

# Sacramento Metropolitan Fire District Community Wildfire Risk Assessment Framework

## 1.1 Program Objective

The Community Wildfire Protection Plan (CWPP) will combine wildfire planning and mitigation with community development and ongoing maintenance activities. The CWPP will develop a decision support and situational awareness capability that will allow the Sacramento District (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. During preparation of the CWPP, will collect up-to-date environmental and community data to support Metro Fire operations from planning to response and recovery.

The key elements of the project include:

- 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.
- Data collection and analysis consisting of baseline community development information, aerial imagery, and emergency response information.

## 1.2 Outcomes

The program will support the following outcomes:

- A community-wide understanding of the risk of wildfire and the benefits of combined individual and community-level mitigation actions.
- A process to quantify improvements in community resiliency over time to include tracking planned and completed mitigation projects and the success of community outreach.
- The integration of pre-event mitigation planning and incident response in the event of a wildfire event.

## 2 FRAMEWORK

### 2.1 Hazard and Risk Definitions

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:

#### METRO FIRE DEFINITION OF HAZARD

*“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.”*

- HAZARD - a condition or element that provides a source of ignition or contributes to spread and severity of fire
- 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.
- A RISK ASSESSMENT involves identifying the risk impact and risk perception in order to support decision making and planning.

### 2.2 SMFPD Wildfire Risk Assessment Framework

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

- Fuels Mitigation,
- Public Outreach and Engagement, and
- 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 support 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 (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:

- Identification of Values at Risk – Identification and description of the community valued assets that may be exposed to the base hazard.

- 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.

## 2.2.1 Values at Risk

In order to define the community assets and values that may be ‘at risk’ for exposure to wildfire, Metro Fire staff reviewed the objectives of the CWPP Program, gained insight from stakeholders across the community, and reviewed possible community actions and behaviors that the Program could promote.

### 2.2.1.1 Objectives

The Wildfire Risk Assessment Framework will support 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 wildland fire 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 wildland fire 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

### 2.2.1.2 Community and Individual Actions

The Wildfire Risk Assessment Framework was developed to support decision making and promote action in the following areas:

- **Provide a common, shared view of the wildfire risk**
  - Adoption of a shared view of wildland fire hazard and risk
- **Support Fuels Mitigation**
  - Homeowner brush clearance and fuel mitigation
  - Community fuel reduction
  - Appropriate wildland resource management
- **Encourage Public Outreach and Engagement**
  - Measurable implementation benefits and costs of CWPP
- **Improve Structure Fire Prevention**
  - Defensible space
  - Community fuel reduction zones
  - Structural modifications/retrofits
  - Community evacuation plans/drills

### 2.2.1.3 Community ‘Values at Risk’

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

Framework:

- Life safety
- Insurable properties and developed areas
- Critical infrastructure
- Environmental resources

### 2.2.2 Contributing and Mitigating 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. In order to accomplish this, Metro Fire and the project team described a variety of contributing and mitigating factors 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 Wildfire CWPP Program 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.

**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.

- Fire behavior rating of parcel
- Fire history (2000+)
- Slope aspect of parcel
- Proximity to large parcel of Wildland vegetation
- Potential Future Addition
  - 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.

**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 wildland fire hazard. These attributes include:

- Roof material
- Other structure features (external walls, eaves, windows, vents, deck, underside of deck)
- Defensible space presence
- Position of structure on slope

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

- Access Road Width

- Response Attributes (Metro Fire drive time compliance with District standards)
- Water Sources (fire hydrant access)
- Pre-Fire Plans (Metro Fire pre-fire planning)

**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 % 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
  - 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
  - Interested in joining a FireSafe Council
  - Interested in leading a FireSafe Council

The below tables described the draft attributes for each Contributing and Mitigating Factor.

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	Wildland Fire Pre-Plan	
Siding			
Windows and doors			
Eaves, overhangs, vents			

## Risk Results

The below table depicts the Risk Rating Values that each parcel will be assigned.

High Fire Risk	High	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	High-Moderate	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	Moderate	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	Reduced	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	Low	Your home has the greatest potential for survivability during a hostile wildfire.