70 percent probability in the next 24-hour period to prevent sediment and herbicides from entering the water via surface runoff.

- Spray nozzles will be configured to produce a relatively large droplet size.
- Low nozzle pressures (30-70 pounds per square inch) will be observed.
- Spray nozzles will be kept within 24 inches of vegetation during spraying.
- Drift avoidance measures will be used to prevent drift in locations where target weeds and pests are in proximity to special-status species or their habitat. Such measures can consist of, but would not be limited to the use of plastic shields around target plants and adjusting the spray nozzles of application equipment to limit the spray area.
- Signs will be posted at each end of herbicide treatment areas and any intersecting trails notifying the public, employees, and contractors of the use of herbicides. The signs will consist of the following information: signal word, product name, and manufacturer; active ingredient; EPA registration number; target pest; preserve name; treatment location in preserve; date and time of application; date which notification sign may be removed; and contact person with telephone number. Signs will be posted at the start of treatment and notification will remain in place for 72 hours after treatment ceases.
- All herbicide and adjuvant containers will be triple rinsed with clean water at an approved site, and the rinsate shall be disposed of by placing it in the batch tank for application. Used containers shall be punctured on the top and bottom to render them unusable, unless said containers are part of a manufacturer's container recycling program, in which case the manufacturer's instructions shall be followed. Disposal of non-recyclable containers will be at legal dumpsites. Equipment will not be cleaned and personnel will not bathe in a manner that allows contaminated water to directly enter any body of water within the treatment areas or adjacent watersheds.
- All appropriate laws and regulations pertaining to the use of herbicides and safety standards for employees and the public, as governed by EPA, the California Department of Pesticide Regulation, and local jurisdictions shall be followed. All applications will adhere to label directions for application rates and methods, storage, transportation, mixing, and container disposal. All contracted applicators will be appropriately licensed by the state. The licensed applicator will coordinate with the County Agricultural Commissioner, and all required licenses and permits will be obtained prior to herbicide application.

- <u>Grazing</u>
  - Prior to introduction into sensitive habitat areas, all animals will be quarantined and fed weed-free forage to prevent the spread of invasive weeds

- <u>Prescribed Burning</u>
  - Metro fire will maintain a buffer between the burn area and water bodies or drainage into riparian zones. Buffers will be a minimum of 25 feet for 5 percent slopes, 75 feet for 5-10 percent slopes, and 250 feet for 10 percent slopes
  - Metro Fire will minimize post fire erosion into waterbodies and drainage channels through natural barriers, and proper erosion control barrier deployment.
  - Burns will take place during the spring season when the ground is wet or the fall season when plant moisture content is low.

Vegetation Treatments

This CWPP is aimed at reducing damage from wildfire to structures, critical infrastructure, and natural resources. Vegetation treatment is a proven tool to minimize damage from wildfire. One of the goals of vegetation management to reduce wildland fire hazard is maintenance of defensible space required to calm fire behavior before it nears a structure. A description of the three wildland fire hazard vegetation treatment zones and associated maintenance guidelines were developed for this CWPP and are described below.

Defensible Space Zone. This zone is located within 100 feet of any structure. The zone encompasses the space nearest the structures and is designed to reduce ignitions near structures, support structural survival during a wildfire, and reduce the chance that an ignition would spread to adjacent properties. The Defensible Space Zone is the responsibility of property owners and will continue to be promoted strongly by Metro Fire under the CWPP.

Roadside Vegetation Management Zone. This zone is located within 10 feet from pavement edge on all streets, courts, driveways, and emergency vehicle access routes. The Roadside Vegetation Management Zone is designed to assist evacuation and emergency vehicle access, to limit roadside ignitions and to provide a location where firefighter resources can be effective. The actions to comply with both the Defensible Space Zone and the Roadside Vegetation Management Zone are the same, with one exception. In the Roadside Vegetation Management Zone there must also be a 15-foot vertical clearance created by tree-trimming over the entire length of the roadway. Maintenance of this management zone is already the responsibility of local agencies and is not a discretionary action.

Community Protection Zone. This zone is located in the 100-foot band beyond the parcels with structures. This would create a 100-200-foot radius from structures of managed vegetation. The purpose of this zone is to calm fire behavior before reaching the Defensible Space Zone. Metro Fire would coordinate with applicable land owners for permission to conduct any fuels treatment on their property. Any actively irrigated crop land would not require treatment unless a fire risk is determined by Metro Fire.

Maintenance Guidelines for Defensible Space Zone. These guidelines apply to defensible space zone maintenance activities in areas around water tanks and other water storage equipment, pump houses, and its supply pumps as well as around outdoor barbeques and outdoor fireplaces. These vegetation management actions comply with the California State PRC 4291, as well as the Uniform Fire Code.

1. Remove all dead plants and dry vegetation to establish and maintain a defensible space.

    a. Within 30 feet from any structure, and under trees cut grass and weeds yearly to less than 4 inches in height no later than June 15 or as directed by Metro Fire. Cut grass may be left on site. Re-mow if late-season rains promote grass growth after the first cutting. Keep the ground, roofs, decking, and balconies free of dead leaves or other plant debris

    b. Clear leaves, bark, and humus under trees and shrubs (including vines and semi-woody species) every year. At no time should a buildup of leaves and humus exceed an average of 2 inches in depth. However, do not expose bare earth in over 50% of the site, and in any one area larger than 10 feet by 10 feet.

    c. Remove dead material that drapes over ground cover (including leaves, bark, and branches) annually, before June 15 or as directed by Metro Fire.

    d. From mature trees, remove all vines, loose papery bark, and dead branches to a height of 8 feet above the ground.

    e. Remove all dead branches from within live ground covers, vines, shrubs (including semi-woody species), and immature and landscape trees.

2. Prune trees and large tree-form shrubs (e.g., oaks, toyons) to provide clearance of three times the height of the understory plant material, or 8 feet, whichever is higher. Prune limbs that are smaller than 3 inches in diameter up to 8 feet above the ground; in young trees, prune these branches in the lower one-third of the height of the tree. Thus, if a tree is 10 feet tall, prune the lower 3–4 feet and keep the understory plant material to less than 1 foot in height. As it grows to 24 feet in height, it can achieve the 8-foot distance from the ground, and the understory plant material can reach 2.5 feet in height.) Mature trees do not need to be removed in order to achieve defensible space.

    a. Do not disturb or thin the tree canopy because these actions promote growth of more flammable vegetation.

    b. Remove all branches within 10 feet of any chimney, flue, or stovepipe. Maintain 5 feet of vertical clearance between roof surfaces and overhanging portions of trees.

    c. Branches over structures but further away than 10 feet from chimneys, and 5 feet from vertical surfaces can remain.

3. Do not locate plants under trees that are replacing ones that die, or native species planted as a mitigation measure. To avoid creating “ladder fuel situations” (in which a fire can climb from one vegetation layer to the next higher one), do not plant shrubs (including vines, semi-woody species, and all chaparral species) under trees. Instead, plant groundcover plant materials. Groundcover includes plants up to 18 inches in height and may be planted under tree canopies. If tree branches start no lower than 8 feet off the ground this understory plant material may be as tall as 2.5 feet.

4. Make sure that all landscaping and replacement plants are fire-resistant in nature. Plants that are highly ignitable and burn with intensity are prohibited. A list of fire resistant and fire-prone plants can be found at http://www.diablofiresafe.org/tolerance.html.

5. Manage individual plants or shrub masses to maintain adequate horizontal spacing. Design distinct groupings of shrubs (including vines, semi-woody species such as poison oak, all types of brush, including coyote brush, and all chaparral species) to dampen the spread of fire. Make sure that the plant groupings are small enough to provide adequate horizontal separation between groupings and to allow proper maintenance; groupings should measure no wider than two times the grouping height, or 120 sq ft. (Exception: one row of shrubs in a linear band with a maximum width of 7 ft, located at least 10 ft from the structure, need not comply with the 120 sq ft area limit.) The space between islands should be greater than three times the height of the shrubs, or 12 ft at a minimum. On emerging trees, clear a spacing of 12 ft from the edge of the canopy.

6. Hardscaping (patios, walkways, driveways, and bare dirt) and irrigated lawn should comprise at least 25% of the area immediately surrounding the structure (within first 30 feet).

7. Remove and safely dispose of all cut vegetation and hazardous refuse.

8. Chipped material can remain on the site, provided the mulch layer is no greater than an average of 2 in. in depth. Otherwise the chipped material can be spread within the Fuel Modification Zone or Roadside Vegetation Management Zone.

Maintenance Guidelines for Roadside Vegetation Management Zone. Direct maintenance activities in the Roadside Vegetation Management Zone apply to the strip of land within 10 feet of the pavement edge from both sides of the roadway. The actions to comply with both the Defensible Space Zone and the Roadside Vegetation Management Zone are the same, with one exception. In the Roadside Vegetation Management Zone, an unobstructed vertical clearance of 15 feet over the entire length of any roadway used for fire access shall be established and maintained through tree-trimming.

Maintenance Guideline for Community Protection Zone. The goal of the Community Protection Zone is to calm fire behavior before reaching the Defensible Space Zone so that it bolsters structure survival in a wildfire. This zone is a transition area in which a potentially hot fire is cooled and slowed. The vegetation removal treatments would prevent an intruding fire from reaching into the crowns of the overstory. Treatment methods within the Community Protection Zone would include alteration of vegetation through mechanical mowing and masticating, prescribed grazing, hand labor, and/or specific herbicide application. There may still be fire in this via ember-casting, but the alteration of the vegetation would have a concomitant change in fire behavior. By removing fuel volume and creating discontinuity in the distribution of fuels through alteration of the vegetation in this zone, wildfires are slowed and flame length (and associated fire intensity) is reduced.

Vegetation removal treatments would limit torching capability by minimizing the understory and mid-story fuels (shrubs and small trees). Fire intensity as measured by flame length could drop to less than four feet at the boundary between the Defensible Space Zone and the Community Protection Zone. This would facilitate direct fire attack and containment at this peripheral location.

Shrubs and young trees under oaks would be treated the same as described under the Defensible Space Zone guidelines. As in the Defensible Space Zone, spacing of shrubs from continuous stands shall be 6 feet between crowns of shrubs, and from the dripline of adjacent trees.

Standing dead trees that are isolated from other vegetation and which will not fall on buildings or structures or on roadways/driveways may be retained when pruned of branches smaller than 3 inches up to a height of 15 feet.

Timing of Implementation

This CWPP is intended to be a living document with a 20-year planning horizon. Proposed activities and fuel treatments under the CWPP would be implemented as funding becomes available.

PRIORITIZATION OF PROJECTS

Rationale for Prioritization

Prioritization weights the importance and the sense of immediacy of a project with its ease of accomplishment. Each project was suggested by an entity, or a sponsor, and each project has a beneficiary; sometimes projects have many sponsors and beneficiaries.

The long-term scale of impact adds to a project's priority. However, as important and as urgent as a project may be, several constraints may be present that influence the priority. Some projects can be done independently of another entity while other projects may require an agreement between many entities. This can affect the prioritizing of projects as the need for an agreement between entities can affect how quickly a project may start-up. Available funding, volunteer time, and/ or need and availability of a specific skill are also important factors to consider when prioritizing a project.

Priorities of Projects

The following is a description of Metro Fire's highest priority CWPP projects at this time.

COMMUNITY COLLABORATION

Conduct joint prescribed burns to bolster awareness of wildland fire behavior and response needs (Response)

FUEL REDUCTION

Support targeted compatible vegetation management in the ARP that reduces fire hazards through funding, cooperative operations. (Prevention)

Collaborate with California State Parks and County Parks on prescribed burns to increase Metro Fire's familiarity with the use of prescribed burn techniques. (Prevention and Response)

TREATMENT OF STRUCTURE IGNITABILITY

Revise the fire codes for the area within the WUI throughout the District. The code would identify defensible space and construction requirements for different site conditions, formalize inspection schedules, and identify the responsibility for fulfilling the defensible space requirements. Revisions to the code could be implemented over several years, beginning with the areas of highest risk. (Prevention)

Other projects are prioritized on whether the sponsor or proponent is able and willing to take action, follow up, and/or fund (or otherwise supply the necessary resources) to plan and implement the project.

9 ACTION PLAN

The action plan is the tool for gauging success of implementing the CWPP. The metrics to be measured, the schedule of monitoring, and the success criteria are outlined in this action plan as a method to assess level of completion, or effectiveness of the projects identified in the CWPP. The feedback mechanisms are intended to allow the evaluation of tradeoffs of the actions as they are implemented to ensure relevance and effectiveness over long term.

ROLES AND RESPONSIBILITIES

The CWPP is a living document that will be updated as projects get implemented, lessons are learned, and new partners become involved or new areas become developed. There may be a shift in priorities. Updates are planned to be done every three years.

Roles and Responsibilities for the Priority Projects

The agencies and organizations and individuals that benefit from a specific project play an important role in planning implementing and sustaining the project. Several project partners have agreed to participate in project planning and implementation:

- Sacramento Metropolitan Fire District
- Sacramento County Regional Parks
- California State Parks
- Sacramento County Planning Department
- CAL FIRE[6]

In addition, at least one homeowner association expressed an interest in several projects that directly benefit their area.

The types of roles and responsibilities vary with each project. The beneficiaries of the priority projects appears on Table 9-1. Some projects require only collaboration, others require development of treatment prescriptions, equipment, and staff time to implement on-the-ground projects. Other projects require staff time to develop training, or collect data. This same table describes the types of resources needed, which is associated to the roles and responsibilities required.

Table 9-1 Projects by Roles and Responsibilities

	Projects	Treatment Location	Primary Beneficiaries	Type of Funding Request	Funding Source
Community Collaboration					
1	Establish a framework for Metro Fire staff and staff of other stakeholder agencies to collaborate on implementing the plan (i.e., form agency-to-agency organization, to foster resource sharing, contract specifications, etc.) (Preparedness)	None	Metro Fire, CalFire, County Parks, CAF&WS, St Pks. SMUD, more	Staffing	Collaborators, landowners
2	Add the CWPP to the Amador/Eldorado Cal Fire Unit Fire Plan. (Preparedness)	None	Metro Fire, CALFIRE	none needed	none needed

6 The Amador/El Dorado Unit Strategic Plan updates provide opportunity to view wildfire protection for Sacramento County in context with neighboring Placer and El Dorado Counties. The Amador/El Dorado Unit collects information from the various stakeholders to develop their unit plan each June. The CAL FIRE unit plan will be shared with Metro Fire, who will incorporate the information into the CWPP updates

Table 9-1 Projects by Roles and Responsibilities

	Projects	Treatment Location	Primary Beneficiaries	Type of Funding Request	Funding Source
3	Conduct joint training with cooperating agencies				
	a Foster the relationship between the Sheriff's Department, cities of Rancho Cordova and Citrus Heights Police Departments, and Metro Fire to jointly address evacuation routes and procedures. (Response)	None	Metro Fire, Sheriff's Department, Rancho Cordova, Citrus Heights Police Departments	none needed	none needed
	b Collaborate and participate with California State Parks and Sacramento County Regional Parks in their existing and planned prescribed burn activities with the intention of increasing Metro Fire's familiarity with prescribed burn techniques and overall increased collaboration between these entities. (Prevention and Response). Include Minimum Impact Suppression Techniques in the training curriculum. (Preparedness)	Prairie City State Park, County Parks	Metro Fire, St Pks, County Parks, Sac City FD, Roseville FD, Folsom FD, Cosumnes FD, Wilton VFD, Latrobe FD	none needed	none needed
4	Work with citizen-based response organizations (i.e., Neighborhood Watch, Community Emergency Response Team (CERT)) to supplement law enforcement and fire department efforts. Encourage the linkage between crime prevention and fuel reduction near homes. (Preparedness and Response)	None	Neighborhood Watch, Community Emergency Response Team (CERT)	Staffing	Volunteers, interns, grants
5	Encourage the formation of a countywide Fire Safe Council. This entity could serve as an "umbrella" organization under which smaller, community-based firesafe councils would be formed when and where there is interest. The countywide firesafe council would assist in organizing and finding funding for the community based firesafe councils. (Preparedness)	None	Metro Fire, County Parks, CALFIRE, homeowners, landowners	Staffing	Volunteers, interns, grants
6	Encourage the formation of a countywide Fire Safe Council. This entity could serve as an "umbrella" organization under which smaller, community-based fire safe councils could be formed when and where there is interest. The countywide fire safe council would assist in organizing and finding funding for the community-based fire safe councils. (Preparedness)	None	Metro Fire, County Parks, CALFIRE, homeowners, landowners	Staffing	Volunteers, interns
7	Continue to hold community meetings to educate residents about their fire environment and measures they can take to minimize their risk and prepare for a wildfire (Preparedness). These meetings could include: a.A description of practices to reduce structural ignitability and to limit ignitions; b.An explanation of how common architectural features respond when ignited; c.A description of evacuation protocols and drills; and d.Information about defensible space and fire-resistant landscaping.	None	Metro Fire, homeowners, landowners	Staffing	Volunteers, interns
8	Seek grant funding to fund projects, and involve stakeholders to maximize community support for projects when prioritizing projects. (Preparedness)	None	Metro Fire, homeowners, landowners	Staffing	Volunteers, interns

Table 9-1 Projects by Roles and Responsibilities

	Projects	Treatment Location	Primary Beneficiaries	Type of Funding Request	Funding Source
9	Inform citizens of details of this CWPP through a Community Education Program. Topics would include provisions for evacuation; shelter in place; safety zones; fuels reduction; and the neighborhood provisions for fire safety, prevention, and public safety. The education program would include a Metro Fire library of information on fire safety, fire-wise landscaping, defensible space, first-aid, and other literature for distribution to citizens upon request. (Preparedness)	None	Metro Fire, homeowners, landowners	Staffing	Volunteers, interns
10	Recommend the amendment of general plans, building codes, and zoning ordinances to strengthen and to provide additional protections for wildfire while still allowing property owners to develop their land. Goals, policies and implementing actions are listed in Appendix K. (Prevention, Preparedness, Response, Recovery).	None	Sacramento County Cities of Rancho Cordoba and Citrus Heights	none needed	none needed
Fuel Reduction					
1	Gather more information about existing fire conditions and hazards in the WUI in order to better direct and prioritize fuel reduction projects	Small isolated locations			
	a Install remote automatic weather stations (RAWs) to determine fire conditions and conditions requiring red flag warnings. The automatic weather stations would be installed on existing poles or structures, or within existing developed areas, and would not be placed in areas that are highly visible. (Preparedness and Response)	None	Metro Fire	Equipment	NRCS EQUIP, corporate sponsors
	b Train Metro Fire staff how to use and interpret RAW data. (Preparedness and Response)	None	Metro Fire	Training	NRCS EQUIP, corporate sponsors
	c Establish and adopt a mechanism to notify stakeholders when a red flag warning is issued. (Response)	None	Metro Fire	Staffing	Volunteers, interns (SJSU Meteorology Dept, Desert Research Institute-UNR)
	d Evaluate and, as warranted, revise dispatch protocol for red flag warnings. (Response)	None	Metro Fire	Staffing	Volunteers, interns (SJSU Meteorology Dept, Desert Research Institute-UNR)
	e Hire an intern to map the WUI fire history to portray the locations, times, and causes of wildfire ignitions. (Preparedness)	None	Metro Fire, County Parks	Staffing	Volunteers, interns
	f Develop a fire prevention plan for areas of frequent ignitions. The plan would include fire prevention goals and strategies based on the area's fire history (i.e., children playing with matches, unattended barbecues, or warming fires), community education needs, enforcement of regulations, and/or modification of fuels to ensure they are less ignition-prone. (Prevention)	None	Metro Fire, County Parks	Staffing, contractors	Collaborators, landowners, grants
2	Work with partner agencies to conduct fuel management and augment response and/or reestablish Metro Fire work crews to treat vegetation in projects identified in this CWPP. (Prevention and Response);	Targeted locations in wildlands	Metro Fire, County Parks	Staffing, contractors	FEMA grants, collaborators, landowners, private participation, district budget

Table 9-1 Projects by Roles and Responsibilities

	Projects	Treatment Location	Primary Beneficiaries	Type of Funding Request	Funding Source
3	Use established governmental work programs such as the Sacramento Regional Conservation Corps to conduct fuel reduction projects (as detailed in the following pages) and to bolster response capabilities. (Preparation and Response)	Targeted locations in wildlands	Metro Fire	Staffing	Grant to fund district staff, collaborators, volunteers, interns
4	U Use community groups, such as Neighborhood Watch and CERT volunteers, to help with advisory inspections and to educate homeowners about defensible space and how it reduces their exposure to wildfire damage. (Prevention)	Within 100-ft of structures	Metro Fire, homeowners		Volunteers
5	Where feasible, use California Department of Correction and Rehabilitation (CDCR) work crews to treat vegetative fuels at CWPP project sites (as detailed in the following pages). (Prevention)	Targeted locations in wildlands	Metro Fire, homeowners	Staffing	Reserves, recruits, county parks collaboration
6	Develop pre-fire plans for communities within the WUI to speed emergency response and make it more effective. These plans will identify available water supply, alternative access points, structure footprints, location of locked gates, contingency zone locations, areas sensitive to dozer operations, and communication protocols. (Prevention, Preparedness, and Response)	Throughout the WUI	Metro Fire, landowners	Staffing, contractors	Grant to fund district staff, collaborators, volunteers, interns, reserves, recruits, county parks collaboration
7	Support targeted compatible vegetation management in the ARP that reduces fire hazard through funding and cooperative operations. Work to minimize impacts to sensitive habitats through establishment of best management practices and be consistent with the 2008 ARP Master Plan. (Prevention)				
	a.Manage vegetative fuels for fire hazard reduction through maintenance of existing fuel reduction areas (i.e., 100-feet of mowed area within Defensible Space Zone) located around structures adjacent to WUI areas within the ARP (see areas identified in Figure 8-1 of the CWPP). CDCR crews or SCC crews may be utilized to reduce fuel loading in areas with heavy vegetation. Seek grant funding for this work. (Prevention)	American River Parkway, within 100-ft, strategic firebreaks	County parks	Staffing, contractors	Volunteers, Collaborators, landowners

Table 9-1 Projects by Roles and Responsibilities

	Projects	Treatment Location	Primary Beneficiaries	Type of Funding Request	Funding Source
8	Expand area of fuel treatment adjacent to equestrian trails by 10 feet in selected locations and rehabilitate burn areas in Rossmoor Bar (see areas identified in Figure 8-1 as 'Fuel Reduction Area Maintenance/Enhancement, 'Horse Trail Fire Break', and ' Rossmoor Burn Areas Rehabilitation') to protect sensitive resources from the spread of fire. CDCR crews or SCC crews may be utilized to reduce fuel loading in heavy vegetation. Metro Fire would seek grant funding for this work. Activities under this fuel reduction project would include: a.Expand the area of fuel treatment along horse trails near Bannister Park. Treatments would include mowing or discing a strip to prevent fire spread and pruning of lower branches of trees to prevent torching and remove understory shrubs to minimize fire intensity. b.Use SCC crews to rehabilitate the fire area in Rossmoor Bar. This would include pruning lower dead branches of oak trees, removal and piling of dead material away from trees, and weed-whip/mow the grass under the trees so fire cannot carry and create further damage. c.Increase the firebreak width (mow or blade an area up to 30-feet wide, including the disced width) outside areas where mitigation trees were planted. (Prevention).	American River Parkway,Banister Park, Rossmoor Bar; within 100-ft, strategic firebreaks by selected equestrian trails.	County Parks	Staffing, contractors	Volunteers, Collaborators, landowners
9	Encourage the American River Coalition to establish a volunteer program to focus on activities that remove or prune vegetation in the area behind residences within the ARP, especially those residences south of the river. (Prevention and Preparedness)	American River Parkway, within 100-ft, strategic firebreaks, by equestrian trails	County parks	None needed	Volunteers
10	Renew and update the fuel reduction work done in 2010 and 2012 in Ed Levy area and elsewhere in the ARP (see Figure 8-1 of CWPP)	American River Parkway, Ed Levy area	County parks	Staffing, contractors	Volunteers, Collaborators, landowners
11	Coordinate with Caltrans and County Public Works on implementing currently authorized roadside fuel reduction treatment projects that would include mowing grass, shrub removal, and tree pruning within road right-of-ways. (Preparedness)	Roadsides	Caltrans, Sac County Public Works	Staffing, contractors	FEMA grants, collaborators, landowners, private participation, district budget
12	Treat high fire hazard areas (determined by estimated flame length) near structures with establishment of a community protection zone with associated firebreaks. Figure 8-2 of the CWPP identifies approximate location of proposed subdivision fuel treatment areas. (Preparedness). Give the highest priority to projects that: a.Reduce hazardous fuels, which if left untreated, would generate high intensity fire adjacent to structures or communities at risk, or produce large quantities of burning embers that would threaten communities; b.Reduce hazards along strategic emergency access and evacuation routes, or other critical infrastructure; and c.Reduce impacts of wildfire to sensitive high value ecosystems and high use recreational areas by reducing fire intensity and or increasing chances of fire containment before reaching the area	specific areas of flame length within 100-ft of structures	Landowners	Staffing, contractors	FEMA grants, collaborators, landowners, private participation, district budget
Treatment of Structural Ignitability					
1	Develop a means to enforce defensible space on private property in the WUI, as required by Public Resources Codes 4291. (Preparedess)	Within 100-ft of structures	Metro Fire	Staffing of authorized inspectors	FEMA grants, district budget

Table 9-1 Projects by Roles and Responsibilities

	Projects	Treatment Location	Primary Beneficiaries	Type of Funding Request	Funding Source
2	Gather more information about existing structural conditions and risks in the WUI in order to better direct and prioritize projects addressing structural ignitability. (Preparedness)				
	a Seek funding to support staff collection of structural data to support parcel-based risk assessment (Preparedness)	None	Metro Fire	Staffing, contractors	Grant to fund district staff, collaborators, recruits, reserves, volunteers, interns
3	Hire additional staff to conduct defensible space inspections and inventory of wildfire risk Inspectors would determine whether the vegetation on the parcel is in compliance with the adopted weed abatement ordinance and the presence of risk factors such as vegetation condition, structure characteristics and parcel attributes (See Section 7 for a detailed discussion of risk factors). (Prevention)	Within 100-ft of structures	Metro Fire	Staffing	Volunteers, Interns, Student Conservation Assn
4	As grant funding becomes available, administer a program that funds replacement of wood shake roofs with non-combustible roofing in the areas most at risk. (Prevention)	Gold Run, Rancho Murieta, Areas of Carmichael in WUI	Metro Fire, homeowners	Hand labor, designs, equipment, materials	FEMA Grants, corporate donations, private participation
5	As grant funding becomes available, retrofit the structural components, building materials, and landscaping of older Metro Fire stations. (Prevention)	Station 33, other Metro Fire Stations	Metro Fire	Hand labor, designs, equipment, materials	FEMA Grants, corporate donations, BSA

Several community leaders play a vital role in the CWPP by approving the document. By doing so, these leaders have approved and endorsed the planning process and the initial set of projects that stakeholders have identified. These include Metro Fire, CAL FIRE, a representative from the Sacramento County Board of Supervisors, and the Mayor of the City of Citrus Heights and City of Rancho Cordova.

FUNDING SOURCES

Many of the projects do not require funding, but are sustained instead through collaboration, volunteerism, and self-interest of parties involved. However, many projects require funds to hire staff, purchase equipment, or increase training, and to pay for vendors to conduct work and perform services.

The use of interns, reserves, and recruits offers ways to collect data, analyze conditions, and develop reports. This type of labor is of lower cost, and may be a viable option for some projects. Barriers to this type of assistance include the need for liability insurance, so organizations that already have that insurance for interns and volunteers should be pursued. Examples of these are the Boys Scouts of America, Student Conservation Association, Americorp, some universities and colleges (U.C. Davis, the Desert Research Institute of the University of Nevada Reno, and San Jose State University). Many of the universities and colleges are best suited for collection and analysis of weather information, while other groups might be best suited for parcel-based risk data collection. The Volunteers in Police Service organize and screen volunteers that could be used to handle private data, and perform other duties. Groups associated with parks, homeowner associations and environmental groups might be useful for tailored fuel management work that doubles as restoration activities. Opportunities to Treatment prescriptions that serve both purposes should be developed.

Funding for wildfire mitigation projects come from a variety of sources such as federal, state or corporate grants, donations, property tax, or department budgets. Each funding mechanism has unique requirements, strengths, and weaknesses. Some are best suited for one-time expenditures such as capital improvements; other are suited for ongoing maintenance activities. The "strings" attached to each mechanism should not be overlooked.

Funding sources require that projects be developed through collaborative planning (e.g., the Healthy Forest Initiative requirement for a Community Wildfire Protection Plan). Some funding sources are relatively easy to obtain, while others require an intricate application process, or include administrative burdens associated with monitoring how funds are spent and complex reporting requirements. A local community or homeowner association may be willing to fund solutions that add value and are worth their cost, but may only fund projects with citizen committee oversight, or if connected to other efforts the community favors. The sustainability of funds is another key difference.

Through implementation of the CWPP, Metro Fire will develop a "funding quilt," made up of a patchwork of mechanisms to cover fire mitigation projects. Multiple sources provide greater stability, more funds, increased continuity, more stakeholders with greater buy-in, and the ability to expand the scope of work. Source of funding anticipated include:

- **Department funding.** Budgets for fire departments or fire districts often cover education, enforcement, and capital improvements. If the Department so chose, selected projects could be funded through the regular Department funding mechanism.

- **Private grants and donations.** Private funds and volunteerism usually play a large role in the implementation of community fire plans. Large national businesses often have grant programs. Local nurseries, contractors, and small businesses are often key partners. Typical partnerships include:

    1. A private-public partnership can be created formally, happen organically, or can be regulated around a specific issue or problem

    2. Formal partnerships may take the form of FireSafe councils or homeowner associations that agree to work on fire safety in a community in conjunction with local government, citizens, and businesses; they may fund their work through dues, gifts, or in-kind contributions, or seek funding from outside sources

    3. Informal partnerships usually involve voluntary participation with no money changing hands, and little recognition of common goals (when things go well, peer pressure holds a community to an accepted standard); informal partnerships may take the form of local agencies, citizens, and businesses each taking care of their own lands and funding the work themselves; a formal partnership may occur when the informal relationship no longer meets the participants' needs

    4. Regulated partnerships include private property owners required to comply with state or local regulations such as weed abatement or defensible space ordinances (often fire departments take the lead with inspections and notifications of non-compliance); to abate effectively, a program must have teeth, but funding these efforts can be difficult, as the regulated usually do not wish to fund enforcement. Regulations happen when informal or formal partnerships break down and no longer meet the community's needs.

- **Federal and State Aid Programs.** Federal funding is distributed through many avenues, and most federal grants can be researched electronically. Commonly-used major programs for fire safety fund mitigation are the National Fire Plan and the Healthy Forest Restoration Act. More recently major grants have been provided through the Federal Emergency Management Agency (FEMA) and the U.S. Fire Administration. Many grants are extremely competitive, with requests for funding far exceeding available funds, while others have a specific focus.

- **Assistance to Fire Departments.** Three primary federal funding programs that provide assistance to fire departments vary on grant size, non-federal match requirements, the population size a fire department serves, and the location in relation to the funding agencies' lands. They typically provide funding for organizing, training, prevention materials, and equipment to protect the health and safety of the public and firefighting personnel.

  - **Rural Fire Assistance (RFA)** supports the capabilities of rural and volunteer fire departments located near or on Department of Interior lands, with awards up to $20,000 for training, equipment, and fire prevention. RFA is administered by one of four agencies: Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), U.S. Fish and Wildlife Service (USFWS), and National Park Service (NPS).

  - **Assistance to Firefighters** through FEMA includes the overall Assistance to Firefighters Grant (AFG) and the Fire Prevention and Safety Grant Program. AFG is limited to fire departments. Fire Prevention and Safety Grants are open to a wider range of organizations.

  - **FEMA Disaster Mitigation Programs** include two programs: Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation Program (PDM).

    1. HMGP funds are available to states after a disaster has been declared to mitigate future risk from any type of disaster (amounts available are linked to the total emergency funds); a state mitigation plan must be approved prior to the disaster declaration.

    2. The PDM facilitates cooperation between state and local authorities with funds awarded competitively for both planning and project implementation activities at the state and local level, as a subgrantee (the extent to which this program will address wildfire compared to the more traditional agency focus of hurricanes, floods, and earthquakes remains to be seen).

- **Community Assistance State Fire Assistance (SFA)** includes a supplemental appropriation allocation through the National Fire Plan, in addition to a regular appropriation distributed by formula to state foresters through the USDA Forest Service. These funds can be used to plan and implement hazard mitigation projects, including fuel reduction, prevention and mitigation education, and community hazard reduction. The funds are competitive and available nationwide, with 35 percent distributed among the states to meet firefighting preparedness and safety needs.

- **National Conservation of Resources Services (NCRS)** implements a grant program aimed at promoting effective and safe land management practices on private lands. Grants are provided for equipment, planning and management, and reward collaboration and cooperation between adjacent landowners. Fire hazard reduction that increases habitat and watershed value is more likely to be funded.

- **State Aid Programs.** Many states administer grants using monies from the National Fire Plan budget and other sources. State Foresters play an important role in distributing grant funds aimed at assisting private landowners. The following programs are under the State and Private Forestry branch of USDA Forest Service, the Natural Resources Conservation Service, and the Cooperative State Research, Education, and Extension Service:

  - Cooperative Forestry (includes Landowner Assistance Programs) such as Forest Stewardship Program (FSP); Stewardship Incentives Program (SIP); Watershed Forestry Initiative; Forest Legacy; Urban and Community Forestry (U&CF); Economic Action Program (EAP).

  - Forest Health Management: Federal Lands Forest Health Management and Cooperative Lands Forest Health Management

  California Forest Stewardship Program provides technical and financial assistance to communities and private landowners, includes a number of programs that can be related to fire safety. The California

Forest Improvement Program (CFIP) is a cost share for forestry, watershed, and riparian protection and enhancement. The Vegetation Management Program (VMP) will have CALFIRE conduct a prescribed burn on private land to control unwanted brush and other vegetation that creates wildfire hazards. The Western State Fire Assistance Competitive Grant Program provides a forum for state agencies to submit grants on behalf of cooperators, partners, or clients.

- **Private Foundations.** Several private foundations offer small grants that can be used to reduce fire hazards, increase community capacity to collaborate, and promote environmental awareness and action. Some grants are from national corporations, such as the Urban Land Institute's ULI Foundation, that have instituted Community Action Grants. Applicants must be ULI members or part of a ULI District Council. Other local private foundations donate to local projects, and typically to a local non-profit organization (such as a nascent firesafe council).

MONITORING AND FEEDBACK PROCEDURES TO CONFIRM SUSTAINABILITY

Performance Metrics for CWPP

The following framework offers strategies to monitor, evaluate, and adapt the elements of the CWPP (Institute for a Sustainable Environment 2008).

Monitor what matters. Partners should identify key goals and objectives and make decisions to monitor what is most important to the long-term sustainability of their CWPP.

- **Track accomplishments and identify the extent to which CWPP goals have been met**. This might include development of "success stories."
- **Examine collaborative relationships** and their contributions to CWPP implementation.
- **Identify actions and priority fuels reduction projects** that have not been implemented and determine why.
- **Set a course for future actions** and update the plan.

Program performance indicators will assist Metro Fire in tracking progress towards key program goals and assessing the overall success of the program and various program elements. In selecting Key Performance Indicators (KPIs), it is critical to limit them to those factors that are essential to achieving program goals. It is also important to keep the number of KPIs small, just to keep everyone's attention focused on achieving the same KPIs. However, since many program goals, and therefore measurement, are long term, it is also necessary to identify short-term measures that feed the long-term results and impacts. Therefore, three levels of measurement are suggested: impact, result and activity. Each KPI is also categories as a measurement of change in the built, natural, response, and/or social environment.

- **Impact**: At the highest or most conceptual level, long term impact of the program is measured by a reduction in wildfire losses (e.g., reduction in deaths, injuries, property or environmental loss, suppression cost, etc.).
- **Desired Results**: At a slightly lower level, intermediary impact is measured by the degree to which the culture supports a reduction in wildfire losses (i.e., increase in actions to reduce risk by individuals and collaborative partners). In theory, if the desired results are achieved, the impact will be achieved. Progress toward program results, based on this theory, can be measure in terms of the actions taken by individuals and community groups to reduce their risks. Even when actions are not yet demonstrated, progress toward taking action can be measure in terms of community sentiment and belief systems.

- **Outputs:** At the lowest level of detail, outputs and activities are measure by the degree to which they contribute to the desired results, e.g., increase in specifically targeted actions by targeted individuals and groups. In theory, if the output measures are positive, the desired results will be achieved.

The ability to measure program performance at these three levels allows for oversight, management and evaluation of the Metro Fire CWPP outputs individually as well as the effectiveness of the program as a whole.

There are four CWPP program goals that will be monitored. These goals are not prioritized, as they all work together towards achieving Metro Fire's mission. The first immediate and ongoing goal is to protect human life and reduce the loss of property, critical infrastructure and natural resources. The second goal is to have the community evacuate safely with minimal loss of life and injuries during a wildfire. A long-term and continuing goal is to develop partnerships, with the community taking a lead role and Metro Fire acting as support. The fourth goal is to achieve culture change so that the community understands, owns, and actively mitigates risk.

Each program goal has a way to gauge its impact. The impact of each program must be described in very different ways, since for example, the impact of protecting the safety of lives and property is described in different ways from fostering culture change in the community in regards to risk.

The goal of protecting life, property, critical infrastructure and natural resources has the most ways of describing the impact of the program. The impacts are measured in terms of the number of deaths and injuries, the amount of property and infrastructure loss per capita, environmental loss (percent of acres burned below damaging threshold), cost of suppression (percent reduction from 5-year average), secondary losses (percent reduction from 5-year average), and degree of fire control (duration of fire control event, acres burned, resources committed).

The goal of having the community evacuate safely is described via the number of deaths and injuries during the event.

- The goal of developing partnerships with the community is seen through the level of effort that is taken by the stakeholders. For example, when the stakeholders are leading with moderate to high support from Metro Fire, the goal is achieved. The five levels of effort on which this impact is rated are:

1. Metro Fire is leading with minimal to no partner support
2. Metro Fire is leading with moderate to high partner support
3. Partner and Metro Fire are co-leading
4. Partner leading with moderate to high Metro Fire support
5. Partner is leading with minimal or no Metro Fire support

The goal of changing the culture of the community to one where they understand, own and actively mitigate risk is described in how well the community actively protects themselves from loss due to wildfire and relies less heavily on the resources of Metro Fire.

Each impact is measured in some way. Most impact measurements use information already collected in the risk assessment database. For example, the measurements to address property loss in terms of dollars per capita, are measured in a variety of ways, including the percent increase in the reduction of structural ignitability hazards. This measurement includes the total number of homes and percent toward 100% of structures that have ignition-resistant roofs, eaves and vents, siding, doors and windows, and decks patios and fences. All these are reported via the Metro Fire risk assessment database. The types of measurements associated with each impact are listed in Appendix K.

Please see Appendix L for recommended method to track KPIs for the CWPP.

10 REFERENCES

AECOM. 2011. *Final EIR – City of Citrus Heights General Plan Update and Greenhouse Gas Reduction Plan*.

California Department of Toxic Substances Control (DTSC). 2014. EnviroStor Database. Available at: <http://www.envirostor.dtsc.ca.gov/>. Accessed April 24, 2014.

Communities Committee, National Association of Counties, National Association of State Foresters, Society of American Foresters, and Western Governors' Association. 2004. Preparing a Community Wildfire Protection Plan, *A Handbook for Wildland–Urban Interface Communities*.

County of Sacramento. 2010. Final EIR for the 2030 General Plan Update. April 2010.

Foote. 1991. Also A.G. Wilson, SRI 1974, and more recent studies.

Institute for Ecological Health, The. Undated. *Grappling with Growth and Sprawl in the Six County Region*. Available at: http://www.instituteforecologicalhealth.org/sacramento_region.html. Accessed April 28, 2014.

Institute for Ecological Health, The. 2008. Evaluation framework adapted from: Community Wildfire Protection Plan Evaluation Guide. Prepared by Resource Innovations, Institute for a Sustainable Environment. August 2008. University of Oregon. Available at: <csfs.colostate.edu/pdfs/eval_9-8-08_web.pdf>. Accessed December 22, 2013.

National Fire Protection Association (NFPA). 2014. The basics of defensible space and the "home ignition zone." Available at: http://www.firewise.org/wildfire-preparedness/be-firewise/home-and-landscape/defensible-space.aspx. Accessed April 2, 2014.

National Weather Service (NWS). 2010, August. Available at: <http://www.wrh.noaa.gov/sto/CLISAC2010.pdf>. Accessed April 28, 2014.

Sacramento Metropolitan Air Quality Management District. 2013. Draft GHG Threshold of Significance Concepts. Available at: <http://www.airquality.org/lutran/20131113WorkshopHandout.pdf>. Accessed May 20, 2014.

Sacramento Metropolitan Fire District. 2013. AF&S Grant Application to Federal Emergency Management Agency.

SMAQMD. *See* Sacramento Metropolitan Air Quality Management District.

State of California Department of Conservation. 2012. California Important Farmland Finder. Available at: <http://maps.conservation.ca.gov/ciff/ciff.html>. Accessed May 21, 2014.

State Water Resources Control Board. 2014. Fire Management and Fire Management Practices. Available at: <http://www.waterboards.ca.gov/water_issues/programs/nps/encyclopedia/2g_fire_mgmt.shtml>. Accessed May 9, 2014.

Western Regional Climate Center (WRCC). Undated. Annual Temperature Summary for the period of 1949—2006. Available at: <http://www.wrcc.dri.edu/htmlfiles/citycomptemp.html>.