
Fire Protection Plan

Suisun Expansion Project Specific Plan

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Prepared for:

CALIFORNIA FOREVER

Contact: Anye Spivey

Prepared by:

DUDEK

1810 13th Street Suite 110
Sacramento, California 95811

Contact: Austin Ott

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
AMSL	Above Mean Sea Level
APN	Assessor's Parcel Number
CAL FIRE	California Department of Forestry and Fire Protection
Caltrans	California Department of Transportation
CBC	California Building Code
CCR	California Code of Regulations
CGC	California Government Code
CEQA	California Environmental Quality Act
CFC	California Fire Code
EMS	Emergency Medical Service
FAHJ	Fire Authority Having Jurisdiction
FDIP	Fire Department Infrastructure Plan
FHSZ	Fire Hazard Severity Zone
FMZ	Fuel Modification Zone
FPP	Fire Protection Plan
FRAP	Fire and Resource Assessment Program
GIS	Geographic Information System
HFHSZ	High Fire Hazard Severity Zone
IBHS	Insurance Institute for Business and Home Safety
IFC	International Fire Code
LRA	Local Responsibility Area
MFPD	Montezuma Fire Protection District
MPH	Miles Per Hour
NFPA	National Fire Protection Association
NOAA	National Oceanic and Atmospheric Association
NWS	National Weather Service
OSFM	Office of the State Fire Marshal
PRC	Public Resources Code
RAWS	Remote Access Weather Station
RFW	Red Flag Warning
SCFD	Suisun City Fire Department
USDA	United States Department of Agriculture
WUI	Wildland Urban Interface

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Executive Summary

The Suisun Expansion Project would expand the boundaries of Suisun City (City) through annexation of unincorporated Solano County land both within and beyond the City's existing Sphere of Influence. Within the annexation area, the Project would establish the Suisun Expansion Area Plan (Area Plan) and the Suisun Expansion Specific Plan (Specific Plan). This Fire Protection Plan (FPP), unless otherwise noted, provides a detailed analysis of the Specific Plan, including summaries of the regulatory and environmental settings, related wildland fire risk analysis with wildfire behavior modeling, code compliance analysis, evacuation analysis, and potential impacts on the Suisun City Fire Department (SCFD). Further, this FPP provides requirements, recommendations, and measures to reduce the risk and potential impacts to acceptable levels, as determined by the SCFD.

This FPP was prepared in consideration of the requirements of the California Environmental Quality Act (CEQA), including the requirement to analyze whether the Specific Plan would expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires. This FPP evaluates and identifies the potential fire risk associated with the Specific Plan's land uses and identifies requirements for water supply, fuel modification and defensible space, emergency access, building ignition and fire resistance, and fire protection systems, among other pertinent fire protection criteria. The purpose of this FPP is to generate and memorialize the fire safety requirements and standards of the SCFD along with measures based on the unique conditions present within the Specific Plan area, its intended use, and its fire environment.

The Specific Plan is an urban-design, master-planned community proposed for development within 15,737 acres. The Specific Plan will include residential, commercial, industrial, civic, recreational, and other land uses common to cities. The Specific Plan intends to implement unique project features such as pedestrian friendly roadways and mixed-use districts to provide residents with opportunities for work, retail shopping, and recreation without the need for personal automobiles. The Specific Plan area is located in Solano County, California along the north side of State Route 12 (SR-12), east of Fairfield and west of Rio Vista on land that has not previously been developed. The Specific Plan area is relatively flat with slight rolling hills and an approximate elevation variation of 100.

Fire service for the Specific Plan would be provided by the SCFD. A Fire Department Infrastructure Plan (FDIP) has been prepared that analyzes the projected number of personnel, apparatus, and stations that will be necessary at complete build out of the Specific Plan to meet the emergency response demands of residents, workers, and visitors. Due to the size of the Specific Plan area, 18 new fire stations are proposed and will be built to keep pace with development of the Specific Plan. The fire stations will be located to meet or exceed the NFPA 1710 response time goal of a 4-minute travel time. The quantity of fire stations will be adequate to ensure desirable unit hour utilization, so that no emergency response unit is on calls for more than 30% of their shift (Fitch & Associates, n.d.). An emergency response unit is defined as a pre-determined number of firefighters and/or emergency medical responders assembled into a team that responds to emergency incidents on an emergency response vehicle. This FDIP will be implemented and adjusted by key decision makers as the Specific Plan build-out progresses.

Due to recent updates of the state's fire hazard maps, portions of the Specific Plan area have been designated by the California Department of Forestry and Fire Protection (CAL FIRE) as Fire Hazard Severity Zones within a Local Responsibility Area (LRA). A total of 725 acres have been designated as Moderate Fire Hazard Severity and a total of 11,278 acres have been designated as High Fire Hazard Severity. The 2007 version of the fire hazard mapping did not designate any fire hazard severity zones within the Specific Plan area. Fire Hazard Severity Zone

designations are based on topography, vegetation, and weather, among other factors. CAL FIRE identifies hazard, not risk, meaning that although portions of the Specific Plan area are within a designated Fire Hazard Severity Zone, actual wildfire behavior and the associated risk can be mitigated through the application of current codes, regulations, and standards. In Local Responsibility Areas, development in Very High Fire Hazard Severity Zones (VHFHSZs) requires compliance with wildfire mitigation codes. The Specific Plan area does not have any VHFHSZs but has chosen to provide construction materials and methods along with defensible space vegetative fuel modification and management in accordance with Very High Fire Hazard Severity Zone requirements.

An analysis of fire history in the Solano County area found that no fires greater than 10 acres have been reported within 10 miles of the Specific Plan area since CAL FIRE began collecting data in the early 20th century. The annexation area does have a potential wildland-urban interface (WUI) fire area, with grasslands and agricultural fields around the perimeter of the Specific Plan area. However, as long as the grasslands continue to be grazed and agricultural fields continue to be managed and harvested as proposed by this FPP, wildfire hazard in these areas would be considered low. Because no portions of the Specific Plan area have been designated as a VHFHSZ, there is currently no requirement to comply with defensible space vegetative fuel management provisions of Chapter 49 of the California Fire Code or the materials and construction methods for exterior wildfire exposure provisions of Chapter 7A of the California Building Code. However, it is expected that as codes become more stringent over time, and due to the buildout timeline of the Specific Plan, future fire and building codes will require defensible space vegetation fuel management and construction materials and methods for exterior wildfire exposure for development within the Specific Plan area. Therefore, the Specific Plan is designed to comply with these standards. Further, the Specific Plan has voluntarily established maintained peripheral roadways and open space that provide a buffer between the Specific Plan area and adjacent open spaces or agricultural lands. The inclusion of this roadway and open space system in the Specific Plan far exceeds defensible space requirements for projects located in VHFHSZs.

As determined during the analysis of the site and its fire environment, the land within the Specific Plan area in its current condition prior to development, and depending on the time of year, may include characteristics that, under adverse weather conditions, could have the potential to facilitate fire spread. The open spaces around the Specific Plan area are characterized by agricultural fields and grazed grasslands, representing low fire hazard conditions. Out of an abundance of caution, the fire behavior modeling conducted in support of this FPP was evaluated for two scenarios.

First, modeling was conducted to evaluate fire behavior if the grasslands were not grazed and the agricultural lands were not managed or harvested and left to dry out at full fuel depth/height. This scenario presents the most extreme fire conditions for the annexation area. While the flat topography would not amplify the fire behavior, the Diablo winds from the northeast could create flame lengths of up to 18.5 feet with a fireline intensity of 9,048 BTU/ft-sec.

Second, modeling was conducted to evaluate fire behavior in existing and historical conditions of managed/harvested fields and grazed grasslands. In this more realistic scenario, flame lengths may still reach up to 18.5 feet and fireline intensities may reach up to 9,048 BTU/ft-sec, but only in those areas that are historically unmaintained/ungrazed, which is a small portion of the surrounding area. For the majority of areas that are harvested and grazed, flame lengths would only reach up to 4 feet in height and fireline intensities would reach up to 67 BTU/ft-sec. Such conditions could be easily managed by fire suppression units proposed by the Specific Plan or would burn out without firefighting intervention when the flames meet the code-exceeding fuel breaks provided by peripheral roadways.

In the extreme worst-case scenario, where surrounding agricultural fields and grass lands are completely unmaintained and left to dry out/cure at full fuel depth, modeled flame lengths reach up to 18.5 feet. The maintained open space surrounding the Specific Plan area is up to half a mile (2,640 feet) in width, which would be more than adequate to protect the development within the Specific Plan area from fires with 18.5-foot flame lengths. Should a fire burn into or start within the maintained open space, the roadways surrounding the Specific Plan area provide an additional level of protection. The 200-foot wide roadways would be sufficient to protect the development within the Specific Plan from open space fires, should they occur. Lastly, the Specific Plan provides a mandatory code-exceeding 200-foot vegetative fuel modification zone (FMZ) around the entirety of the Specific Plan area as a redundant layer of fire protection that complements the aforementioned roadways and maintained open space.

In addition to fire behavior modeling, fire progression modeling was also conducted in support of this FPP to evaluate the susceptibility of the region to the spread of wildfire. Three realistic off-site ignition locations were selected and a modeled fire was evaluated from each location under the worst-case wind conditions. Assuming the annexation area is maintained as it presently is through grazing and crop cultivation, wildfire spread stopped short of the Specific Plan area following both the 20-year plan and full Specific Plan buildout, demonstrating the effectiveness of grazing and agricultural land uses in modifying surface fuels to halt fire progression. Fire progression was also modeled using worst-case conditions assuming the agricultural areas and grasslands were no longer managed and allowed to dry out at full fuel depth/height. Under these conditions, the modeled fire reached the Specific Plan open spaces and vegetative fuel modification zones in a minimum of 50 minutes, but fire progression was stopped by the open space and the outer edge of the vegetative fuel modification zones.

In addition to the code-exceeding vegetative fuel modification zones and fuel modification equivalent areas surrounding the Specific Plan area, the Specific Plan will comply with all applicable code requirements, including an amended fire code specifically created for the Specific Plan that is more stringent than the California Fire Code as currently adopted by the SCFD. This is accomplished, in part, by requiring fire sprinklers in almost all building occupancy types greater than 1,000 square feet and requiring more than one point of access to nearly every building (all newly constructed residential units are already required by code to include fire sprinklers). The current fire code was adopted by Suisun City in 2023; a new fire code, typically more stringent than the previous edition, is adopted every three years. As the Specific Plan is built out, it will be required to comply with the more stringent requirements of subsequent code editions.

Large and increasingly destructive wildfires have forced many Californians to evacuate when an encroaching wildfire threatens their community. Due to the design features of the Specific Plan, and the low wildfire risk in the area, wildfire exposure is expected to be minimal. This would reduce the likelihood of evacuations being ordered due to wildfire impacts. It is likely that public safety officials would opt to shelter residents, workers, and visitors in place or direct an on-site relocation in the event a wildfire in the region is advancing toward the annexation area. In summary, while the natural fuel beds adjacent to the Specific Plan area do pose a potential for a wildfire event if not maintained, grazed, or cultivated as they historically have been, the hazard is low and the risks of loss or injury to property or people are also low. This is supported by the lack of recorded wildfires greater than 10 acres within the Specific Plan area, according to CAL FIRE, dating back to the early 1900s. If, in a worst-case scenario, the surrounding agricultural and grassland areas were unmanaged and allowed to grow to full height and dry-out, thereby presenting a suitable wildfire fuel, the 200-foot vegetative fuel modification zone would create a fuel break that is more than ten times wider than the modeled worst-case scenario flame lengths. These findings, paired with the construction and staffing of additional fire stations and adherence to all current and future applicable fire and building codes, result in a project that does not increase the likelihood of a wildfire or expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires.

Table 1. Specific Plan Fire Safety Features

Feature No.	Description
1	Construction Fire Prevention Plan. A detailed Construction Fire Prevention Plan (CFPP) shall be prepared for the Specific Plan and submitted to the Suisun City Fire Department for review and approval. The CFPP shall designate fire safety measures to reduce the possibility of fires during construction activities, including fire watch during hot work such as welding and heavy machinery activities, spark arresters on all equipment, water supply via hose lines attached to hydrants or a water tender pursuant to SCFD requirements, red flag period restrictions, and mandatory on-site fire resources.
2	Code Exceeding 200-foot FMZ. Throughout construction and eventual occupancy, a 200-foot fuel modification zone that exceeds the CAL FIRE and SCFD requirement by 100 feet will be provided and maintained. The Open Space land uses provide additional protection in addition to the 200-foot vegetative fuel modification zone.
3	Pre-Combustible Construction Site Improvements. Prior to bringing lumber or combustible materials related to building construction into the Specific Plan area, site improvements within the active development area shall be in place, including utilities, operable fire hydrants, and an approved, temporary roadway surface suitable for fire apparatus access, along with vegetative fuel removal in accordance with defensible space requirements.
4	Proximity to Fire Stations. The planned fire stations will meet or exceed 4-minute travel times as recommended by NFPA 1710. The Specific Plan is committed to providing adequate firefighting personnel and apparatus as defined in the Fire Department Infrastructure Plan. Further, the Delta Conservation Fire Camp is adjacent to the Specific Plan area and able to assist with fire suppression as a mutual aid resource.
5	Automatic Interior Fire Sprinklers. The CFC requires all residential buildings to have fire sprinklers. Per SCFD Fire Code, all structures greater than 5,000 square feet are required to have a fire sprinkler system installed. This is far more stringent than the requirements in the CFC. This FPP is recommending that the Fire Code as adopted by SCFD further enhance building protection by requiring all structures greater than 1,000 square feet to have a fire sprinkler system installed.
6	Roadside Landscaping. All roadways surrounding and within the Specific Plan area will be paralleled by maintained landscaping or other non-combustible surfaces, reducing the probability of roadside ignition.
7	Fire Apparatus Access. The entire Specific Plan is designed with code-compliant fire access in mind and will comply with adopted codes and standards.
8	Water Availability. Water capacity and delivery will provide for a reliable water source capable of supplying the required fire flow in volume and time duration for all fire suppression operations. Water supply will be consistent with the adopted Fire Code for the number and spacing of fire hydrants. Internal waterlines will also supply sufficient fire flows and pressure to meet the demands for required on-site fire hydrants and interior fire sprinkler systems for all structures.
9	Undergrounded Electrical Utility. Electrical service for the Specific Plan will be undergrounded to prevent risk of ignition from overhead or exposed power lines.

1 Introduction

This Fire Protection Plan (FPP) has been prepared for the Suisun Expansion Project Specific Plan (Specific Plan) in Solano County, California, which is included in a proposed Suisun City annexation area. The purpose of this FPP is to evaluate the potential impacts resulting from wildland fire hazards and identify the measures necessary to adequately mitigate wildland fire hazards and risks to a level acceptable to the City of Suisun City. Additionally, the purpose of this FPP is to generate and memorialize the fire safety requirements of the fire authority having jurisdiction (FAHJ), which, if annexation is approved, will be Suisun City Fire Department (SCFD). The Specific Plan area is currently within the jurisdiction of the Montezuma Fire Protection District (MFPD). Requirements and recommendations detailed in this FPP are based on site-specific characteristics, applicable code requirements, input from SCFD and fire protection subject matter experts, and planners, engineers, and architects.

As part of the assessment, this FPP has considered the fire risk presented by the Specific Plan, including the property location and its topography, geology, surrounding combustible vegetation (fuel types), climatic conditions, fire history, and the proposed land use. This FPP addresses water supply, fire apparatus access, structural type, fire protection systems and equipment, impacts on existing emergency services, defensible space, and vegetation management. This FPP also identifies open space zones and recommends the types and methods of landscape treatment that, when implemented and maintained, are designed to protect the Specific Plan's assets and residents. This FPP also recommends measures for developers, builders, managers, and other responsible entities to implement in order to reduce the probability of structural and vegetation ignition.

The following tasks were performed in completing this FPP:

- Gathered site-specific climate, terrain, and vegetative fuel data.
- Collected site photographs obtained by others. Field observations by others were used to augment existing digital site data in generating the fire behavior models and formulating the recommendations presented in the FPP. Refer to Appendix A, *Representative Site Photographs*, for site photographs of existing site conditions.
- Processed and analyzed data using the latest geographic information system (GIS) technology.
- Predicted fire behavior using scientifically based fire behavior models, comparisons with actual wildfires in similar terrain and fuels, and experienced judgment.
- Analyzed the design of proposed infrastructure.
- Analyzed the existing and proposed emergency response capabilities.
- Assessed the wildfire risk associated with the annexation area.
- Evaluated nearby firefighting and emergency medical response resources.
- Detailed how wildfire risk will be mitigated through vegetative fuel modification, structural ignition-resistance enhancements, and fire protection system upgrades.

The following points highlight key characteristics identified and addressed in this FPP:

- Applicable codes and regulations.
- Historical occurrence of wildfire and potential risk of future wildfire.
- Specific Plan land characteristics and fire environment.
- Current and proposed fire safety features.
- Resident, worker, and visitor safety during wildfire events.

1.1 Intent

The intent of this FPP is to provide guidance and requirements for reducing fire risk for the Specific Plan, preventing off-site ignitions, and minimizing the demand for fire protection services associated with development of the Specific Plan. To that end, a comprehensive, holistic fire protection plan is detailed herein which includes redundant layering of measures, including pre-incident planning, fire prevention, fire protection, passive and active suppression, and related measures proven to reduce fire risk and prevent fire ignitions. The fire protection planned for the Specific Plan has been proven, through real-life wildfire encroachment examples throughout California, to reduce wildfire risk through home hardening, ignition-resistant construction, and a generally wildfire-aware development.

1.2 Specific Plan Area Related Plans

In addition to this FPP, a Fire Department Infrastructure Plan and a Fire Prevention and Grazing Plan have been prepared for the Specific Plan area to provide additional details related to fire prevention, protection, and safety for development associated with the Specific Plan.

1.2.1 Fire Department Infrastructure Plan

A Fire Department Infrastructure Plan (FDIP) has been prepared by Dudek to identify the minimum number of fire stations, apparatus, firefighters, and emergency medical services personnel needed in order to provide adequate service to the planned community. Adequate service was defined through implementation of NFPA 1710 *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments* which helped to provide guidance regarding acceptable response times for different incident types and guided location of stations and acceptable staffing per apparatus which then guides the number of total staff and appropriate resources for alarm type. Additionally, Dudek reviewed comparable fire agencies to determine consistency with standard practices throughout the region and state.

The key findings of the FDIP, which are included in the *Emergency Response and Service* section of this FPP, were that 18 stations housing 23 fire units could be located throughout the Specific Plan area to provide travel times of 4 minutes or less to incidents throughout the boundaries of the Specific Plan, thus achieving applicable response time standards. The 23 fire units would be sufficient to handle all calls without creating an unrealistic workload on the units, with between 5 and 8.4 calls per day, per unit, assuming a Specific Plan call volume rate of between 115 and 192 calls per day, which was determined to be realistic given comparisons with similarly sized fire agencies.

1.2.2 Fire Prevention and Active Grazing Plan for California Forever Land Holdings in East Solano County

The Fire Prevention and Active Grazing Plan (Appendix C) sets forth the land management activities that are provided on and which have been committed to for land surrounding the Specific Plan area as it is developed. The key finding is that nearly all land around the Specific Plan area would be grazed and maintained for the life of the Project. This information aids Fire Protection Planners in understanding realistic fire behavior and progression in the annexation area. Fire Protection Planners also modeled and analyzed fire behavior and progression without the land management practices to analyze a truly worst-case scenario.

2 Suisun Expansion Project Specific Plan Description

The Suisun Expansion Project Specific Plan (Specific Plan) proposes development of a master-planned community on 15,737 gross acres in eastern Solano County that is within a proposed annexation area of Suisun City. Within the annexation area, the Suisun Expansion Area Plan (Area Plan) and the Suisun Expansion Specific Plan (Specific Plan) would be established. The Area Plan would apply to 7,136 acres, which would consist of 1) a 5,726-acre Travis Protection Zone, creating a protection zone around Travis Air Force Base (AFB), promoting connectivity to existing city boundaries, and preserving open space; and 2) 1,410 acres of the existing Lambie Industrial Park. The Specific Plan would guide land uses and development on 15,737 acres in the eastern portion of the annexation area. The Suisun Expansion Project would also include the development of External Specific Plan Improvements (External SP Improvements) located outside of the Specific Plan boundary which are needed to support the build-out of the Specific Plan.

The Specific Plan intends to implement unique characteristics such as pedestrian friendly roadways and mixed-use districts to provide residents with opportunities for work, retail shopping, and recreation without the need for use of personal automobiles. The Specific Plan includes various land uses including residential, commercial, industrial, civic, recreational, and other common land uses along with some major regional attractions such as sports and music venues. Per the Specific Plan, “The plan features neighborhoods centered around local shopping streets and schools, with small blocks of row houses and apartment buildings, where each family can live within a short walk for most daily needs, including schools. The community is designed to provide a range of transportation alternatives to cars, including walking, biking, and frequent transit service”¹. (Figure 1, *Specific Plan Area Location*.)

The Specific Plan will make use of the full complement of wildfire prevention and safety codes, regulations, and standards including vegetative fuel modification and maintenance, ignition-resistant construction, water supply capable of providing required fire flows, automatic fire sprinkler systems, automatic fire alarm systems, standpipe systems, commercial cooking fire suppression systems, clean agent systems, a fire apparatus access road network, and emergency response capability. To that end, this Specific Plan will include:

- Substantial on-site firefighting capability provided through the construction and staffing of new fire stations to ensure compliant response times to fire and medical emergencies.
- Customized vegetative fuel modification zones providing defensible space based on fire behavior modeling results and experienced wildfire safety planning subject matter experts.
- Ignition-resistant construction meeting all regulatory requirements capable of providing sheltering in place or on-site relocation as alternatives to evacuation during wildfire events.
- Automatic fire sprinkler systems installed in all residential structures and any other type of structure greater than 5,000 square feet with a recommendation to require fire sprinkler systems in all structures greater than 1,000 square feet.

¹ Suisun Expansion Plan, 2025

2.1 Suisun Expansion Project Location

The Suisun Expansion Project is located in Solano County, directly east of Suisun City, west of Rio Vista and the Sacramento River, and southeast of the existing Travis Air Force Base. Solano County is the mid-point between San Francisco and Sacramento. The current boundaries of Suisun City would be expanded through annexation of unincorporated Solano County land both within and beyond the City's existing Sphere of Influence. The Suisun Expansion Project overlays the existing State Route 12 (SR-12), which runs east to west from Rio Vista to Fairfield and State Route 113 (SR-113), which runs north to south from Dixon to the intersection with SR-12. See Figure 1, *Specific Plan Area Location*.

The 15,737-acre Specific Plan within the Suisun Expansion Project is surrounded by existing open space historically used for agricultural uses. As demonstrated in Figure 2, *Land Uses*, the Specific Plan area would be set back from these surrounding land uses by large arterial roadways and open space under the control of the Suisun Expansion Project. The land within the Specific Plan area is primarily flat agricultural land and open space that has not previously been developed.

2.1.1 External Specific Plan Improvements

Transportation and utility improvements located outside the boundaries of the Specific Plan site are needed to establish sufficient services and connectivity to the new community and are considered part of the Suisun Expansion Project. These improvements include roadway improvements, commuter bike trails, and stormwater infrastructure.

- **Major Arterial, Minor Arterial, and SR-12 Improvements:** A disturbance width of **approximately 230** feet is assumed for the major arterial road (improvements to Lambie Road) running east-west and connecting the Specific Plan site to SR-12. A disturbance width of **approximately 200** feet is assumed for the minor arterial road running east-west and connecting the southwest corner of the Specific Plan site to SR-12. The associated intersection improvements to SR-12 are included in the limit of disturbance, as well as improvements to SR-12 extending to Denverton for the necessary lane adjustments to the west.
- **Commuter bike trails:** A disturbance width of 50 feet is assumed, and a study area of 250 feet on either side of that disturbance width is evaluated. The study area includes approximately 82 acres for commuter bike trails.
- **Stormwater infrastructure:** Two sections of drainage swales will be constructed to convey stormwater flows from the Specific Plan site to the east. A disturbance width of 50 feet is assumed, and a study area of 250 feet on either side of that disturbance width is evaluated. The study area includes approximately 7 acres of stormwater infrastructure to the east of the Specific Plan boundary.

2.2 Specific Plan Land Uses

The Specific Plan proposes the development of a master-planned community with residential, commercial, industrial, civic, recreational, and other uses common to cities. See Figure 2, *Land Uses*. The Specific Plan consists of approximately 14,266 acres of developable land on 15,737 gross acres split into districts which are classified by land use. Each district is designed to be walkable, meaning that provisions have been put in place to allow for pedestrian and cyclist access on all street types.

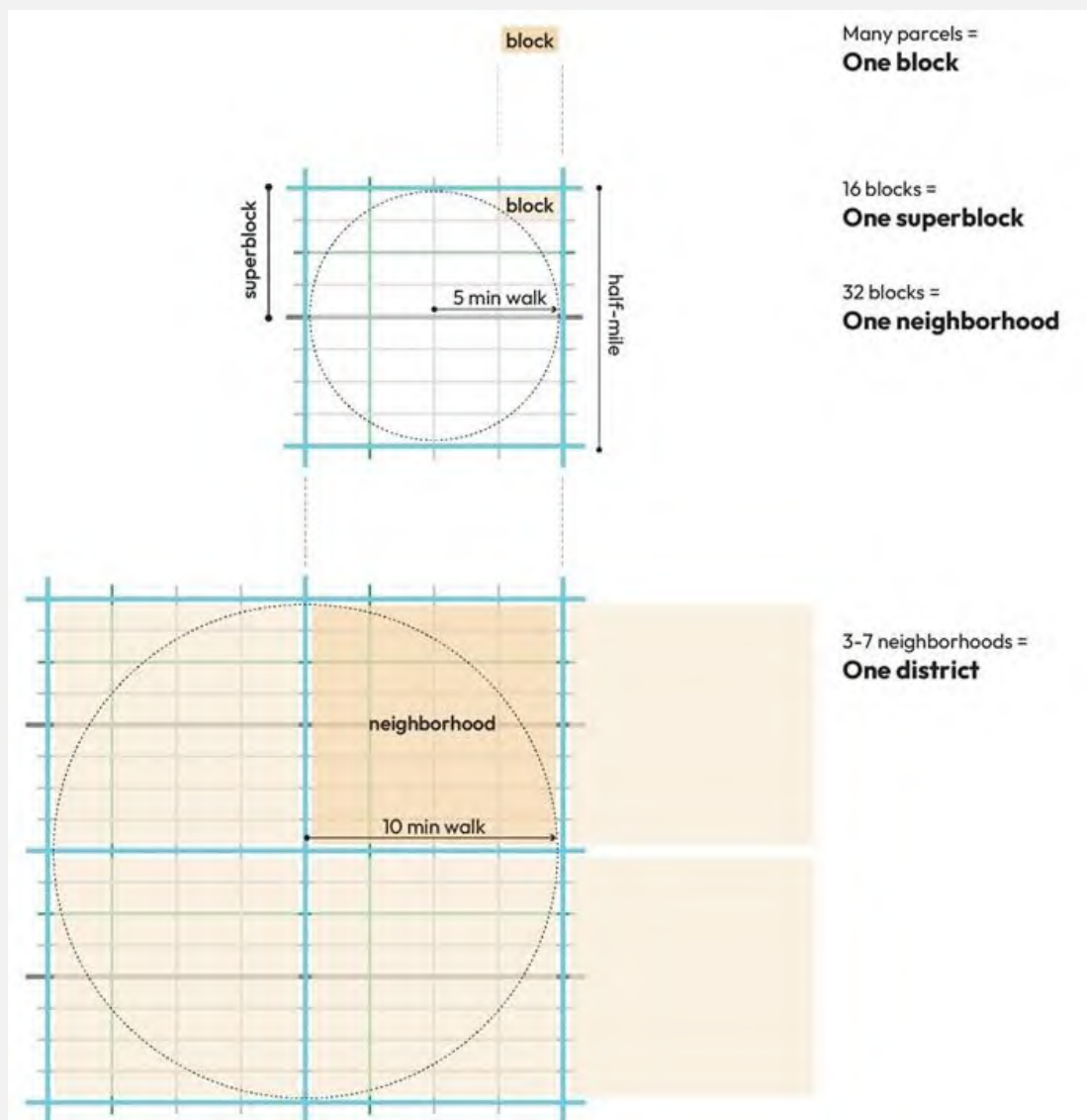
The Specific Plan, generally north of SR-12 and bisected by SR-113, encompasses 15,259 acres of California Forever-owned lands and 268 acres of agency-owned transportation corridors. After annexation, the City would rezone the Specific Plan area from Solano County agricultural and industrial zones to the following zones:

- Commercial Mixed Use (CMU)
- Industry and Technology (IT)
- Maker and Manufacturing (MM)
- Neighborhood Mixed Use (NMU)
- Open Space – Civic (OSC)
- Open Space – Infrastructure (OSI)
- Open Space (OS)

The Specific Plan would establish a gross developable land area of approximately 14,266 acres. The Specific Plan would provide up to 173,913 dwelling units (du) within the Neighborhood Mixed Use, Commercial Mixed Use, and Maker and Manufacturing zones. The Specific Plan would support approximately 155 million gross square feet of non-residential uses including commercial, industrial, retail, hotel, and other employment-generating uses; schools; civic/institutions such as museums, hospitals, and libraries; parking; infrastructure and utilities; and other uses. The remainder of the Specific Plan area would be zoned for Open Space and infrastructure. The total population supported by the Specific Plan would be up to approximately 400,000 people, at densities of approximately 15,000 people per square mile. The Specific Plan as evaluated in this report assumes the development and operation of all land uses within the Specific Plan. Table 2 below summarizes the characteristics of each district use type.

At this point in the design process, for the purposes of this FPP evaluation, the Specific Plan is best understood as a composite of individual elements known as districts and neighborhoods. For purposes of conceptualizing the elements of the Specific Plan, a typical 640 gross acre district is comprised of 4 Neighborhoods, each containing approximately 160 gross acres. Each Neighborhood is comprised of 2 Superblocks, each containing approximately 80 gross acres. Each Superblock is comprised of approximately 16 Blocks. Due to geographical differences and anomalies, the prescribed acreage/sizes of each component are approximate, however the methodology that a District is comprised of Neighborhoods, which is comprised of Superblocks, which is comprised of Blocks is maintained throughout the Specific Plan. Exhibit 1 more thoroughly demonstrates this concept.

Exhibit 1. Blocks in relation to Superblocks, Neighborhoods, and Districts

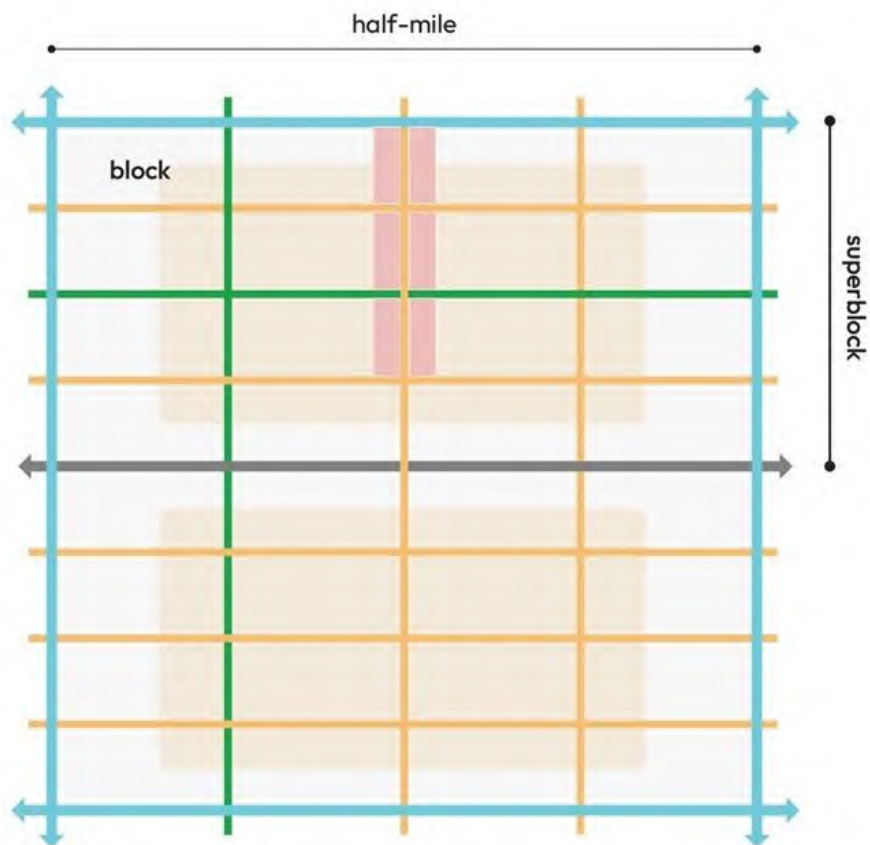


Various street types dissect the development area, facilitating the movement of large volumes of traffic while allowing neighborhood access and providing for walkable, bikeable streets. The street types include Regional and Local Bus Routes, Local Transit with Bike, Local Transit with Bike and Car, Local Bike and Car, and Community Streets. Table 2 demonstrates characteristics of each street type and Exhibit 2 demonstrates the spatial location of street types within a Neighborhood.

Table 2. Street Type Characteristics

Street Type	Use Description
Neighborhood Streets	For local access within superblocks. Roadway supports automobiles, bicyclists, and pedestrians.
Car Free Streets	Provides a connective network throughout the community for cyclists and pedestrians.
Movement Streets	For local and regional access, supports buses, automobiles, bicyclists, and pedestrians. Provide frequent transit service, along with bike and car connections, across the city and between neighborhoods. Movement Streets generally occur on a quarter- and half-mile grid which define areas called “superblocks.”
Parkways, Arterials, and Highways	Connects the plan area to the surrounding region. Primarily supports automobile usage.

Exhibit 2. Demonstration of street types through typical neighborhood.



Typical Neighborhood

- Slow Streets
- Slow centers
- Block
- Streets with transit
- Streets for car + bike
- Greenways
- Retail

2.2.1 Open Space Land Uses as Planned Buffer Zones

Open Space land uses surround the Specific Plan site and buffer the developed area in addition to the 200-foot vegetative fuel modification zone. Land uses are demonstrated in Figure 2, *Land Uses*. The maintenance of these Open Space land uses contributes to the effective fuel reduction around the Specific Plan area, providing an additional buffer well beyond the 200-foot vegetative fuel modification zone, which was already more than sufficient for the anticipated wildfire flame lengths.

2.2.1.1 Open Space Civic Zone (OSC)

The Open Space - Civic (OSC) zone covers the land area of the grand Central Park. This is a zone for all kinds of active and passive recreational uses, civic gathering places like amphitheaters and water parks, along with supporting retail and visitor-serving facilities. As it relates to wildfire fuel load, the highly maintained and irrigated landscaping associated with the OSC land use does not provide suitable fuel for a wildfire. This irrigated zone is consistent with Zone 1 Defensible Space requirements from CAL FIRE which are the lean, clean, green zone. This type of vegetative fuel management is traditionally relied upon to reduce and eliminate flames from an oncoming wildfire. The OSC areas will similarly be unlikely to support fire due to lack of available fuel.

Exhibit 3. Conceptual Image of OSC Land Use



2.2.1.2 Open Space Infrastructure Zone (OSI)

The Open Space – Infrastructure (OSI) zone, located at the periphery of the Specific Plan area, permits infrastructure uses, such as water and waste management systems, solar farms, and energy storage. This zone also allows public uses, such as pedestrian, bicycle, and multi-use trails, as well as natural conservation areas, buffers, and wildlife corridors. As it relates to wildfire fuel load, the various infrastructure areas such as water basins, waste management systems, solar farms, and energy storage are required to be maintained free of combustible vegetation and therefore will not contribute fuel to a wildfire.

Exhibit 4. Conceptual Image of OSI Land Use



2.2.1.3 Open Space Zone (OS)

The Open Space (OS) zone is intended to create recreational opportunities while preserving and protecting natural resources and sustaining existing agricultural lands. The OS zone provides a visual buffer and transition to the natural and agrarian areas surrounding the community and is intended to serve multiple functions, including recreation. Select park uses, like arboretums, as well as pedestrian, bicycle, and equestrian trails are allowed. As it relates to wildfire fuel load, there is potential for limited fuel load in these areas. However, areas would be subjected to disturbance from grazing as they historically have been, and the proposed network of trails serve as fire breaks throughout the open space.

Exhibit 5. Conceptual Image of OSI Land Use



2.2.2 Conservation Easement

Certain areas within the Specific Plan are subject to conservation easements that apply restrictions to the allowed uses. Compliance with the conservation easements is required as long as the easements are in effect. These Conservation Easement areas are zoned for open space uses. As it relates to wildfire fuel load, there is potential for limited fuel load in these areas. However, areas have historically been subjected to disturbance from grazing and would continue to be grazed to remove fuels.

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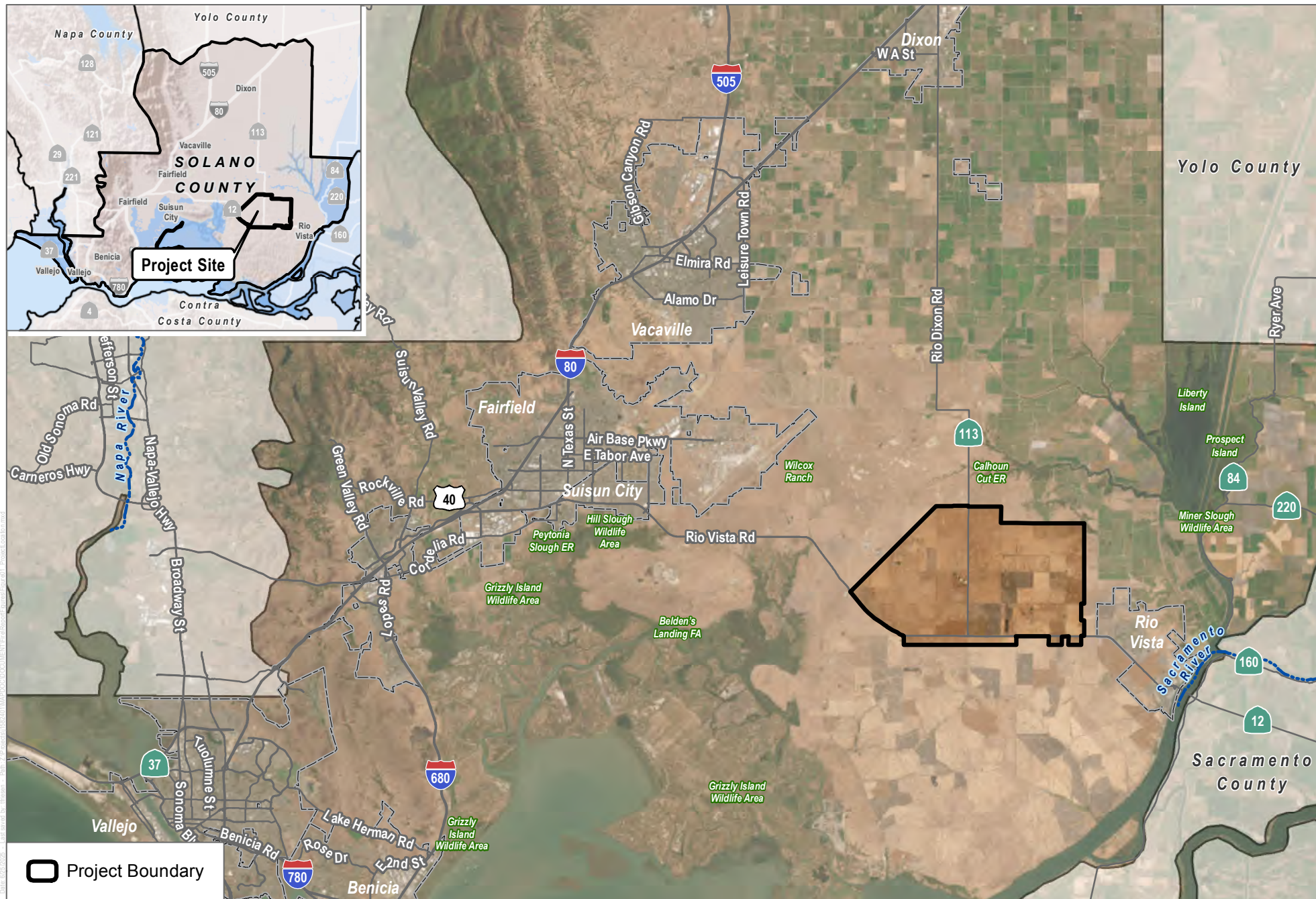


FIGURE 1
Specific Plan Area Location
 Suisun Expansion Project

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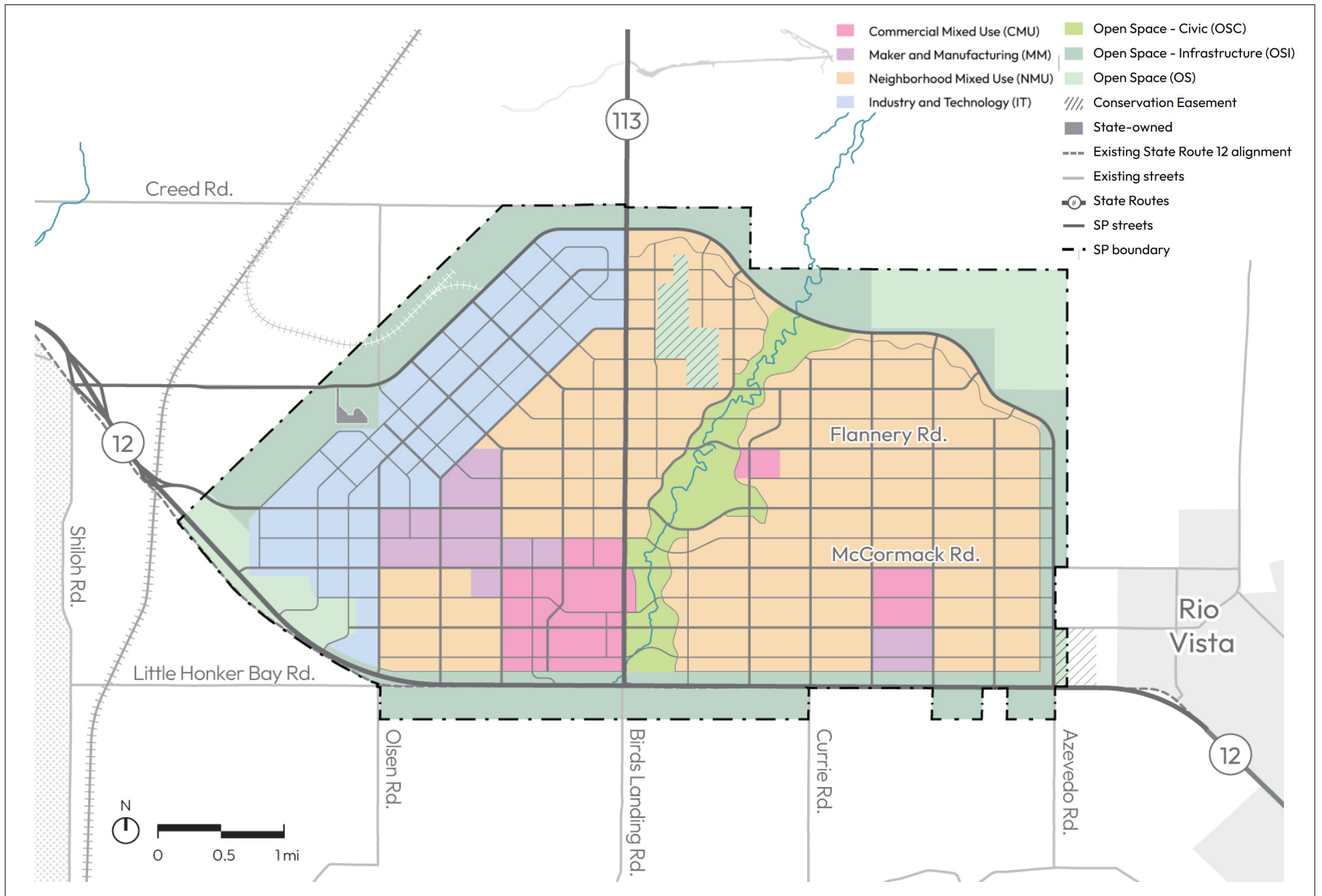


FIGURE 2

Land Uses

Suisun Expansion Project

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3 Regulatory Setting²

This section provides a summary of the federal, state, and local plans, laws, codes, regulations, and standards applicable to the Specific Plan. This section, and subsequent sections that provide more detail with regard to fire protection, also provides analysis of regulatory compliance and notes any changes or updates that will be needed for County and City plans and codes as a result of the Specific Plan. Due to the buildout timeline of the Specific Plan, the applicable plans, codes, and regulations are likely to be updated many times in accordance with the maintenance requirements of the approved plans and standard update cycles of the adopted codes, with the new codes likely becoming more restrictive with each successive edition.

3.1 Applicable Federal Regulations and Standards

3.1.1 National Response Framework

The National Response Framework (NRF) provides foundational emergency management doctrine for how the Nation responds to all types of incidents. The NRF is built on scalable, flexible, and adaptable concepts identified in the National Incident Management System (NIMS) to align key roles and responsibilities across the Nation. The structures, roles, and responsibilities described in this Framework can be partially or fully implemented in the context of a threat or hazard, in anticipation of a significant event, or in response to an incident. Implementation of the structures and procedures described in the NRF allows for a scaled response, delivery of specific resources and capabilities, and a level of coordination appropriate to each incident.

For large disasters, such as wildfires or earthquakes, the incident complexity is increased as others—such as states or tribes and, ultimately, the Federal Government—become involved. Businesses, voluntary organizations, and other elements of the private sector are also key stakeholders, providing the essential services that must be restored following an incident. The NRF provides the foundation for how these organizations coordinate, integrate, and unify their response.

The NRF is structured to help jurisdictions, citizens, non-governmental organizations (NGO), and businesses develop whole community plans, integrate continuity plans, and collaborate with the private sector and NGOs to stabilize community lifelines and enable restoration of services in severe incidents. The NRF describes ways to improve coordination and response structures to build preparedness for catastrophic incidents.

3.1.2 National Incident Management System

The National Incident Management System (NIMS) guides all levels of government, nongovernmental organizations, and the private sector to work together to prevent, protect against, mitigate, respond to, and recover from incidents. NIMS provides community members with a shared vocabulary, systems, and processes to successfully deliver the capabilities described in the National Preparedness System. The National Preparedness System is a Presidential Policy Directive establishing a common goal to create a secure and resilient nation associated with prevention, protection, mitigation, response, and recovery to address the greatest risks to the nation. One core area is fire management and suppression. NIMS defines operational systems that guide how personnel work together during incidents.

² The content of this section, with the exception of any Specific Plan-related analysis, is taken from the referenced documents verbatim with minor editing for clarification, unless otherwise noted.

3.1.3 Pets Evacuation and Transportation Standards Act

The Pets Evacuation and Transportation Standards Act (PETS Act) of 2006 amends the Stafford Act, and requires evacuation plans to take into account the needs of individuals with household pets and service animals, prior to, during, and following a major disaster or emergency.

3.1.4 Disaster Mitigation Plan

The Disaster Mitigation Act of 2000 requires that a state mitigation plan, as a condition of disaster assistance, add incentives for increased coordination and integration of mitigation activities at the state level through the establishment of requirements for two different levels of state plans: “Standard” and “Enhanced.” States that develop an approved Enhanced State Plan can increase the amount of funding available through the Hazard Mitigation Grant Program. The Disaster Mitigation Act also included a provision requiring local governments to create hazard mitigation, commonly known as a Local Hazard Mitigation Plan (LHMP).

3.1.5 International Code Council

The International Code Council (ICC) is the leading global source of model codes and standards and building safety solutions that include product evaluation, accreditation, technology, training, and certification. ICC codes, standards, and solutions are used to ensure safe, affordable, and sustainable communities and buildings worldwide. The ICC is the largest international association of building safety professionals and is a trusted source of model codes and standards that establish the baseline for safety of the built environment. The ICC is not a federal agency and the codes published by the ICC are not federal regulations. The codes are, however, used extensively throughout the US by states and local governments as their construction and safety codes.

The International Codes published by the ICC are the model codes from which the California Codes are derived. ICC codes used in the development of the California Codes include the International Building Code, International Fire Code, and International Residential Code. Codes are updated and adopted on a three-year cycle by the California Building Standards Commission.

3.1.6 National Fire Protection Association

The National Fire Protection Association (NFPA) publishes codes, standards, recommended practices, and guides that are developed through a consensus standards development process approved by the American National Standards Institute. These standards provide requirements for the design of fire protection systems, electrical systems, and other building systems. NFPA standards are recommended guidelines and nationally accepted good practices in fire protection, with some of those standards having the force of law by being included in codes adopted by states and local agencies.

3.2 Applicable State Plans, Laws, Regulations, and Codes

3.2.1 California Strategic Fire Plan

In 2024, CAL FIRE released the updated California Strategic Fire Plan. This plan outlines CAL FIRE's Mission, Vision, Values, and Goals. The Strategic Plan focuses on emergency response, natural resources protection, prevention and regulatory oversight. The Plan implements continuous review and evaluation of internal operations to find ways to streamline and maximize CAL FIRE's effectiveness while ensuring the health and safety of CAL FIRE's workforce.

3.2.2 California Emergency Services Act

The California Emergency Services Act (CESA) in California Government Code Section 8550, et seq., provides for the creation of an Office of Emergency Services, which is charged with assigning and coordinating functions and duties to be performed during an emergency; facilitating mutual aid; and assigning resources, including staffing and facilities, throughout the state for managing any emergency that may occur.

3.2.3 Senate Bill 901

Senate Bill 901 is legislation that aims to address catastrophic wildfires in California and revises the Budget Act of 2018 to include pre-deployment of fire and rescue resources of the Office of Emergency Services along with local government resources that are part of the California Fire and Rescue Mutual Aid System or additional resources upon the authority and approval of the Office of Emergency Services.

3.2.4 Assembly Bill 130

Assembly Bill 130 (AB 130) was adopted June 30, 2025, as one of two budget trailer bills that went into effect immediately with the fiscal year 2025-26 budget. Prior to the enactment of AB 130, California law granted cities and counties broad authority to deviate from residential building standards codified in the California Building Standards Code and Title 14 of the California Code of Regulations on a jurisdiction-by-jurisdiction basis. Specifically, local jurisdictions were permitted to adopt modifications to applicable residential building standards upon making express findings that such deviations were reasonably necessary because of local climatic, geological, or topographical conditions.

AB 130 adopted amendments that significantly curtail the authority of local governments to unilaterally amend residential building standards on the basis of localized physical conditions. Cities and counties are now prohibited from modifying applicable building standards for residential projects within their jurisdictions between Oct. 1, 2025, and June 1, 2031. Pursuant to this reform, local jurisdictions may implement modifications to the state building standards for residential projects only if one or more narrowly defined statutory conditions are met.

Broadly, these conditions will allow the local government to modify the locally applicable building code only if the modifications relate to wildfire home hardening efforts, are similar to a modification that was filed before the building code freeze took effect, are offered as emergency standards to protect health and safety, are necessary to implement certain local code amendments that align with a general plan approved before June 10, 2025, or

otherwise modify various administrative practices. For the vast majority of residential projects, only those building standards in effect as of Sept. 30, 2025, will govern project design and construction, thereby insulating projects from subsequent local amendments. (Holland & Knight, 2025).

3.2.5 Standardized Emergency Management System

The Standardized Emergency Management System (SEMS) is the cornerstone of California's emergency response system and the fundamental structure for the response phase of emergency management. The system unifies all elements of California's emergency management community into a single integrated system and standardizes key elements. SEMS incorporates:

- Incident Command System (ICS) - A field-level emergency response system based on management by objectives.
- Multi/ Inter-agency coordination - Affected agencies working together to coordinate allocations of resources and emergency response activities.
- Mutual Aid - A system for obtaining additional emergency resources from non-affected jurisdictions.
- Operational Area Concept - County and its sub-divisions to coordinate damage information, resource requests and emergency response.

3.2.6 California Code of Regulations

The Specific Plan would be subject to relevant sections of the California Code of Regulations (CCR). More specifically, it would be subject to those portions of the CCR that contain regulatory requirements that relate to fire safety, accessibility, water supply, and development in fire hazard areas.

3.2.7 California Government Code

Portions of the Specific Plan are in a Local Responsibility Area High Fire Hazard Severity Zone while other portions are located in a Moderate Fire Hazard Severity Zone. Local Responsibility Area Very High Fire Hazard Severity Zones are required to comply with sections California Government Code (CGC) related to wildfire safety. The Specific Plan has chosen to comply with the requirements for Very High Fire Hazard Severity Zones. Relevant sections of the CGC are as follows:

Government Code Sections 51175–89, Fire Hazard Severity Zones – Government Code Sections 51175–89 direct CAL FIRE to map areas of significant fire hazards based on fuels, terrain, weather, and other relevant factors. These zones, referred to as fire hazard severity zones (FHSZs), define the application of various mitigation strategies to reduce the risk associated with wildland fires. Portions of the Specific Plan are located within High and Moderate fire hazard severity zones as designated by the California Department of Forestry and Fire Protection (CAL FIRE) (FRAP 2007), see Figure 3 – *Fire Hazard Severity Zone*.

Government Code Section 51182 – Requires each person who owns, leases, controls, operates, or maintains an occupied dwelling unit or structure in a Very High FHSZ to maintain 100 feet of defensible space around each side of the building, as well as manage nearby vegetation and eliminate fire hazards. The Specific Plan is not within a VHFHSZ Section 51182 requires the removal of dead or dying vegetative materials from the roof of a structure, and trees and shrubs must be trimmed from within 10 feet of the outlet of a chimney or stovepipe. Fuel management

may vary within the 100-foot perimeter of the structure, with more intense fuel reductions between 5 and 30 feet. Section 51182 emphasizes creating an ember resistant zone within 5 feet of structures and mandates compliance with state and local fire safety standards.

3.2.8 California Fire Code

The California Fire Code (CFC) is based on the International Fire Code (IFC) as published by the International Code Council. The CFC addresses a wide variety of conditions that are hazardous to life and property, including fire, explosions, and hazardous materials handling or usage. The CFC places an emphasis on prescriptive and performance-based approaches to fire prevention and fire protection systems. The CFC is updated every three years and uses a hazard classification system to determine the appropriate measures to be incorporated to protect life and property. Other times these measures include construction standards and specialized equipment. The CFC uses a permit system based on hazard classification to ensure that the required measures are instituted. The 2025 edition of the CFC is published and adopted by the State of California, which is then adopted by the Suisun City Municipal Code via Section 15.04.030

The Specific Plan would be required to comply with the 2025 California Fire Code (CFC) as adopted by the SCFD through Section 15.04.030 of the Suisun City Code. The CFC establishes regulations to safeguard against the hazards of fire, explosion, or dangerous conditions in new and existing buildings, structures, and premises. Typical CFC safety requirements include fire sprinklers in all high-rise buildings; fire-resistance standards for fire doors, building materials, and particular types of construction; debris and vegetation clearance within a prescribed distance from occupied structures within wildfire hazard areas; and fire-flow requirements, fire hydrant spacing, and access road specifications.

The CFC also establishes requirements intended to provide safety for and assistance to firefighters and emergency responders during emergency operations. The provisions of the Fire Code apply to the construction, alteration, movement, enlargement, replacement, repair, use and occupancy, location, maintenance, removal, and demolition of every building or structure throughout California. The Fire Code includes regulations regarding fire-resistance-rated construction, fire protection systems such as alarm and sprinkler systems, fire services features such as fire apparatus access roads, means of egress, fire safety during construction and demolition, and WUI areas.

Chapter 49 of the California Fire Code provides guidelines aimed at preventing the spread of wildfires towards and away from structures in WUI Fire Areas. It's designed to address the risk of wildfires engulfing buildings, endangering lives, and overwhelming firefighting efforts, as well as causing significant property damage. The chapter aims to minimize these risks by setting both performance and prescriptive standards for construction and development in areas designated as having Moderate, High, or Very High Fire Hazard Severity Zones, encompassing State Responsibility Areas (SRA) and Local Responsibility Areas (LRA). Key elements include the development of fire protection plans, landscape strategies, and ongoing vegetation management, along with the establishment and upkeep of defensible space.

3.2.9 California Building Code

The California Building Standards Code (CCR Title 24) contains provisions for building and safety standards, including fire safety standards for new buildings that are provided in the California Building Code (CCR Title 24, Part 2) and the CFC (CCR Title 24, Part 9). These standards apply to all occupancies in California, except where state agencies and local governing bodies adopt more stringent standards.

The CBC includes several chapters relevant to fire safety and protection that address types of construction, fire and smoke protection features, construction materials and methods, and rooftop construction. Chapter 7A of the CBC includes the requirements for materials and construction methods for exterior wildfire exposure and applies to new buildings located within a wildland-urban interface area, which is a geographical area identified by the state as a and fire hazard severity zone in a State Responsibility Area and a Very High Fire Hazard Severity Zone in a Local Responsibility Area.

3.2.10 California Wildland-Urban Interface Code

Adopted July 1, 2025, and effective January 1, 2026, the California Wildland-Urban Interface Code (CWUIC) is a stand-alone part of the Building Standards Code. The CWUIC is based on the ICC's Wildland-Urban Interface Code and is a compilation of the wildfire construction, prevention, and safety codes currently found in the California Building, Fire, and Residential Codes.

3.2.11 Fire Hazard Severity Zones

To assist each fire agency in addressing its wildfire responsibility area, the California Department of Forestry and Fire Protection (CAL FIRE) uses a severity classification system to identify areas or zones of severity for wildfire hazards within the state. CAL FIRE is required to map these fire hazard severity zones for State Responsibility Areas and identify Local Responsibility Area (LRA) Very High Fire Hazard Severity Zones (VHFHSZ). The Specific Plan is located within a LRA. A total of 725 acres have been designated as Moderate Fire Hazard Severity and 11,278 acres have been designated as High Fire Hazard Severity. The remaining 3,735 acres within the Specific Plan have not been designated as a wildfire hazard severity zone. In a LRA, development in Very High Fire Hazard Severity Zones requires compliance with wildfire mitigation codes. As noted, the Specific Plan does not have any VHFHSZs but has chosen to provide construction materials and methods along with defensible space vegetative fuel modification and management in accordance with Very High Fire Hazard Severity Zone requirements.

It is important to note that Fire Hazard Severity Zone maps evaluate hazard, not risk. A determination of the level or severity of a fire hazard is based on the physical conditions that create a likelihood of a wildfire hazard-related event and the expected fire behavior without considering mitigation measures such as home hardening, recent wildfires, or fuel reduction efforts. Risk is the potential for damage due to a wildfire event in a designated hazard area or zone under existing conditions and accounting for any modifications such as fuel reduction projects, defensible space, and ignition-resistant building construction. An acknowledgement of the wildfire hazard as determined by CAL FIRE is accompanied by an analysis of risk in this FPP both before and after development of the Specific Plan area. An analysis of risk of necessity also includes proposed hazard mitigation and risk reduction as discussed in the Hazard Mitigation and Risk Reduction section of this FPP.

3.2.12 Attorney General's Guidance

In 2022, the California Office of the Attorney General issued guidance outlining best practices for analyzing and mitigating wildfire impacts of development projects under the California Environmental Quality Act (CEQA). The Guidance is not regulatory in nature and does not impose additional legal requirements on local governments, nor does it alter any applicable laws or regulations. Instead, the Guidance is intended to help local governments' evaluation and approval considerations for development projects in fire-prone areas, and to help project design in a way that minimizes wildfire ignition and incorporates emergency access and evacuation measures. The following

provides an overview of the Attorney General's Guidance. An analysis of the Specific Plan's compliance with the guidance is provided in the Code Compliance Analysis section of this FPP.

Attorney General Guidance for Analyzing Project's Impacts on Wildfire Risks

Baseline Conditions – The Guidance states that an EIR's discussion of existing environmental (baseline) conditions should include information about open space areas and habitats within the project area that may be fire prone, a discussion of fire history and fuels on the project site and a description of existing available water supplies for firefighting.

Modeling – The Guidance encourages modeling fire scenarios to quantify increased wildfire risks resulting from a project adding more people to wildfire prone areas and assessing risks.

Project Density – The Guidance encourages projects to utilize higher density development patterns as opposed to low- to intermediate-density development patterns, which are more likely to experience greater fire spread and structure loss.

Location in the Landscape – Where a project's structures are placed in the landscape relative to fire environment features (vegetation, topographical features, and wind alignments) also influences wildfire risk.

Water Supply and Infrastructure – Water supply and infrastructure to address firefighting within the project site are relevant to evaluating wildfire risk.

Mitigating Wildfire Risk – Potential Measures

The Guidance identifies potential project design features that may reduce a project's wildfire risk impacts, such as:

- Avoiding and minimizing low-density development patterns or “leapfrog-type” developments with undeveloped wildland between developed areas.
- Decreasing a project's “edge” or wildland interface area and creating buffer zones and defensible space measures within and adjacent to the project.
- Undergrounding power lines.
- Upgrading building materials and installation techniques to increase a structure's resistance to heat, flames and embers (i.e. “fire hardening”) and requiring fire-hardened communication facilities to the project site.
- Requiring adequate water supplies during a wildfire
- Parking limitations to ensure access roads are not clogged with parked vehicles. Placement of development close to adequate emergency services, existing or planned ingress/egress, and designated evacuation routes.

3.3 Applicable Regional and Local Plans, Regulations, and Codes

3.3.1 Regional Emergency Coordination Plan

The Regional Emergency Coordination Plan (RECP), prepared in accordance with national and state emergency management systems and plans; the National Incident Management System, the Standardized Emergency Management System, the Master Mutual Aid Agreement, the California State Emergency Plan, and relevant mutual aid plans. The Regional Emergency Coordination Plan provides an all-hazards framework for collaboration among responsible entities and coordination during emergencies in the San Francisco Bay Area. The Regional Emergency Coordination Plan defines procedures for regional coordination, collaboration, decision-making, and resource sharing among emergency response agencies in the Bay Area.

3.3.2 Solano County Emergency Operations Plan

The 2024 Solano County Emergency Operations Plan (Solano EOP) establishes an emergency management organization and assigns functions and tasks consistent with SEMS and the NIMS. It provides for the integration and coordination of planning efforts of the Solano County Operational Area (OA). The intent of the Solano EOP is to provide direction on how to respond to an emergency from the outset through an extended response, and into the recovery process. The OA consists of the cities/ towns, special districts, and unincorporate areas within the County.

The Solano EOP was prepared under the oversight of the Solano County Office of Emergency Services (Solano OES) to establish a comprehensive approach to managing extraordinary incidents, such as natural, technological, and human-caused emergencies. It may also be used to manage large events within the Operational Area (OA) that require a coordinated response. It does not apply to routine emergencies and the procedures used by OA partners to cope with such emergencies.

The Solano EOP applies to all agencies and individuals, public and private, having responsibilities for emergency preparedness, prevention, response, recovery, and mitigation, in unincorporated areas of the county. The cities of Benicia, Dixon, Fairfield, Rio Vista, Suisun City, Vacaville, and Vallejo are responsible for maintaining their own EOPs, consistent with the policies and procedures established by The Solano EOP. Consistent with SEMS, The Solano EOP also provides the structure for coordination and support of the incorporated cities when an incident spans multiple communities, when needs exceed the resources available within one or more communities, or when an incident is otherwise complex and assistance is requested.

The Solano EOP provides an all-hazards approach to dealing with incidents and empowering Solano County staff and partners to respond to emergencies. It consists of the Base Plan, Functional Annexes, Hazard Specific Appendices, and Supporting Documents and Attachments. Relevant to the Specific Plan and this FPP are Annex D – Mass Care and Shelter, Annex F – Protective Actions, and Appendix II – Wildfires.

The Solano EOP Mass Care and Shelter Annex provides a framework for the delivery and coordination of mass care and sheltering functions in response to the care and shelter of residents and visitors of Solano County in response to emergencies and disasters within the county. The basic services of the sheltering and mass care sites are intended to provide an environment conducive to the physical and emotional safety of people displaced from the places where they normally live or reside.

The Solano EOP Protective Actions Annex provides an overview of the protective actions, roles and responsibilities, and overall guidance for the evacuation or shelter-in-place activities for residents and visitors of Solano County in response to incidents within the county. The Protective Actions Annex provides a framework for the County to prepare for, execute, and communicate the safe and effective sheltering-in-place and/or the organized and managed evacuation of an at-risk area within the County to areas of safe refuge in response to a potential or dangerous environment. In addition, protective actions encompass the safe re-entry of the population when feasible. The overall emergency management concepts, policies, and procedures contained in the Solano EOP remain in place.

The purpose of the Solano EOP Wildfire Appendix is to identify and describe the County's specific concerns, capabilities, training, agencies, and resources to mitigate against, prepare for, respond to, and recover from a wildfire event. The Wildfire Appendix is intended to establish the policies and procedures beyond those listed in the Solano EOP Base Plan under which the County will respond to and operate in the event of a wildfire; identify roles and responsibilities of County departments, agencies, and partners, specifically regarding wildfire incidents; and provide decision-makers with options that can be used to prepare for, respond to, and recover from wildfire incidents. The Wildfire Appendix has been developed to address the needs of unincorporated Solano County regarding the issues of wildfires and to support a multi-jurisdictional or complex response with municipalities in the Solano County Operational Area during a wide-area wildfire event.

Given that the Solano EOP is an emergency management framework for assigning functions and tasks at the County level during an emergency, the Solano EOP is not affected by the Specific Plan. The framework can be applied to the Specific Plan without having to be modified.

Similarly, the annexes and appendices of the Solano EOP provide guidance for the planning and delivery of emergency services to residents of the county who live in unincorporated areas along with providing guidance as to how the County will support Cities during emergencies. As the annex and appendix documents note, Cities are responsible for creating their own emergency operations plans that integrate with the County's plans. As such, the Specific Plan will not require Solano EOP annexes and appendices to be updated.

3.3.3 Solano County Multi-Jurisdictional Hazard Mitigation Plan

The purpose of the Solano County's Multi-Jurisdictional Hazard Mitigation Plan (Solano MJHMP) is to identify risks and ways to minimize damage from natural and human-caused disasters. The plan is a comprehensive resource document that serves many purposes such as enhancing public awareness, creating a decision tool for management, promoting compliance with State and Federal program requirements, enhancing local policies for hazard mitigation capability, and providing inter-jurisdictional coordination.

The City of Suisun City is included in the Solano MJHMP. Volume Two of the Solano MJHMP contains jurisdiction-specific annexes for cities and special districts within the County. Section Five of Volume Two is the City of Suisun City jurisdictional annex. The City has formally adopted the Solano MJHMP Volume One and its corresponding jurisdictional annex.

The Solano MJHMP was prepared to guide County and City officials in protecting the people and property within the county from the effects of natural disasters and hazard events. The Solano MJHMP demonstrates Solano County's commitment to reducing risk from natural hazards through mitigation and serves as a tool to direct County resources to achieve optimum results with available administrative, technical, and financial resources.

The Solano MJHMP provides an overview of prevalent hazards within the county. It also describes how hazards may affect the county and participating jurisdictions differently based upon various relationships to natural hazards. The Solano MJHMP identifies risks to vulnerable assets, both people and property. Most importantly, the mitigation strategy presented in the Solano MJHMP responds to the identified vulnerabilities within each community and provides prescriptions or actions to achieve the greatest risk reduction based upon available resources.

The term *hazard mitigation* as used in the Solano MJHMP refers to actions or strategies that can reduce or eliminate long-term risks caused by natural disasters. Mitigation activities can be developed, planned, and implemented before or after a disaster occurs. The Solano MJHMP notes that after disasters, repairs and reconstruction often are completed in such a way as to simply restore damaged property to pre-disaster conditions. These efforts may return property and infrastructure to what is considered normal, but the replication of pre-disaster conditions may result in a repetitive cycle of damage and reconstruction. Hazard mitigation planning in Solano County intends to break the repetitive cycle by reducing vulnerability to hazards through smart construction and proper planning of future development and critical infrastructure. The Solano MJHMP also notes that hazard mitigation activities can be conducted through a wide variety of mitigation strategies, such as construction of regional flood control projects or implementing fuel reduction around buildings within high wildfire risk areas.

Jurisdictional Annex 5 of the Solano MJHMP was prepared for Suisun City (Suisun City Annex). It provides additional hazard mitigation information specific to the City of Suisun City with a focus on providing additional details on the planning process, risk assessment, and mitigation strategy for Suisun City. The Suisun City Annex notes that the City of Suisun City followed the planning process detailed in Volume 1, Section 3 of the Solano EOP, including participating in the County Hazard Mitigation Planning Committee and Steering Committee and formulating its own internal planning team to support the broader planning process.

The Risk Matrix within the Suisun City Annex is the product of an interactive process that helped City officials and community stakeholders better understand Suisun City's vulnerabilities. The exercise rated a wildfire event as having a highly likely probability with a critical impact on the city.

The Suisun City Annex addresses future development within the city and recommends that in the event some limited development occurs within a hazard area, the City Code should ensure impacts from a hazard event are mitigated and losses are minimal. The Suisun City Annex notes that if development does occur in hazard areas, evacuation and emergency planning should take into consideration the anticipated local impacts of a hazard-related event as it pertains to the development.

With regard to the Specific Plan and the Suisun City Annex, the Specific Plan will result in the need to update the hazard profile of Suisun City along with updating the exposure maps and damage estimations since Suisun City does not currently include the annexation area in which the Specific Plan is located. The overall risk assessment included in the Suisun City Annex will remain unchanged since the annexation area and Specific Plan will have the same hazards as those that exist within the current sphere of influence and jurisdictional boundaries of Suisun City.

3.3.4 Solano County Community Wildfire Protection Plan

The 2023 County Community Wildfire Protection Plan (CWPP) serves multiple purposes in addressing the risk of wildfires and protecting human life and property. It aims to provide a comprehensive assessment of wildfire risk and protection needs across the County, bringing together various stakeholders involved in wildfire management and suppression. By identifying gaps and deficiencies, the CWPP provides a framework for future planning and implementation of mitigation measures. It also includes a list of actionable projects to mitigate identified risks. The Specific Plan will not require the CWPP to be updated.

3.3.5 City of Suisun City Emergency Operations Plan

The 2019 City of Suisun City Emergency Operations Plan (Suisun EOP) delineates the functions, roles, and responsibilities of all emergency response agencies and the overall emergency management system for the City. The Suisun EOP serves as a directive to City departments and supporting agencies to prepare for and execute emergency tasks that minimize property damage and ensure proper life-saving measures are instituted to protect at-risk populations. The Suisun EOP describes the responsibilities for emergency response and should be used in conjunction with other plans specific to the situation at hand. The Suisun EOP addresses the planned response to emergency situations associated with natural, technological, and human-caused emergencies or disasters within or affecting Suisun City.

The Suisun EOP applies to any extraordinary emergency situation which may affect the city and that generates situations requiring planned, coordinated responses by multiple agencies or jurisdictions. The provisions, policies, and procedures of the Suisun EOP are applicable to all agencies and individuals, public and private, having responsibilities for emergency preparedness, response, recovery and/or mitigation in the City.

The Suisun EOP is organized into a base, all-hazards and all-risk plan that is supplemented with topic-specific appendices along with annexes that focus on specific hazards and operational guidelines. Relevant to the Specific Plan and this FPP are the Evacuation Annex and the Mass Care and Shelter Annex. The Suisun EOP does not have a Wildfire appendix or annex.

City of Suisun City Emergency Operations Plan – Evacuation Annex (2019)

The Evacuation Annex details the strategies and procedures for the City, Solano County, and other supporting agencies necessary to effectively respond to emergencies that involve the evacuation of people from an affected area. The Evacuation Annex details evacuation triggers, public alerts, warnings and information, evacuation transportation, and related traffic control. Additionally, the Evacuation Annex can be used in conjunction with other annexes and plans designed for the protection of the population. The outlined operational concepts, and organizational roles and responsibilities, provide a distinct process for accomplishing an evacuation in the city.

City of Suisun City Emergency Operations Plan – Mass Care and Shelter Annex (2019)

The Mass Care and Shelter Annex provides an overview of mass care and shelter functions, agency roles and responsibilities, and overall guidelines for the care and shelter of people who need such services during an emergency situation in incidents occurring with and without warning. The Mass Care and Shelter Annex describes the actions, roles, and responsibilities of coordinating and participating organizations in the City and County in their endeavor to manage the care and shelter process before, during, and after the emergency. The Mass Care and Shelter Annex addresses only general strategies used for any emergency in general and the EOC coordination efforts specifically. The Mass Care and Shelter Annex notes that tactical actions that are taken at a shelter or an evacuation site are described in individual agency procedures.

The Mass Care and Shelter Annex further notes that the City of Suisun City is the agency with primary responsibility for sheltering residents and visitors in the city. Although Suisun City has overall responsibility within its jurisdiction, the American Red Cross (ARC) has been designated and will be expected to serve as the principal organization responsible for operating Care and Shelter facilities. ARC serves as the lead organization for developing potential shelter sites and training shelter staff.

Evacuation and sheltering with regard to the Specific Plan are discussed and analyzed in the Wildfire Related Evacuation section of the FPP.

3.3.6 City of Suisun City Fire Code and Building Code

The City of Suisun City adopts the 2025 California Fire Code with additions, deletions and amendments. Specific amendments to the Fire Code are described in Section 15.04.230 of the Suisun City Code.

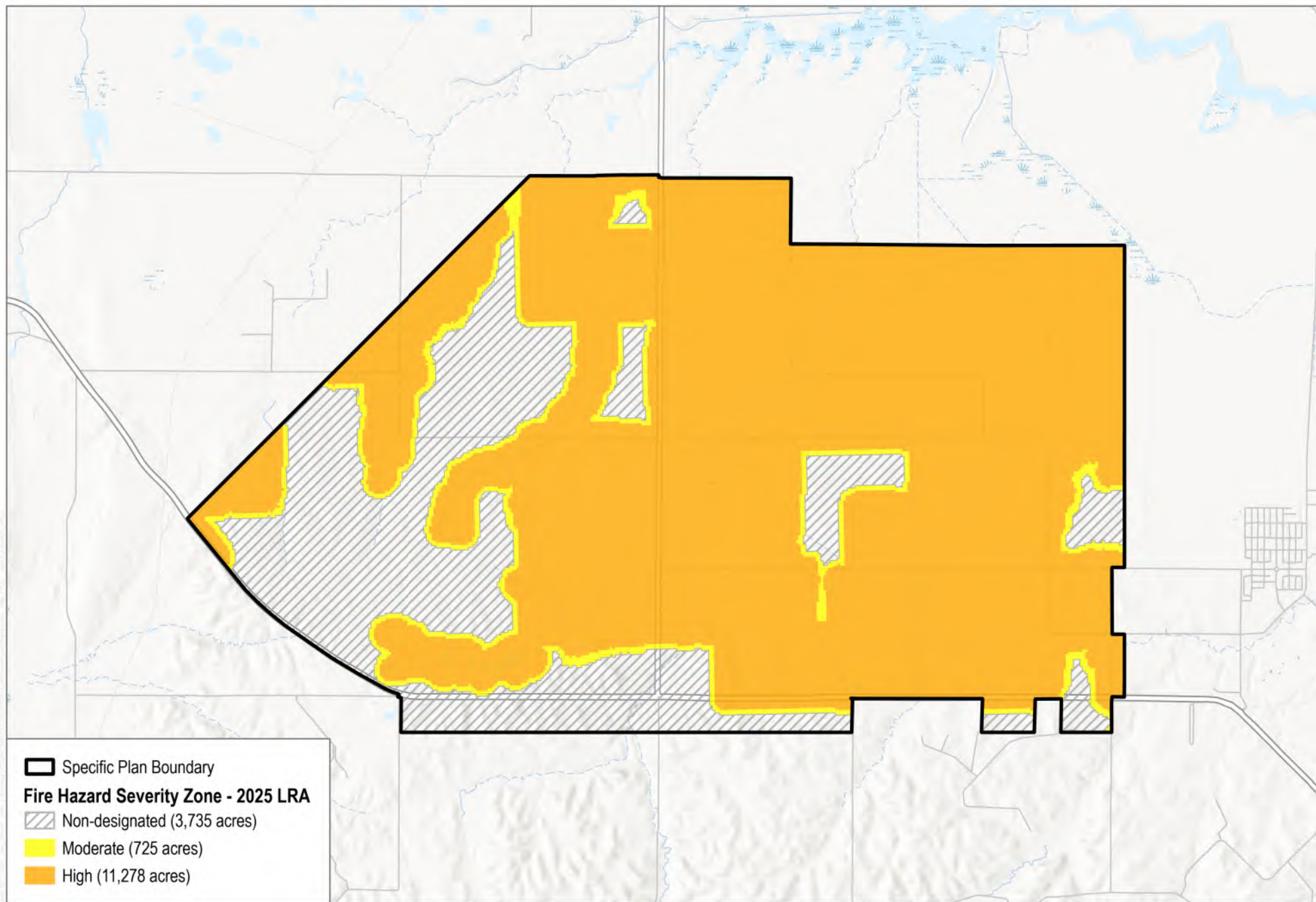
Title 15 of the Suisun City Code is Buildings and Construction. The Code is intended to regulate the construction of applicable facilities and includes and formally adopts associated elements of the 2025 California Building Code. Specifically, this includes regulating the erection, construction, enlargement, alteration, repair, moving, removal, demolition, conversion, occupancy, use, height, area and maintenance of all structures and certain equipment therein.

Due to the build-out timeline of the Specific Plan, it is believed that between the preparation of this FPP, and the build-out of the Specific Plan, relevant codes and regulations will continue to be updated and will realistically become more stringent. Each structure built will be required to comply with the codes in place at the time of permit application.

The Specific Plan's compliance with currently adopted codes, along with recommended amendments to the codes, is discussed and analyzed in the Code Compliance Analysis section of this FPP.

3.4 Updates to Laws, Regulations, and Codes

The Specific Plan is proposed to be constructed in phases. As new laws and regulations are adopted by the Legislature and new codes are approved by the Building Standards Commission, future development and construction will be required to comply with the new and/or modified laws. For example, the California Building Code and California Fire Code are typically updated every three years. Each subsequent code edition is generally more restrictive than the previous edition.



SOURCE: CALFIRE 2025

DUDEK



0 2,500 5,000
Feet

FIGURE 3
Fire Hazard Severity Zone
Suisun Expansion Project

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4 Environmental Setting

Fire environments are dynamic systems and are comprised of many environmental factors and site characteristics. Fires can occur in any environment where conditions are conducive to ignition and fire movement. The three major components of the fire environment are topography, vegetation (fuels), and climate. The interaction of these components determines the characteristics and behavior of a fire at any given moment. The following sections discuss the environmental characteristics of the Specific Plan site and the surrounding area on both a local and regional scale.

4.1 Topography

Topography influences fire risk by affecting fire spread rates. Typically, steep slopes result in faster fire spread up-slope and slower spread down-slope. Sloped terrain that forms a funneling effect, such as canyons, canyon features (chimneys or chutes), or saddles on the landscape can result in especially intense fire behavior. Conversely, flat terrain such as that surrounding the Specific Plan area tends to have little effect on the speed of fire spread, resulting in fires that are driven primarily by the presence of vegetative fuels and wind.

The Specific Plan is located on flat agricultural land in the western portion of the San Joaquin Valley northwest of the Sacramento River. Immediate surrounding land use includes generally flat agricultural land to the north and east, and the gentle slopes of Montezuma Hills approximately five miles to the south and Potrero Hills approximately seven miles to the west. The Specific Plan site is approximately 22 miles southeast of Lake Berryessa and the adjacent mountainous region. As mentioned previously, the site is relatively flat with only slight undulations as elevations on the Specific Plan site range from approximately 70 feet above mean sea level (amsl) to approximately 150 feet amsl.

4.2 Climate

The Specific Plan site, like much of the Bay Area California, is influenced by the Pacific Ocean and a seasonal, migratory subtropical high-pressure cell known as the “Pacific High.” Wet winters and dry summers with mild seasonal changes characterize the Coastal California climate. This climate pattern is occasionally interrupted by extreme periods of hot weather, winter storms, or dry, easterly Diablo winds. The average high temperature for the region is approximately 72°F, with average highs peaking in July and August at approximately 89°F. The region is considered to have a Mediterranean climate. Daily maximum relative humidity averages between 30 and 65 percent year-round and is at its lowest between June and September. Daily minimum relative humidity averages between 25 and 50 percent year-round and is at its lowest from June through September. Precipitation averages approximately 13.3 inches annually with approximately 81% of that total occurring between November and March on average and only approximately 2% of that total occurring between June and September on average (FEMS 2024).

From a regional perspective, the fire risk in California can be divided into three distinct “seasons” (Nichols et al. 2011, Baltar et al 2014). The first season, the most active season and covering the summer months, extends from late May to late September. This is followed by an intense fall season characterized by fewer but larger fires. This season begins in late September and continues until early November. The remaining months, November to late May, cover the mostly dormant, winter season. Mensing et al. (1999) and Keeley and Zedler (2009) found that large fires in the region consistently occur at the end of wet periods and the beginning of droughts.

Typically, the highest fire danger in coastal California coincides with Diablo winds which can occur year-round, but most commonly occurring between May and October. The Diablo wind conditions are a temporary reversal of the prevailing west-southwesterly winds that usually occur on a region-wide basis. They are dry, warm winds that flow from the deserts in the east through the mountain passes and canyons. As they converge through the canyons, their velocities increase.

The prevailing wind pattern is from the west-southwest (onshore), but extreme wind events are associated with north-northeasterly winds. Sustained wind speeds average approximately 7 to 12 mph throughout the year and are highest between April and August. Hourly gust speeds average approximately 14-21 mph throughout the year, with monthly average highs of approximately 30-35 mph throughout the year, but slightly higher in the spring months. The fastest gust ever recorded was approximately 48 mph in March of 2023 and the fastest gust ever recorded during fire season was approximately 45 mph during October of 2021 (FEMS 2024). The highest wind velocities are associated with downslope, canyon, and Diablo winds. However, the Specific Plan site is generally flat with little topographical influence on local wind speeds.

The Specific Plan is located in Zone 218 of the National Weather Service (NWS) and National Oceanic and Atmospheric Association (NOAA)'s Northern California Fire Weather Zone Boundaries. Since 2006, 71 Red Flag Warnings (RFW) have been issued within California Fire Zone 218. The NWS defines a RFW as environmental conditions where warm temperatures, very low humidities, and stronger winds are expected to combine to produce an increased risk of fire danger. By looking at the historical frequency of Red Flag Warnings for a given region, an estimate of how many such events can be expected annually in the future can be determined. On average, approximately 4 RFW events can be expected to occur annually. However, this has ranged from as little as 0 to as many as 11, and individual events can vary in duration. Approximately 28% of the RFWs occurred between May and June and approximately 61% occurred between August and October with 32% having occurred during October alone (Iowa State University, 2024).

In many areas, RFWs are most common in the Fall, which coincides with seasonal droughts that induce reduced fuel moisture. However, the region experiences RFW events in both the traditional early and late fire seasons (late spring-early summer and late summer-early fall). Further, the region is dominated by flat, arable, agriculture land that when left fallow is dominated by fine fuels that have greater variations in fuel moisture and can more rapidly cure to a level suitable for combustion. The increasing number of days that RFW events occur throughout the year and the responsiveness of dominant vegetation to environmental conditions means that an elevated fire hazard can be expected throughout the year.

4.2.1 Climate Change

A rapidly warming climate is expected to impact California and the Western U.S. from both direct and indirect effects. Since 2006, the State has monitored and created climate change assessments to assess the impacts and risks of climate change. Based on California's Fourth Climate Change Assessment, published in 2019, the current average annual maximum daily temperature is projected to increase between 5.6 and 8.8 degrees by 2100 (State of California, 2019a). The rising temperature is expected to result in increased heat waves in cities by 2050. The increased temperature and increased probability of heat waves will impact electricity demand. Climate change is also predicted to, directly and indirectly, increase the risk associated with public health resulting in earlier deaths and increased illnesses. Currently, there is not a strong consensus on how California as a whole will be impacted by changes in precipitation. The general trend indicates that the northern part of California will become wetter while the southern portion of California will become drier (State of California, 2019a). However, water supply from

snowpack is projected to decline by at least 2/3 by 2100 due to less precipitation falling as snow; with water shortages occurring by 2050. Further, over 3,000 miles of highways are projected to be exposed to temporary flooding because of increased 100-year storm events (State of California, 2021).

A major factor in climate change is greenhouse gas (GHG) emissions, and wildfires can contribute to emissions as well. The California Air Quality Resource Board in 2020 completed a public draft assessment of the GHG and carbon impacts of wildfire and forest management activities (CARB, 2020a). The report is a result of SB 901 which required CARB to assess and report the GHG emissions associated with wildfire and forest management activities. Wildfire CO₂ emissions vary annually with annual emissions ranging from 1 million metric tons (MMT) of CO₂ in 2010 to 39 MMT of CO₂ in 2018 with an overall average CO₂ emission of 14 MMT from 2000-to 2019. Fires in forests and woodlands were the largest contributors to wildfire-caused emissions due to higher fuel loads than in areas dominated by shrubs and grasses. While in 2017, forest and shrublands had roughly equal areas of burned acres, the fires in the forest created more than double the emissions. The 2020 fire season resulted in multiple large fires in forest areas and created record-high emissions with over 106 MMT of CO₂ (CARB, 2020b).

Because wildfires can contribute to climate change via GHG emissions and be affected by climate change, the California's Fourth Climate Change Assessment also examined how climate change is expected to impact wildfires across the state. Fire frequency and intensity are expected to be impacted by the rapidly changing climate; however, as wildfires are affected by multiple complex drivers, the projections range from modest to large increases in wildfire regimes. The area burned by wildfire has been found to increase parallel to the increasing air temperatures. The average area burned may increase by 77% by 2100, if emissions continue to rise. The statewide maximum burn area is projected to rise by 178% and extreme wildfires are predicted to occur 50% more often by the end of the century.

However, model projections regarding wildfire intensity, spread, and duration are limited. The changes to temperature, loss of snowpack, and earlier snowmelt are expected to result in dryer "dry" seasons and result in more susceptible forests. Wildfires are occurring at higher elevations and this trend is expected to be exacerbated by climate change. Late Diablo winds will continue to be most frequent in December and January. However, there is a lack of consensus on how Diablo wind-driven wildfires will change. Additional research is needed to better understand the effect of climate change on extreme wind events and wildfires (State of California, 2019a).

Wildfire simulations found that forested areas, especially the Sierra Nevada, are projected to have the greatest increases in burned areas under extreme weather (State of California, 2018). The burned area is likely to increase in conjunction with warming temperatures and has a stronger effect on montane forests in the northern two-thirds of the State. The increased burned areas were also found to be consistent with current experiences and trends already exhibited in the State and the western U.S. Impacts to tree mortality as a result of fine fuels encroaching on forest canopy areas were only expected to have a small increase from 1-7% in the near future and within the systems natural variability. It was also found that depending on vegetation type and fuel amount, the impact from climate viability changed, demonstrating great spatial diversity in wildfire response to climate change (State of California, 2018).

The effect climate change will have on future fire regimes is not consistent throughout California (Keeley & Syphard, 2016). Future fire regimes are not only changing in response to climate change but also in response to ignitions, with human ignitions complicating the role of climate change in driving wildfires. In California humans account for 95% of fires and have altered the timing of wildfires by increasing the probability of ignitions during Diablo wind events. However, there are no studies to date that link fire-hardened, master-planned communities with new

ignitions. Instead, modern master-planned communities have been shown to be resistant to wildfire, even providing refuge during wildfires. The regional analysis demonstrates that in southern California climate drivers are eclipsed by human ignition drivers and increased population on the landscape, altering future climate regimes (Keeley & Syphard, 2016). The nature of the analysis suggests that this finding would be consistent throughout California.

4.3 Vegetation

On-site and off-site vegetation is a major fire component because some vegetation, such as sage scrub and grassland habitats, are highly flammable, while other vegetation, such as riparian communities or forest understory, are less flammable due to their perennially higher plant moisture content, fuel arrangement, ignition resistance, compact structure, and available shading from overstory tree canopies. Within the Specific Plan, there are five different vegetation communities/land cover types with the vast majority, approximately 98%, being either agriculture (grazing, crops) or grassland (LSA 2023). The vegetation communities and their spatial distributions are presented on Figure 4, *Vegetation*. Further, given the extensive agriculture throughout the area, Figure 5, *Agricultural Use Type* was also provided to demonstrate that many of the areas identified as Grassland are grazed by Sheep or Cattle.

4.3.1 Vegetative Fuel Dynamics

Variations in vegetative cover type and species composition have a direct effect on fire behavior. Some plant communities and their associated plant species have increased flammability based on plant physiology (resin content), biological function (flowering, retention of dead plant material), physical structure (leaf size, branching patterns), and overall fuel loading. Hazardous fuels include live and dead vegetation that exists in a condition that readily ignites; transmits fire to adjacent structures or ground, surface, or overstory vegetation; and is capable of supporting extreme fire behavior. All vegetation burns, however, some plants exhibit characteristics that make them more flammable than others.

Flammability can be defined as a combination of ignitability, combustibility, and sustainability. Ignitability is the ease of or the delay of ignition; combustibility is the rapidity with which a fire burns; and sustainability is a measure of how well a fire continues to burn with or without an external heat source (White and Zipperer 2010). Flammability is influenced by several factors, which can be classified into two groups: physical structure (e.g., branch size, leaf size, leaf shape, surface-to-volume ratio, and retention of dead material) and physiological elements (e.g., volatile oils, resins, and moisture content) (Moritz and Svihra 1996; UCCE 2016; UCFPL 1997; White and Zipperer 2010). Plants that are less flammable have low surface-to-volume ratios, high moisture contents, and minimal dead material or debris. Examples of such plants include agave and olive trees. More flammable species have high surface-to-volume ratios, exhibit low moisture contents, contain volatile oils, and have high levels of dead material or debris (Moritz and Svihra 1996; UCFPL 1997; UCCE 2016; White and Zipperer 2010). Examples of such plants include pampas grass, juniper, and pine. Plant condition and maintenance are also important factors in flammability potential. Some plants that have more flammable characteristics can become less flammable if well maintained and irrigated. Conversely, plants can be highly flammable when poorly maintained, situated on south-facing slopes, in windy areas, or in poor soils (Moritz and Svihra 1996).

Understanding the agricultural usage of the annexation area is important from a wildland fire perspective. The agricultural uses include either lands used for grazing livestock or lands used for growing crops. An agricultural land use type used for grazing eliminates fuels while agricultural land uses for growing crops tend to have higher fuel moistures compared to natural vegetation and thus do not support fire spread and intensity as well as natural

fuelbeds. Additionally, crops are not left to dry out and cure but are instead harvested before becoming hazardous/ignitable. There are also degrees of fire resistance within agriculture use types such as high moisture content row crops being highly resistant to ignition and combustion whereas orchards could have dead, dry biomass either in the canopy or left on the ground which would be more prone to ignition and increased combustion. Other types of agriculture such as wheat, when cured, can more closely resemble fire behavior of adjacent grasslands. Figure 5 demonstrates the different agricultural types throughout the Specific Plan area and in surrounding areas.

The lands used for growing crops are not expected to contribute to a major conflagration due to the higher moisture content. Further, the crops are harvested before curing/drying out, which eliminates the fuel source for a potential wildfire. The surrounding areas that support natural grasses could present a susceptible fuel source for a potential wildfire; however, historic grazing removes these fuels thereby eliminating the fuel source for a potential wildfire.

Wildfire disturbances can also have dramatic impacts on plants and plant composition. Heat shock, accumulation of post-fire charred wood, and change in photoperiods due to removal of shrub canopies may all stimulate seed germination. The post-fire response for most species is vegetative reproduction and stimulation of flowering and fruiting. The combustion of aboveground biomass alters seedbeds and temporarily eliminates competition for moisture, nutrients, heat, and light. Species that can rapidly take advantage of the available resources will flourish. It is possible to alter successional pathways for varying plant communities through manual alteration. Biomass and associated fuel loading will increase over time, assuming that disturbance or fuel reduction efforts are not diligently implemented. This concept is a key component in the maintenance of the proposed fuel modification zones (FMZs) within the Specific Plan. FMZs are landscape areas that minimize fire spread progressively through various restrictions, treatments, and maintenance. FMZs provide a buffer between off-site fuels and the urbanized landscapes that have the dual benefit of protecting communities while also protecting habitats by minimizing the potential for development-related ignitions.

4.4 Fire Behavior Modeling

Following field data collection efforts and available data analysis, fire behavior modeling was conducted to document the type and intensity of the fire that would be expected adjacent to the Specific Plan site given characteristic features such as topography, vegetation, and climate/weather. Dudek utilized the FlamMap software package to analyze potential fire behavior at the landscape level. A discussion of fire behavior modeling is presented in Appendix B, Fire Behavior Modeling.

4.4.1 Fire Behavior Modeling Analysis

The fire behavior modeling analysis was carried out in two phases. First, a landscape-level fire behavior assessment was performed to evaluate key variables such as flame lengths, fire intensity, and spread rates under 97th percentile weather conditions—representative of offshore wind events. These conditions typically align with the highest fire danger periods in the region. Specifically, Diablo wind events, which reverse the region's usual west-southwesterly wind pattern, were used to represent these high-risk scenarios. Second, a fire progression analysis was completed to evaluate the potential for wildfire to advance toward the annexation area from realistic ignition locations. This phase involved modeling numerous scenarios from various ignition points during different weather patterns. Each scenario was modeled at different stages of the Specific Plan's development to evaluate how the Specific Plan impacts fire progression.

The fire behavior modeling analysis incorporated observed fuel types representing the dominant vegetation representative of the annexation area, in addition to slope gradients, wind, and fuel moisture values.

The analysis utilized the FlamMap software and incorporated key factors like fuel types, slope, wind conditions, and fuel moisture, assuming 97th percentile weather conditions typical of high fire danger and representative of Diablo wind conditions. The area was analyzed under two scenarios: one with unmanaged grassland conditions (Scenario 1) and one with managed grassland condition. (Scenario 2).

FlamMap requires a minimum of five (5) separate input files that represent field conditions in the analysis area, including elevation, slope, aspect, fuel models, and canopy cover. Each of these data files was obtained from the LANDFIRE (Landscape Fire and Resource Management Planning Tools) data distribution site and were edited to reflect existing conditions (LSA, 2024).

Natural fuels are made up of the various components of vegetation, both live and dead, that occur on a site. Vegetation is comprised of living and dead fuel. The type and quantity will depend upon the soil, climate, geographic features, disturbance regimes, and the fire history of the site. The major fuel groups of grass, shrub, trees, and slash are defined by their constituent types and quantities of litter and duff layers, dead woody material, grasses and forbs, shrubs, regeneration, and trees. Fire behavior can be predicted largely by analyzing the characteristics of these fuels and is affected by weather (wind, air temperature) and seven principal fuel characteristics: fuel loading, size and shape, compactness, horizontal continuity, vertical arrangement, moisture content and chemical properties.

Vegetation types were classified into a fuel model suitable for use and processing by FlamMap. Fuel Models are simply tools to help fire experts realistically estimate fire behavior for a vegetation type. Fuel models are selected by their vegetation type; fuel stratum most likely to carry the fire; and depth and compactness of the fuels. The fuel model layer was edited to improve accuracy and reflect existing vegetation conditions post-development. Specifically, fuel models in the development areas were reclassified to a non-burnable model value (NB 91). Fuel models in the paved, built, and landscaped portions of the proposed site plan were also reclassified to a non-burnable model value (NB 91). Vegetation and corresponding fuel models outside of the Specific Plan boundary were classified to reflect the SHCP Vegetation Land Cover Vegetation GIS dataset (LSA, 2024). Due to the large extent of agricultural land within the analysis area, fire behavior modeling considered two distinct vegetation conditions including managed grasslands and unmanaged grasslands. While grasslands have historically been grazed or harvested, a true worst-case scenario analysis involves evaluating the grasslands as if the various entities managing the grasslands failed to manage them through grazing and harvesting. This approach provides insight into a highly conservative worst-case scenario, while also accounting for the more probable scenario of reduced grassland fuel loads resulting from ongoing and historical agricultural activities.

Unmanaged Grasslands (Scenario 1):

For the unmanaged grasslands scenarios, fuel models were further refined to reflect mature conditions of agricultural areas using the *Agriculture Parcels - Detailed Use (Updated, April 2024)* dataset as reference. For instance, areas classified as grazing land or dry-land field crops were assigned mature grassland fuel models (Fuel Model GR4) to reflect conditions that could occur if agricultural activities were discontinued and vegetation conditions were to revert to unmanaged grasslands.

Managed Grasslands (Scenario 2):

As presented below in Exhibit 6, the region is dominated by extensive agricultural lands and unvegetated areas which have resulted in substantial reductions in grassland fuels. For the more realistic managed grassland scenarios, fuel models were altered based on the specific agricultural use as detailed in the *Agriculture Parcels - Detailed Use (Updated, April 2024)* dataset as reference. For example, irrigated row crops were classified as non-burnable (Fuel Model NB1), while grazed areas and dryland crop fields were classified as very low-load grasslands (Fuel Model GR1) to reflect grassland following harvest/significant grazing.

Given the large scale of land management in lands surrounding the Specific Plan site, Scenario 2 is considered a more likely prediction of typical fire behavior for the Specific Plan. Historical grazing and agricultural practices which have occurred consistently over recent decades are expected to continue throughout all phases of development as detailed in Appendix C, therefore continuing to provide wildfire mitigation benefits to the Specific Plan site and surrounding areas. While very unlikely, Scenario 1 is provided to analyze the absolute worst-case fire scenario near the Specific Plan site.

Other wildfire metrics including wildfire suppression difficulty and wildfire hazard potential were also assessed and both highlight the low-relative wildfire hazard of the Specific Plan and surrounding areas. The majority of the site and surrounding areas were classified as having low to very low suppression difficulty due to the presence of manageable grass fuels, agricultural lands, and easy access. The implementation of the Specific Plan is expected to further reduce suppression difficulty by converting a large portion of the land into developed areas, which would limit the availability of combustible fuels. Wildfire hazard potential is also considered low, suggesting that large-scale, high-intensity wildfires are unlikely in this area.

Exhibit 6. Grey areas depict agricultural and other non-burnable areas in the region.



Source: Agriculture Parcels - Detailed Use (Updated, April 2024, SHCP Vegetation Land Cover (LSA, 2024))

Exhibit 7. Example of managed (left) and unmanaged (right) grassland conditions.



Based on the post-development vegetation conditions, five different fuel models were used in the fire behavior modeling effort presented herein. Tables 3 and 4 describe the fuel models observed that were subsequently used in the analysis for the Specific Plan. Modeled areas include unmanaged annual grasslands, grazed grasslands, dryland crop fields, irrigated row crops and orchards, Specific Plan open spaces and landscaped areas, and development areas.

Table 3. Existing Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet) ¹
GR1	Short, Sparse Dry Climate Grass	Grazed grasslands and post-harvest conditions of dryland crop fields. Specific Plan open spaces committed to ongoing grazing management	0.4 ft.
GR 4	Moderate-load Dry Climate Grass	Representative of unmanaged annual grasslands	2.0 ft.
FM 8	Low-load ground fuels	Representative of landscaped Specific Plan open spaces and parks	0.2 ft.
NB1	Non-burnable	Development areas, irrigated crop fields, roadways, and marshlands	0.0 ft.

Note:

¹ Listed fuel bed depths reflect the fuel models that best depict the vegetation in and around the Specific Plan site and not an exact measure of local vegetation (Anderson 1982; Scott & Burgan 2005).

In addition to the Landscape file, wind and weather data were incorporated into the model inputs to represent fire behavior and spread during offshore wind (97th percentile) conditions for landscape fire behavior, as well as 90th percentile onshore winds for certain fire progression modeling scenarios. Winds from the north and northeast bring warm and dry air to the region and increase the potential for wildfire ignition and spread.

Fuel moisture inputs for both 97th and 50th percentile conditions were obtained from Remote Automatic Weather Stations closest to the Specific Plan site (Brooks: 042202, Black Diamond: 043008, Altamont: 043047). Wind speed and direction values were obtained from the Travis Airforce Base Weather Station Records (2004-2024). Table 4 summarizes the weather and wind input variables used in the FlamMap modeling process.

Table 4. Variables Used for Fire Behavior Modeling

Model Variable	Peak Offshore Weather (97th Percentile)	Onshore Weather (90th Percentile)
1 h fuel moisture	2%	5%
10 h fuel moisture	3%	6%
100 h fuel moisture	7%	10%
Live herbaceous moisture	30%	40%
Live woody moisture	60%	80%
20 ft. wind speed	19 mph	17 mph
Wind Directions from north (degrees)	85 degrees	240

4.4.2 Fire Behavior Modeling Results

Three metrics of fire behavior were determined and include flame length, rate of spread, and fireline intensity. Flame length, the length of the flame of a spreading surface fire within the flaming front, is measured from midway in the active flaming combustion zone to the average tip of the flames (Andrews, Bevins, and Seli 2004). It is a somewhat subjective and non-scientific measure of fire behavior but is extremely important to fire suppression personnel in evaluating fireline intensity and is worth considering as an important fire variable (Rothermel 1991). Fire spread rate represents the speed at which the fire progresses through surface fuels and is another important variable in initial attack and fire suppression efforts. Fireline intensity is a measure of heat output from the flaming front and also affects the potential for a surface fire to transition to a crown fire.

The results of the fire behavior modeling analysis are presented graphically in Figures 6 through 17. In addition, expected fire behavior for each fuel type is provided below in Table 5. Values for each fuel type were determined by calculating the average across each fuel type within the assessment area.

Table 5. Anticipated Fire Behavior - Unmanaged Fuel Beds (Worst-Case)

Fuel Model	Flame Length (ft)	Rate of Spread (chains/hr)	Fireline Intensity (BTU/ft-sec)
Gr1	3.1	37.6 (0.5 mph)	67
FM8	2.6	10.4 (0.1 mph)	46
Gr4	18.5	252.2 (3.2 mph)	9,048
NB91	0	0	0

As presented in Figures 6 through 17, the Specific Plan will convert a large area of grassland and agricultural areas into development areas and open spaces. This results in a large continuous area of development that is not conducive to wildfire ignition and spread due to the lack of flammable fuels. In areas adjacent to the Specific Plan site, wildfires ignite and spread through grassland fuels. Grasses are fine fuels that are loosely compacted with a low fuel load.³ Grasses have a high surface-area-to-volume ratio, requiring less heat to remove fuel moisture and raise the fuel to ignition temperature. They are also subject to early seasonal drying in late spring and early summer. Live fuel moisture content in grasses typically reaches its low point in early summer, and grasses begin to cure soon after. Due to these characteristics, grasses have the potential for a high rate of spread, rapid ignition, and facilitation of high severity fire behavior. However, their low overall fuel loads typically result in faster moving fires with lower flame lengths and heat output. Unlike other fuels such as shrubs, grasses typically burn out quickly and do not present long extended periods of heat output.

Unmanaged Grasslands (Scenario 1):

When considering unmanaged conditions prior to the reduction of grass fuel loads through grazing management and dryland field crop harvest, flame lengths are predicted to reach a maximum of 18.5 feet. This represents a worst-case scenario for this fuel type, and observed flame lengths across the landscape are likely more variable due to variation in fuel loading due to grazing/harvesting. During a wind event with sustained 19 mph winds, maximum wildfire spread in this vegetation type is modeled to be roughly 3.2 mph, with fireline intensities peaking at 9,048 BTU/ft-sec.

Managed Grasslands (Scenario 2):

A significant reduction in wildfire severity is modelled when assuming managed grassland conditions, which is appropriate given historic grazing practices. During this scenario, fuel models in grazing lands and dryland crop fields were reassigned to reflect the reduction of fuel loads as a result of grazing and crop harvesting. Actively grazed landscapes, including many areas surrounding the Specific Plan, limit the severity of wildfire due to reductions of grassland fuel loads. Flame lengths have been found to be significantly reduced when grassland fuel loads are managed to under 1,225 pounds per acre (Ratcliff et al., 2022). Although a different practice, annual harvesting of dryland crop fields performs a similar function to grazing and substantially reduces grassland fuel loads. When considering the implementation of these management practices, flame lengths in grassland fuels are substantially reduced and predicted to reach a maximum of 3.1 feet. Rate of spread and fireline intensity is also reduced, modeled at 0.5 mph and 67 BTU/ft-sec respectively.

Model results should be used as a basis for fire protection planning only, as actual fire behavior for a given location would be affected by many variable factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns.

Wildfire Behavior in Specific Plan Area Open spaces

The proposed open space land uses are explained in Specific Plan Description section. As shown in Figures 6 through 17, modeled wildfire behavior indicates very low fire intensity within the Specific Plan's designated open space areas. In particular, the perimeter open space zones (Landuse Code: OS) are projected to experience minimal fire behavior due to both landscape characteristics and proactive fuel management strategies. The Specific Plan is committed to maintaining these areas as fire-resilient landscapes through the implementation of active grazing

³ The amount of available and potentially combustible material, usually expressed as tons per acre (NWCG 2022).

management (Appendix C). This ongoing practice effectively reduces fine fuel continuity and grassland fuel loads, which significantly decreases fireline intensity, flame length, and rates of spread (Ratcliff et al., 2022).

Modeling results show that, under worst-case fire weather conditions, flame lengths in these perimeter open space areas are expected to reach a maximum of only 3.1 feet, with a slow rate of spread at approximately 0.5 miles per hour. These fire behavior metrics fall well below thresholds associated with high wildfire hazard potential and suggest that fire suppression efforts would be effective and safe in these zones, especially considering the response times and staffing proposed in the Fire Department Infrastructure Plan.

Within the Specific Plan's other open space areas (Land Use Codes: OSI, OSC) maintained landscaped and irrigated vegetation are not expected to facilitate fire spread. However, if these areas were to burn, model results suggest that fire intensity would be extremely low with maximum flame lengths below 3 feet.

In addition to the grazing-managed open space, the Specific Plan incorporates a mandatory 200-foot fuel modification zone along the interface between open space and developed areas that is subject to enforcement and would be provided either through grazing or mechanical abatement as necessary to provide a reliable fuel break. This zone is designed to further reduce available fuels through thinning, spacing, and strategic planting, while also providing defensible space for firefighting operations. Further, the Specific Plan proposes peripheral roadways that encircle the Specific Plan site, providing a complete perimeter fuel break. Together, the perimeter open space areas, peripheral roadways, and fuel modification zone form a buffer system that greatly limits the ability of wildfire to encroach and produce high fire intensity near developed areas.

4.4.3 Wildfire Behavior Summary

The Specific Plan site is anticipated to be at very low risk from wildfire due to a combination of managed landscapes, proactive fuel reduction strategies, and site-specific design features. In managed grasslands, which include grazing lands and dryland crop fields, fuel loads are significantly reduced by livestock grazing and annual crop harvesting. These actions lower the number of fine fuels available to carry fire, resulting in substantially diminished fire behavior. Modeling shows that under managed conditions, flame lengths are limited to a maximum of 3.1 feet, with a slow rate of spread at 0.5 miles per hour and low fireline intensity of 67 BTU/ft-sec—well below thresholds considered hazardous.

Within the Specific Plan's designated open space areas, wildfire behavior is similarly predicted to remain minimal. The perimeter open space zones (Land Use Code: OS), in particular, benefit from active grazing management, which effectively disrupts fuel continuity and reduces grassland biomass. Even under worst-case fire weather conditions, flame lengths are projected to remain at or below 3.1 feet in these areas, indicating fire intensity low enough to support safe and effective suppression efforts. Interior open space areas (Land Use Codes: OSI and OSC) contain irrigated or maintained vegetation that does not support fire spread. Should fire occur, the resulting behavior would be extremely low in intensity, with flame lengths remaining below 3 feet.

Based on the modeling results, the wildfire risk at the Specific Plan site is low, particularly with the management of fuels like grasslands and agricultural fields, which concurs with the findings from The Office of the State Fire Marshal and the area not being designated as a fire hazard severity zone. While wildfires can still occur, their intensity and spread are expected to be manageable, and the site's development will further reduce the potential for severe fire hazards. With the Specific Plan's conversion of the landscape to hardscape and ignition-resistant development, wildfires may still encroach towards the Specific Plan site but would not be expected to burn through the site due

to the lack of available fuels. This is due to the conversion of landscapes to ignition resistant, maintained areas, lower hazard grassland fuels and agricultural areas, more human monitoring areas resulting in early fire detection and discouragement of arson, and fast response from the fire suppression resources that are located within these developing areas.

In a worst-case scenario, unmanaged grasslands provide a manageable fire that would fail to impact the Specific Plan site as a result of the 200-foot peripheral fuel modification zone, which is more than ten times the length of the anticipated flames. The fire would be starved of fuel before impacting the Specific Plan site.

While it is true that humans are the cause of most fires in California, there is no data available that links increases in wildfires with the development of ignition-resistant communities. The Specific Plan would include a robust system of fire protection, as detailed in this FPP. This same fire protection provides for protections from on-site fire spreading to off-site vegetation. Accidental fires within the landscape or structures would have limited ability to spread. The landscape throughout the Specific Plan and on its perimeter would be highly maintained and much of it irrigated, which further reduces its ignition potential. The abundance of roadways, including the large roadways surrounding the Specific Plan area, provide complete fuel breaks.

4.5 Fire Progression Modeling

Fire progression modeling is a method used to simulate and predict how wildfire may spread across a landscape over time based on key environmental and fire behavior variables. This approach provides insights into potential fire growth, intensity, and timing under various conditions. Additionally, fire progression modeling identifies certain landscape features, such as agricultural areas, roadways, and managed grasslands that alter fire spread patterns.

4.5.1 Fire Progression Modeling Analysis

The modeling process relies on several spatial data inputs, including topography and fuel characteristics such as vegetation type and fuel loading as previously described. Weather conditions, including fuel moisture, wind speed, and wind direction, are also critical inputs, as they significantly influence the rate and direction of fire spread. In addition, ignition points must be defined to represent the likely origin of a fire. The fire progression modeling utilized three ignition locations which, along with the weather inputs, are described below.

Eastern Ignition: An ignition near SR-12 near Rio Vista roughly 2 miles east of the Specific Plan site. Fire spread is driven by northeast winds at 19 mph (97th percentile weather).

Southern Ignition: An ignition near Birds Landing Road near the intersection with Collinsville Road roughly 3 miles south of the Specific Plan site. Fire spread is driven by southwest winds at 17 mph (90th percentile weather).

Western Ignition: An ignition near SR-12 and Denver Road roughly 2 miles west of the Specific Plan site. Fire spread is driven by southwest winds at 17 mph (90th percentile weather).

Fire progression was simulated from each of the three ignition locations to evaluate both managed and unmanaged grassland conditions. Additionally, progression was modeled to simulate fire spread during pre-development conditions, Phase 1 buildout, and full buildout for each ignition point and vegetation scenario.

4.5.2 Fire Progression Modeling Results

The Minimum Travel Time (MTT) tool in the FlamMap software package is a two-dimensional fire growth model which calculates fire growth based on calculated fire spread rates from an ignition source (point, line, or polygon). The MTT tool uses fire spread rates to find minimum travel paths between data cells in the GIS landscape, with an output data file representing the number of minutes for a wildfire to reach a particular location from the ignition source. As FlamMap provides a static representation of fire behavior, modeling using the MTT tool holds wind and weather inputs constant over the modeling period. Each MTT simulation was assigned a burn period of 6 hours (360 minutes).

The output files generated for each of the fire progression runs included one grid and one contour file representing fire progression over time, considering modeling inputs and ignition location. The files include data presenting time (in minutes) for a modeled fire to reach a specific location. This data was analyzed to determine the time necessary for a fire to burn from its ignition point to the Specific Plan site. For some scenario inputs, the modeled fire did not reach the Specific Plan site. This is due to the classification of non-burnable and low load grass fuel models associated with working agricultural lands surrounding the Specific Plan site. Maps depicting the fire progression outputs are included in Figures 18 through 32.

Managed Grasslands

As previously discussed, the region's landscapes are actively managed through a combination of grazing and crop cultivation. These practices significantly reduce grassland fuel loads, creating a patchwork of managed areas across the region. The resulting fuel discontinuity interrupts wildfire spread, as reduced or absent fuels in these zones slow fire progression—often to the point of halting it entirely. The following sections summarize fire progression analysis for managed landscapes originating from the eastern, southern, and western ignition points under pre-development conditions, Phase 1 buildout, and full buildout scenarios.

For all three ignition locations assuming managed landscapes, wildfire spread is not modeled to reach the Specific Plan site following both Phase 1 and full Specific Plan buildout. Given intensive crop cultivation along SR-12 adjacent to the eastern ignition location, the eastern ignition scenario does not produce wildfire spread whatsoever. As evidenced below in Exhibit 8, minimal vegetation in this location does not facilitate wildfire spread and ignition.

Exhibit 8. Agricultural operations along SR-12 adjacent to the eastern ignition location prevent wildfire ignition and spread.



Fire Progression from the southern ignition location considering managed landscapes spreads in a northeast direction driven by 17 mph onshore winds from the southwest (Figures 20, 25, and 30). The fire travels at a moderate rate of spread through a mix of managed and unmanaged grasslands. The fire's flaming front eventually reaches heavily managed grassland areas, and the rate of spread is slowed dramatically. Forward progress eventually stops, and the fire is halted roughly 2 miles south of the Specific Plan boundary.

Fire Progression from the western ignition location results in a very slow spreading wildfire, spreading to the northeast driven by 17 mph southwest winds (Figures 22, 27, 32). The fire slowly burns through actively grazed landscapes with minimal fuel loading. The fire's flaming front does not reach the Specific Plan boundary from this ignition location when considering managed landscapes.

Unmanaged Grasslands

The following summarizes fire progression results when considering unmanaged grasslands from the three ignition locations for pre-development, Phase 1 buildout, and full Specific Plan build out conditions.

Eastern Ignition: Wildfire spread from the eastern ignition location considering unmanaged landscapes travels at a moderate to fast rate of spread in a western direction driven by 19 mph winds from the northeast (Figures 18, 23, 28). Given the absence of managed grasslands, fire spreads continuously through grassland vegetation. Wildfire spread reaches the Specific Plan boundary in roughly 50 minutes. However, given the fire's western direction of spread which is not directly towards the Specific Plan site, fire behavior along the Specific Plan's northern edge would represent a flanking fire. Unlike head fires, which move in the direction of the wind and exhibit greater fire severity, flank fires move parallel to the wind direction and therefore burn at reduced severity.

In addition to increased likelihood of successful suppression of a flank fire in the Specific Plan's southern edge, potential wildfire impacts in this area following Phase 1 and full Specific Plan build out would be mitigated by perimeter open spaces, the 200-foot fuel modification zones, and fire-hardened buildings and development areas. During Phase 1 conditions, the fire's flaming front reaches perimeter open spaces in roughly 90 minutes. However, model results suggest that fire spread is greatly slowed within perimeter open spaces due to managed grasslands and perimeter fuel modification zones. In addition, SR-12 along the southern edge of the Specific Plan site functions as a natural fuel break and prevents wildfire spread further into the Specific Plan area. Following full Specific Plan buildout, the fire's flaming front is modeled to reach perimeter open space areas in roughly 50 minutes. Similar to Phase 1 conditions, the fire's interaction with the Specific Plan area is representative of a flanking fire with moderate to low intensity. Managed landscapes within the Specific Plan's perimeter open space areas rapidly slow fire spread and minimize risks to development areas.

Southern Ignition: Wildfire spread from the southern ignition location considering unmanaged landscapes travels at a slow to moderate rate of spread in a northeastern direction driven by 17 mph winds from the southwest (Figures 19, 24, 29). The fire spreads through continuous grassland vegetation and eventually reaches the southern edge of the Specific Plan boundary in roughly 145 minutes. However, onshore weather conditions result in low to moderate intensity wildfire behavior in this area. Following Phase 1 build-out, fire spread along the Specific Plan's southern edge is greatly slowed due to managed landscapes within perimeter open space areas, as well as the 200-foot Fuel Modification Zone. The same effect is modeled to occur following full Specific Plan buildout.

Western Ignition: Under unmanaged conditions, wildfire originating from the western ignition point spreads in a northeastern direction at a slow to moderate rate, driven by 17 mph southwesterly winds (Figures 21, 26, 31). The fire advances through continuous grassland vegetation, reaching the northwestern edge of the Specific Plan Area in approximately 220 minutes. Because the fire moves away from the Specific Plan site, fire behavior along its northwestern boundary would reflect flanking fire conditions. Unlike head fires, which align with wind direction and exhibit higher intensity, flanking fires burn parallel to the wind and typically display lower severity. Additionally, onshore weather conditions contribute to generally low to moderate fire intensity along the Specific Plan boundary.

With Phase 1 implementation, fire spread along the Specific Plan's western edge is significantly reduced due to fuel load reductions from managed landscapes in perimeter open space areas and the presence of a 200-foot Fuel Modification Zone. This slowing effect is also observed in modeling for the full buildout scenario.

4.6 Fire Brand Hazards and Risks Associated with Vegetation Fuels

As previously discussed, airborne embers produced by a fire, commonly referred to as firebrands, are pieces of burning materials which become airborne in the fire's thermal column, and which are carried for some distance in

an airstream (Babrauskas 2020). Similar to firebrands produced by burning structures, firebrands produced by burning vegetation can cause new ignitions ahead of the main body of the fire, a phenomenon defined as spotting. Spotting occurs when airborne firebrands return to the ground and land in a receptive fuel bed or on combustible materials that are not ignition resistant. Wildfire spotting is multi-faceted and occurs at varying levels of severity. Main drivers of wildfire spotting include (NWCG, 2021):

- Firebrand source, size, and quantity
- Firebrand travel distance
- Probability of ignition where firebrands land

Firebrands pose significant risk to communities. However, these risks can be mitigated through the implementation of fire-resistant construction methods, properly maintained landscaping, fuel modification zones, and ignition-resistant landscaping (NIST, 2022, Tacaliti, 2023). The following sections discuss wildfire hazards caused by vegetation firebrands. Factors influencing firebrand production, transport, and ignition are highlighted, emphasizing the importance of fire-resistant construction methods and defensible space.

4.6.1 Firebrand Generation

In extreme cases, fire spread by firebrands can become the dominant form of fire spread and overwhelm fire suppression efforts. In order for firebrands to pose a hazard, they must have had sufficient initial size to sustain enough heat during transport to ignite a receptive fuel bed (Babrauskas 2020). Firebrand size is influenced by an array of factors including fuel type, fire intensity, and wind speed (Adusumilli and Blunck, 2023, Suzuki and Manzello, 2022). However, the complex nature of firebrand production and spread remains relatively unstudied. Limited research exists regarding processes of firebrand generation and its relation to the source materials which produce firebrands (Manzello and Suzuki, 2023). The vast majority of available firebrand research is focused on transport of firebrands, with little research focused on the burnout process of firebrands following generation and transport (CBC, 2022).

Currently, no computed models exist for predicting firebrand generation. Instead, research into the topic relies on experimental studies. In general, greater fire intensity is found to generate more firebrands (Thomas et al. 2021). Fuel load, or the total amount of combustible fuels, has been found to be related to the severity of firebrand production. The total number of burning firebrands has been observed to increase alongside an increase in the height of trees or shrubs (Adusumilli et al., 2021).

4.6.2 Firebrand Transport

Firebrand transport is the most commonly studied component of firebrands. This is likely because the processes behind firebrand transport are the simplest to model. In addition, understanding maximum firebrand transport provides important information for firefighters and emergency managers during wildfires. Models predicting maximum firebrand transport or spotting distance account for factors such as fuel type, tree height and crown width, wind speed, spotting location (ex. Ridgetop, valley) (Albini 1979, Chase 1981, Rothermel 1983, Albini 1983, Chase 1984, Morris 1987). Before firebrands can travel downwind in the atmospheric air current, they first must be lofted into the air. Ember lofting leads to firebrands and is influenced by fire intensity, fuel loading, and terrain features (NWCG, 2021). Once airborne, firebrand transport distance is mainly driven by wind speed and firebrand size (Manzello and Suzuki, 2023).

4.6.3 Firebrand Ignition

Several properties influence a firebrand's ignition potential upon landing. Firebrand characteristics such as mass and size, thermal degradation or burnout, and environmental conditions (i.e. weather) greatly influence the potential for new ignition caused by firebrands (Bearinger et al., 2020). For example, firebrands may burn out completely in the atmosphere, or, after landing, undergo glowing combustion and die out, smolder, or transition into flaming and grow into a larger fire (Manzello et al, 2021). While the relationship between firebrand characteristics and ignition potential is understudied, several factors are known to mitigate structure losses from firebrands in the wildland-urban interface. It is known from general understanding of thermodynamics that the condition of the receptive fuels, both urban and natural, is a significant predictor of new ignitions from firebrands.

Ensuring code-compliant defensible space around structures has been found to mitigate structure losses from firebrands in the wildland-urban interface. Defensible space is often created in the form of fuel modification zones, which create buffers between natural vegetation and structures. In many jurisdictions, fuel modification zones within 30 feet of structures are required to be irrigated, further limiting the potential for firebrand ignitions. New research has shown that vegetation, decorations, and additional flammable material attached to a house are of the most important factors contributing to structure ignition from firebrands (IBHS, 2023). Research has also shown that firebrands more easily collect around the edges of structures and can significantly contribute to structure ignitions if fuels are readily ignitable (IBHS, 2023). In response to these findings, CAL FIRE has created a new defensible space zone, Zone 0, which requires the first 5 feet from structures to be void of combustible materials.

The condition of building materials themselves greatly determines structure losses from firebrands (NIST, 2022). Studies suggest that building construction is as important, if not more important, than defensible space in determining structure losses in the wildland-urban interface (Syphard et al. 2017). As mentioned previously, firebrands are responsible for the majority of all structure fire ignitions during a wildfire event. Chapter 7A of the California Building Code has been developed through partnership with experimental research into structure losses. Incorporating the building construction and design requirements outlined in Chapter 7A (ex. Roof type and assembling, exterior decking, siding materials, etc.) have been proven to mitigate structure losses from firebrand ignitions (NIST, 2022).

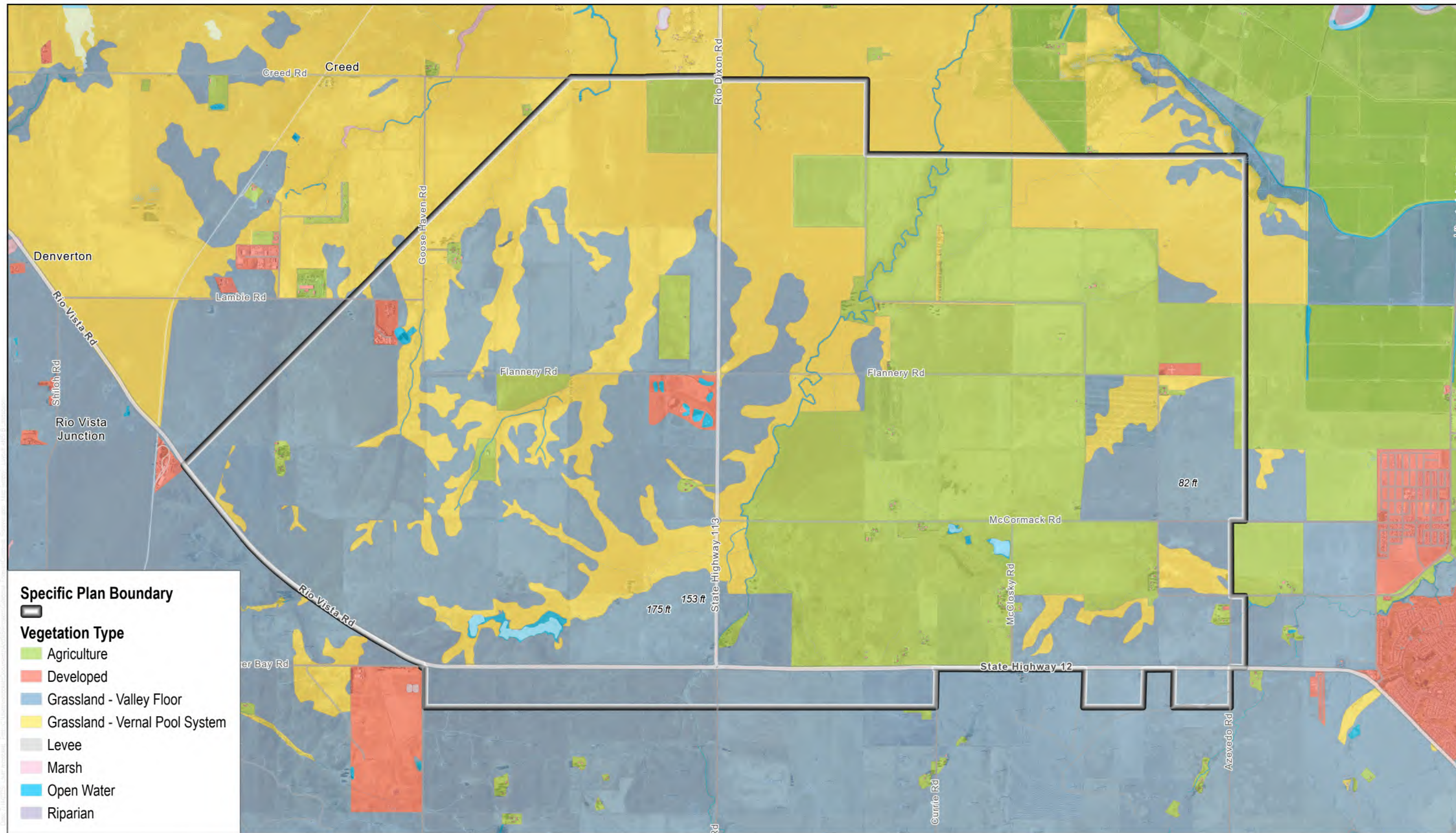
4.6.4 Specific Plan Area Firebrand Capacity

The vegetation surrounding the Specific Plan site is grass, which is a fine fuel that burns quickly and generally completely, especially when provided with ample oxygen for complete combustion via winds. As such, these fuels are expected to burn completely and not create fire brands. Further, due to the small physical structure of the fine grass fuels, it is anticipated that if an ignited piece of grass were to be separated and lifted into the air from convective thermal winds, there is not sufficient mass to prolong burning while the ember is aloft.

4.7 Wildfire Suppression Difficulty Assessment

Wildfire suppression difficulty quantifies relative fire suppression effort based on a variety of factors including topography, fuel type, fire behavior under extreme fire weather, fireline production rates in different fuel types using hand tools, and access (distance from roads, trails). The dataset for wildfire suppression difficulty was obtained from Pyrologix and the USDA Forest Service's Contemporary Wildfire Hazard Across California. This dataset classifies wildfire suppression difficulty in six classes.

As presented in Figure 33, *Wildfire Suppression Difficulty* which shows results for pre-development conditions, the majority of the Specific Plan site and surrounding landscapes are classified as either Low, Very Low, or Little to No Suppression difficulty. This is due to lower hazard grass fuels, extensive agricultural areas, flat to rolling terrain, and many road access points. These findings suggest that wildfires occurring within and surrounding the Specific Plan site would be capable of being quickly suppressed by responding personnel, which is supported by the lack of fires over 10 acres identified in the Fire History section of this report. Suppression difficulty is expected to be further reduced following the implementation of the Specific Plan which will convert a considerable portion of the landscape into developed areas, provide additional roadways to access the open space, provide quicker reporting of fire due to the increased population, and decreased response time that results from implementing the Fire Department Infrastructure Plan.



SOURCE: SHCP Vegetation Land Cover (LSA, 2023)

DUDEK



0 1,500 3,000
Feet

FIGURE 4
Vegetation

Suisun Expansion Project

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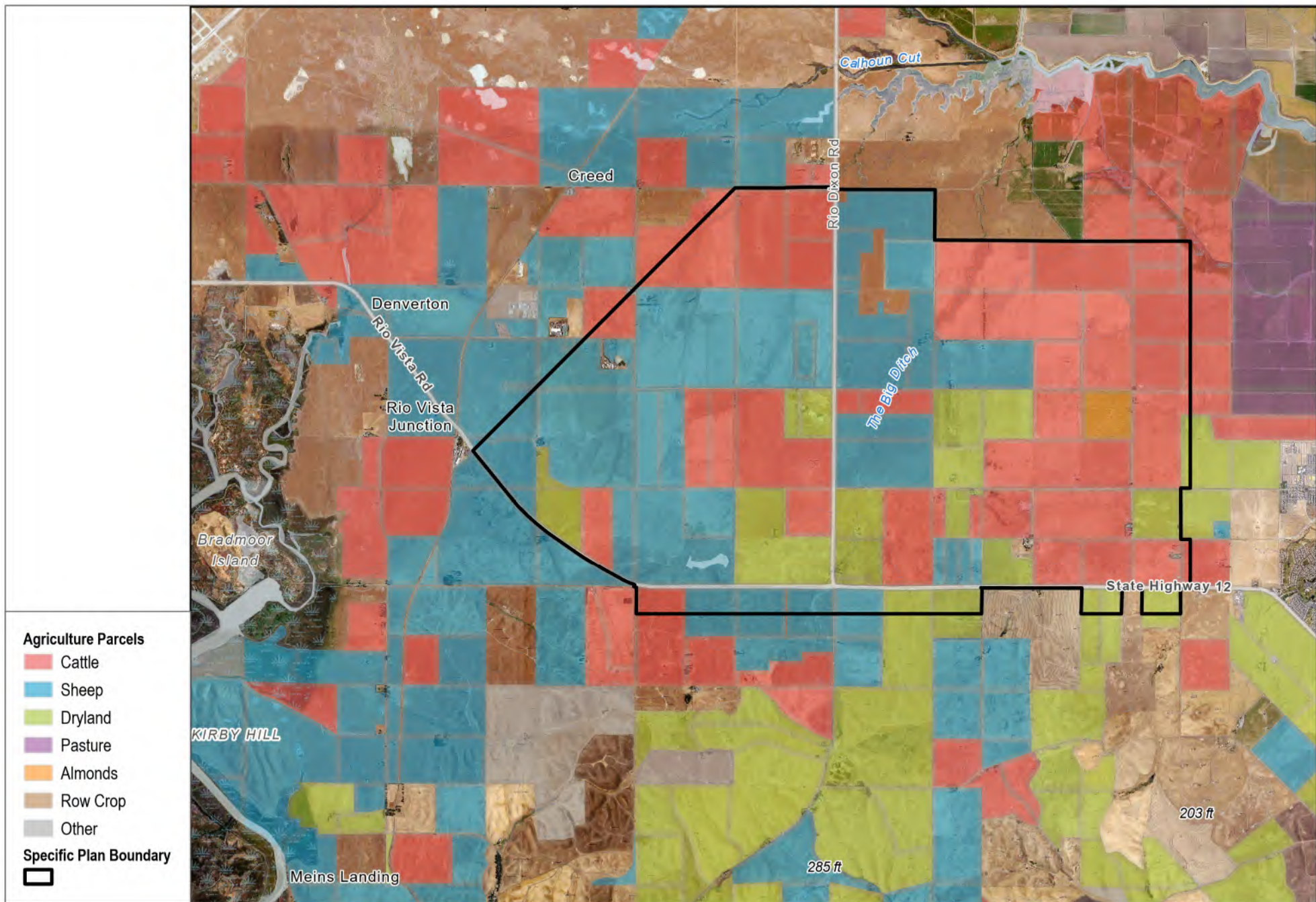


FIGURE 5
Agricultural Use Type
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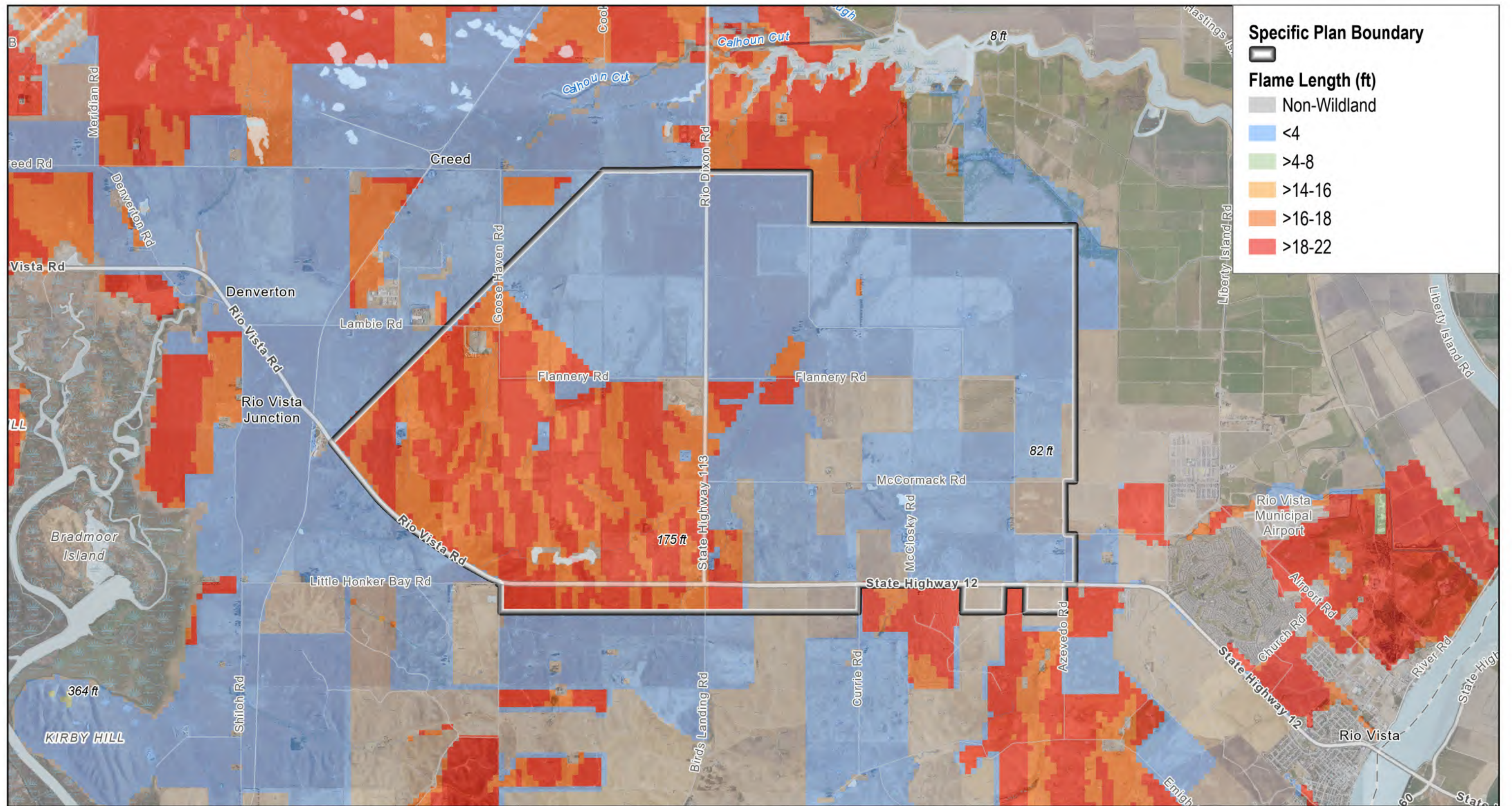


FIGURE 6
Pre-Development Flame Length - 97th Percentile Weather - Managed Grasslands

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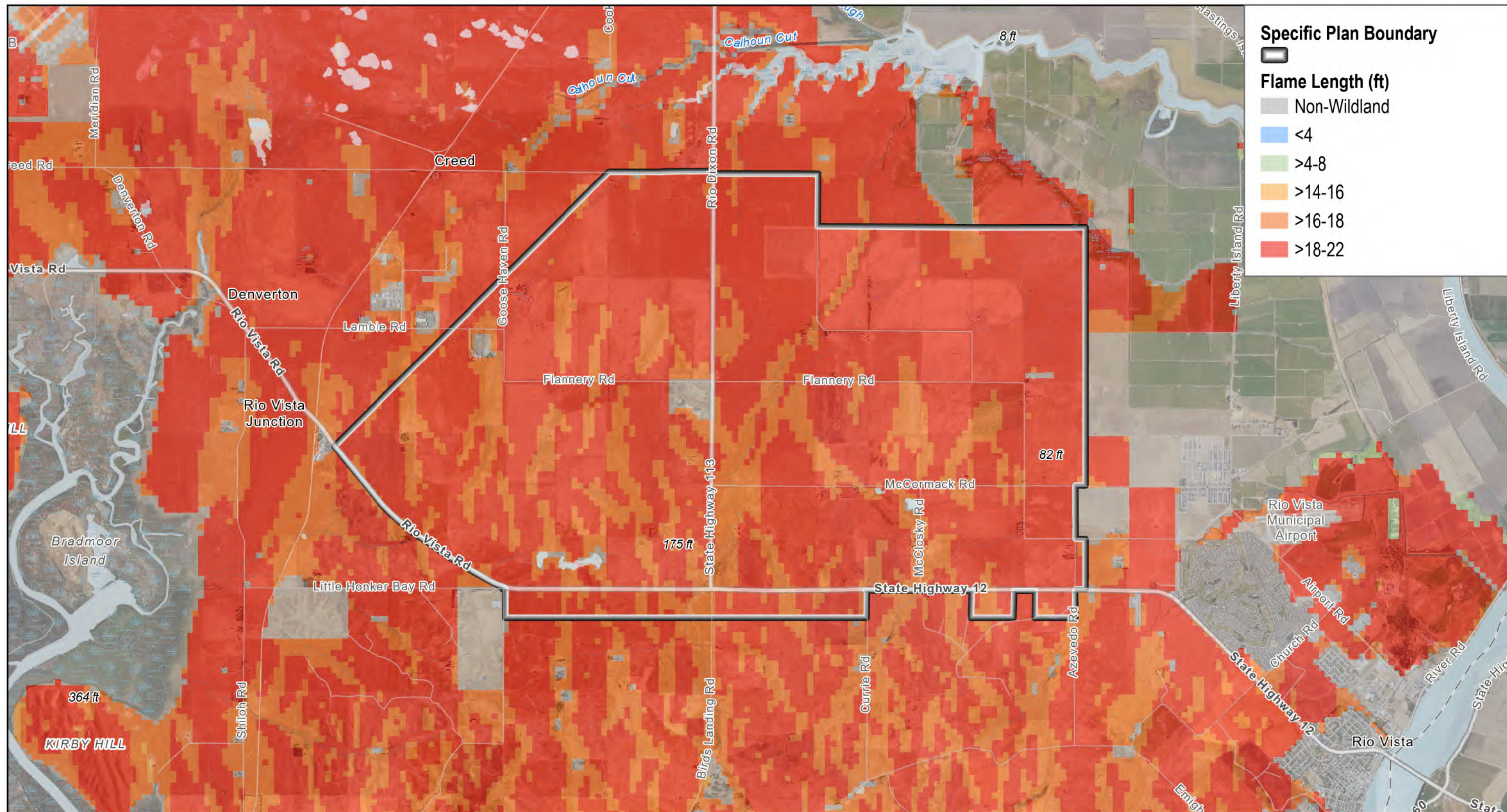


FIGURE 7

Pre-Development Flame Length - 97th Percentile Weather - Unmanaged Grasslands

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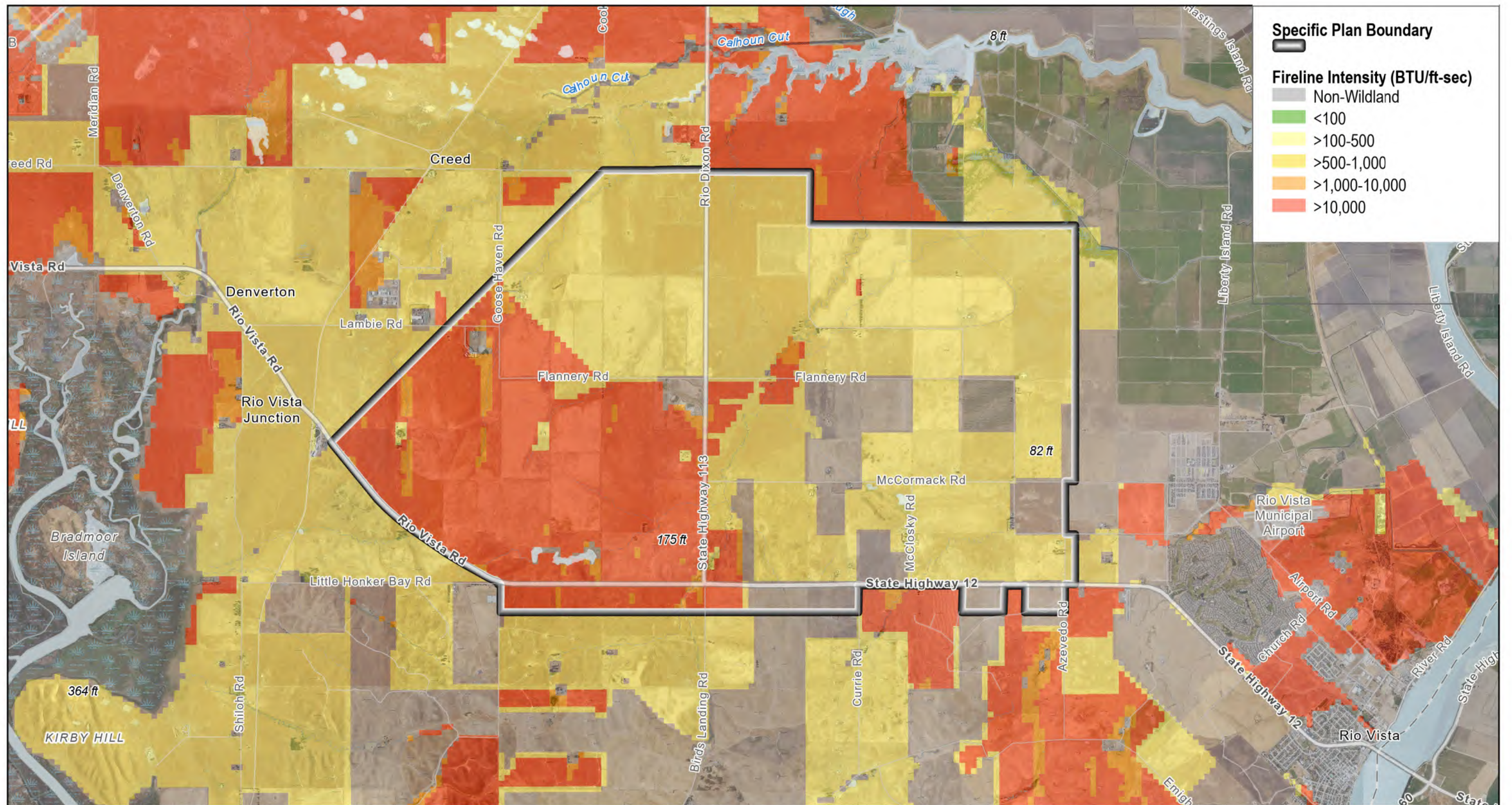


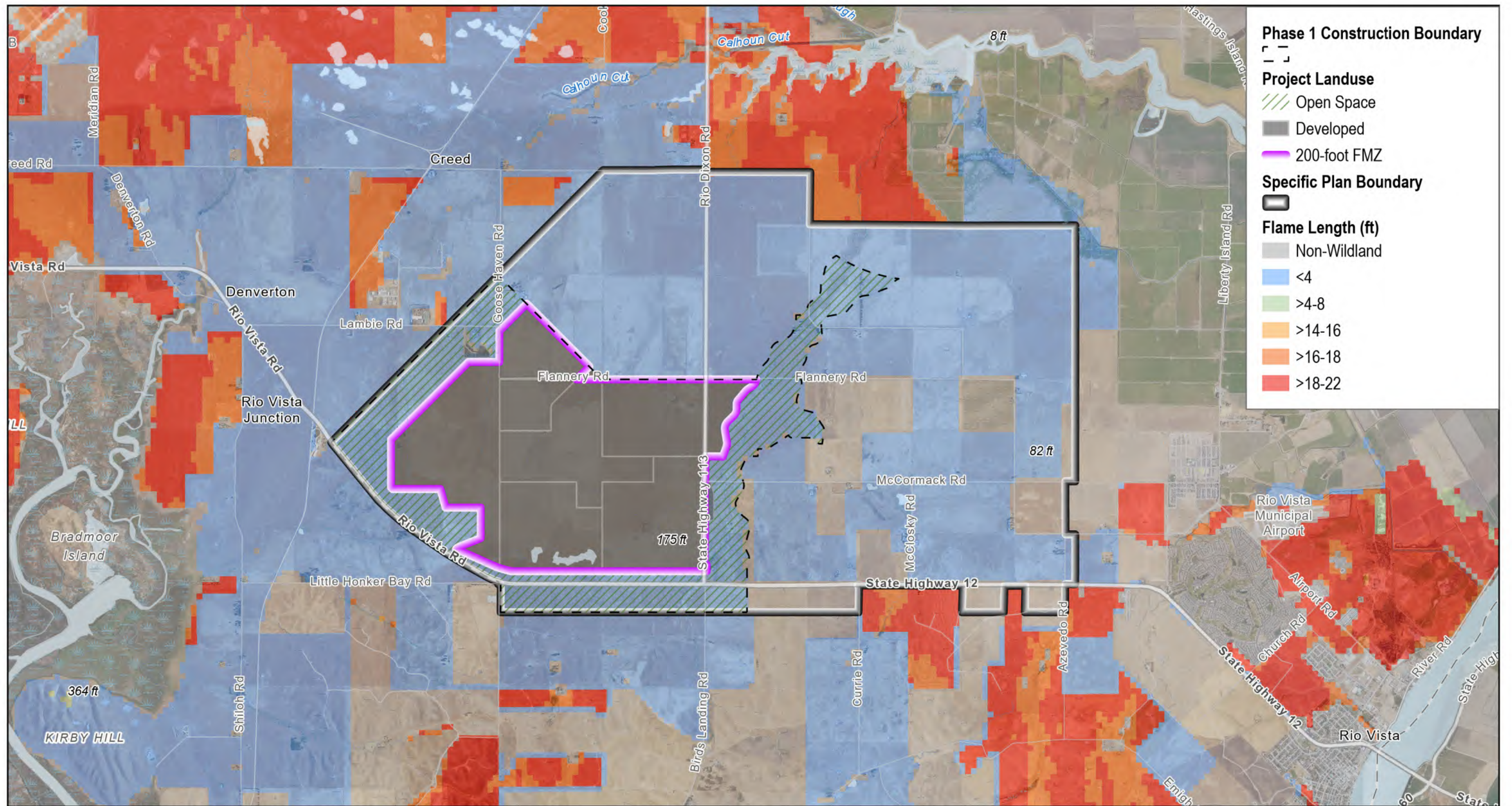
FIGURE 8

Pre-Development Fireline Intensity - 97th Percentile Weather - Managed Grasslands

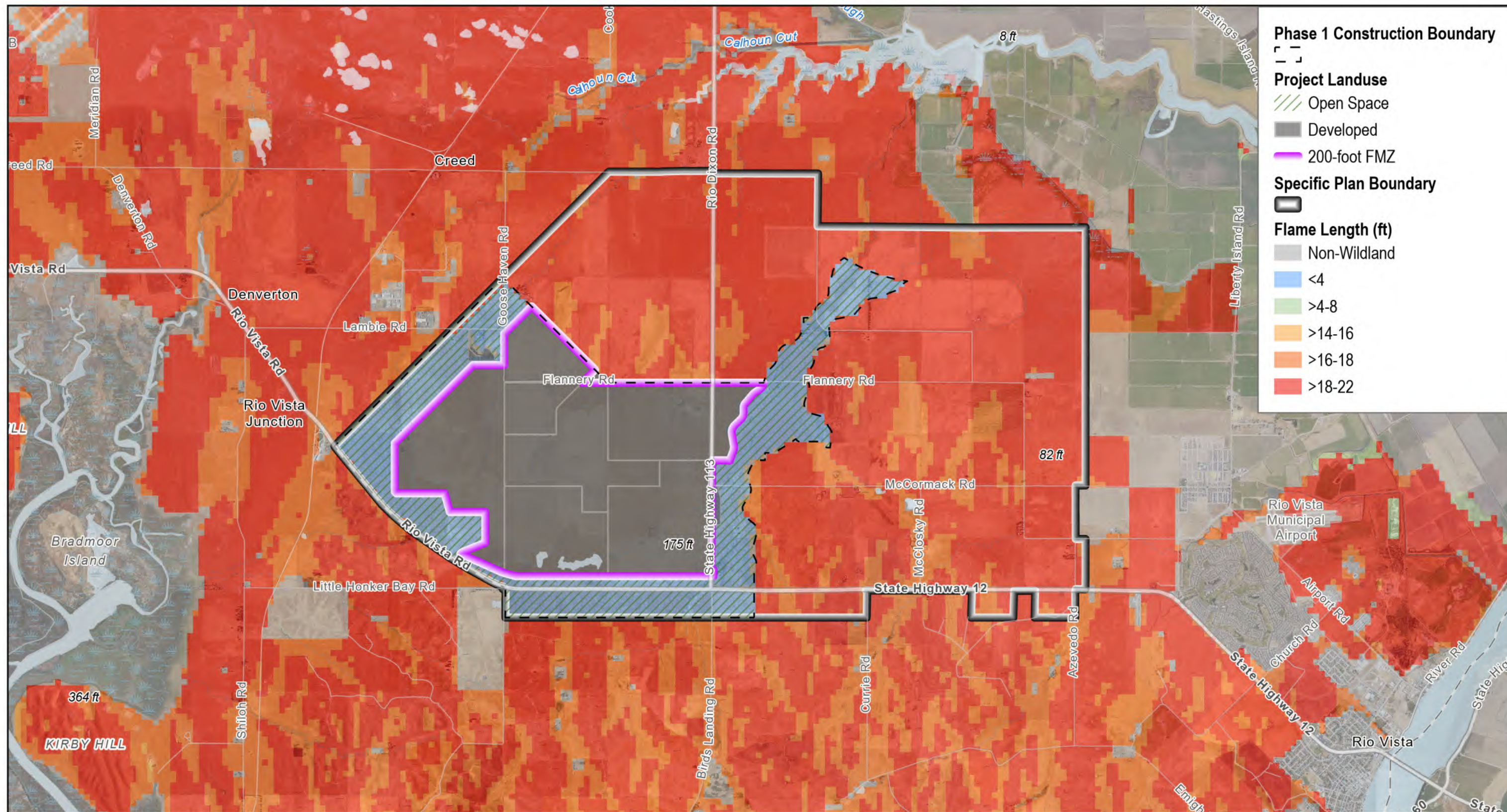
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DUDEK

0 0.75 1.5 3 Miles



FIGURE 11
Phase 1 Flame Length - 97th Percentile Weather - Unmanaged Grasslands

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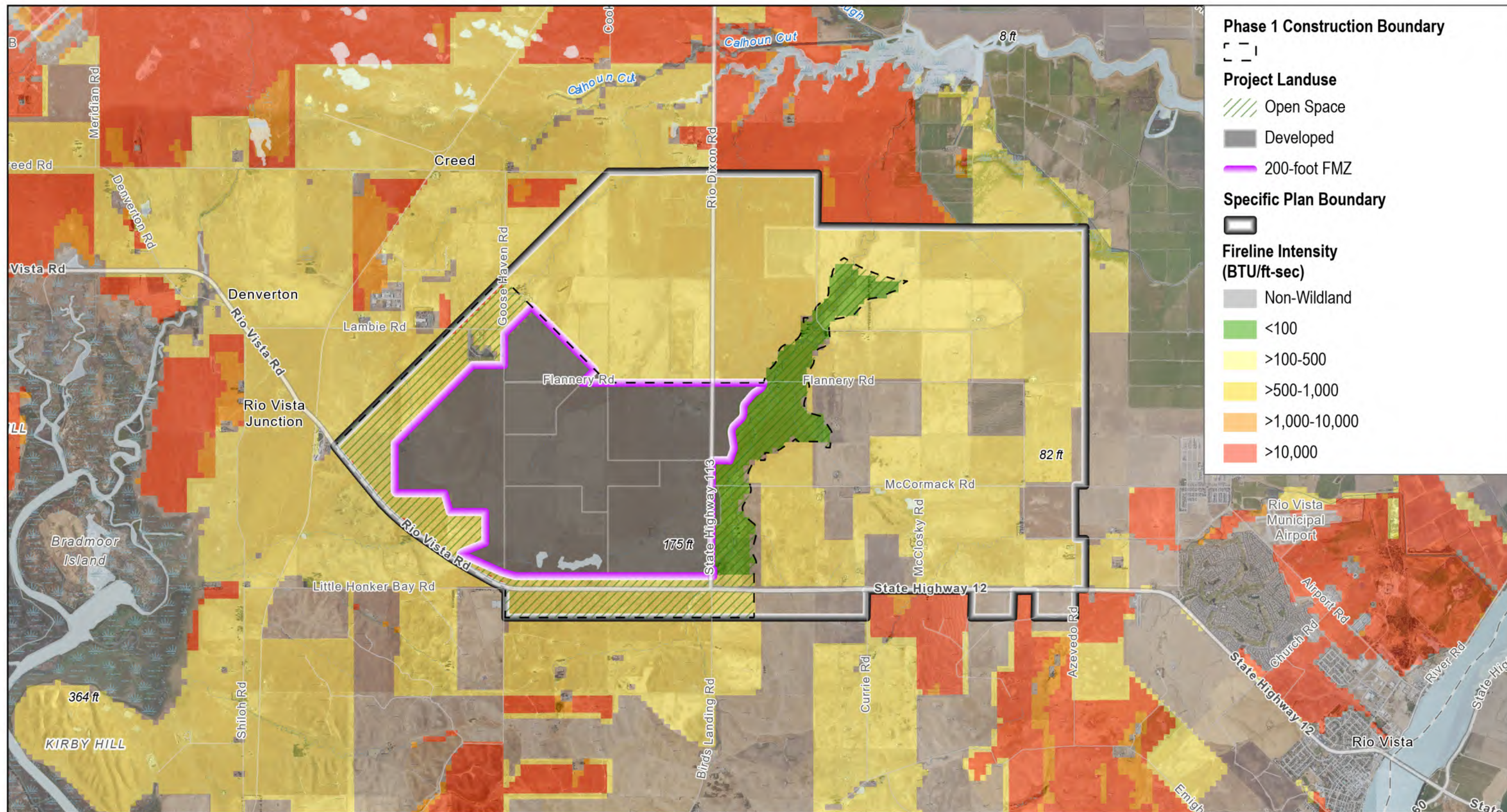


FIGURE 12

Phase 1 Fireline Intensity - 97th Percentile Weather - Managed Grasslands

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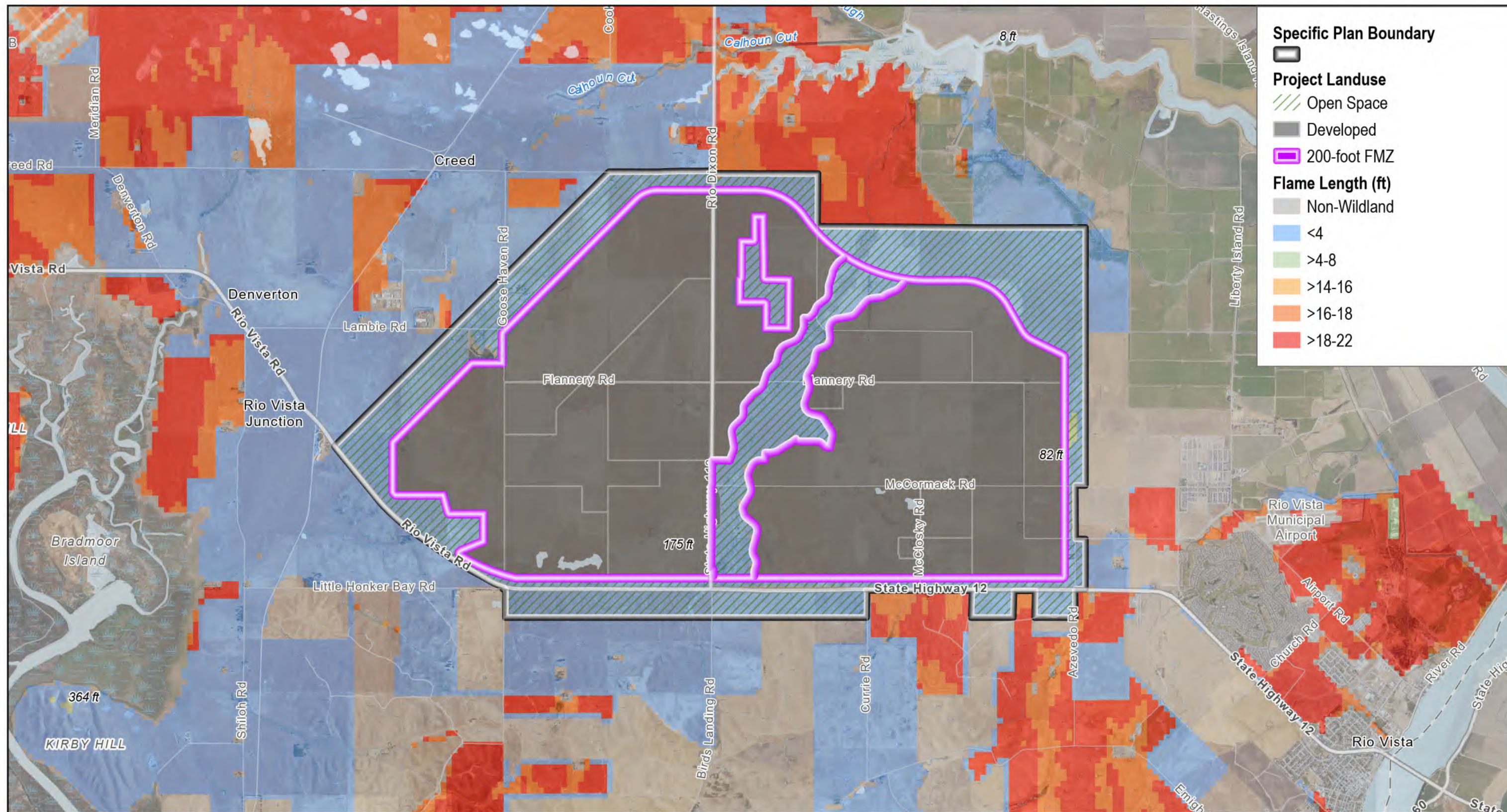


FIGURE 14

Full Buildout Flame Length - 97th Percentile Weather - Managed Grasslands

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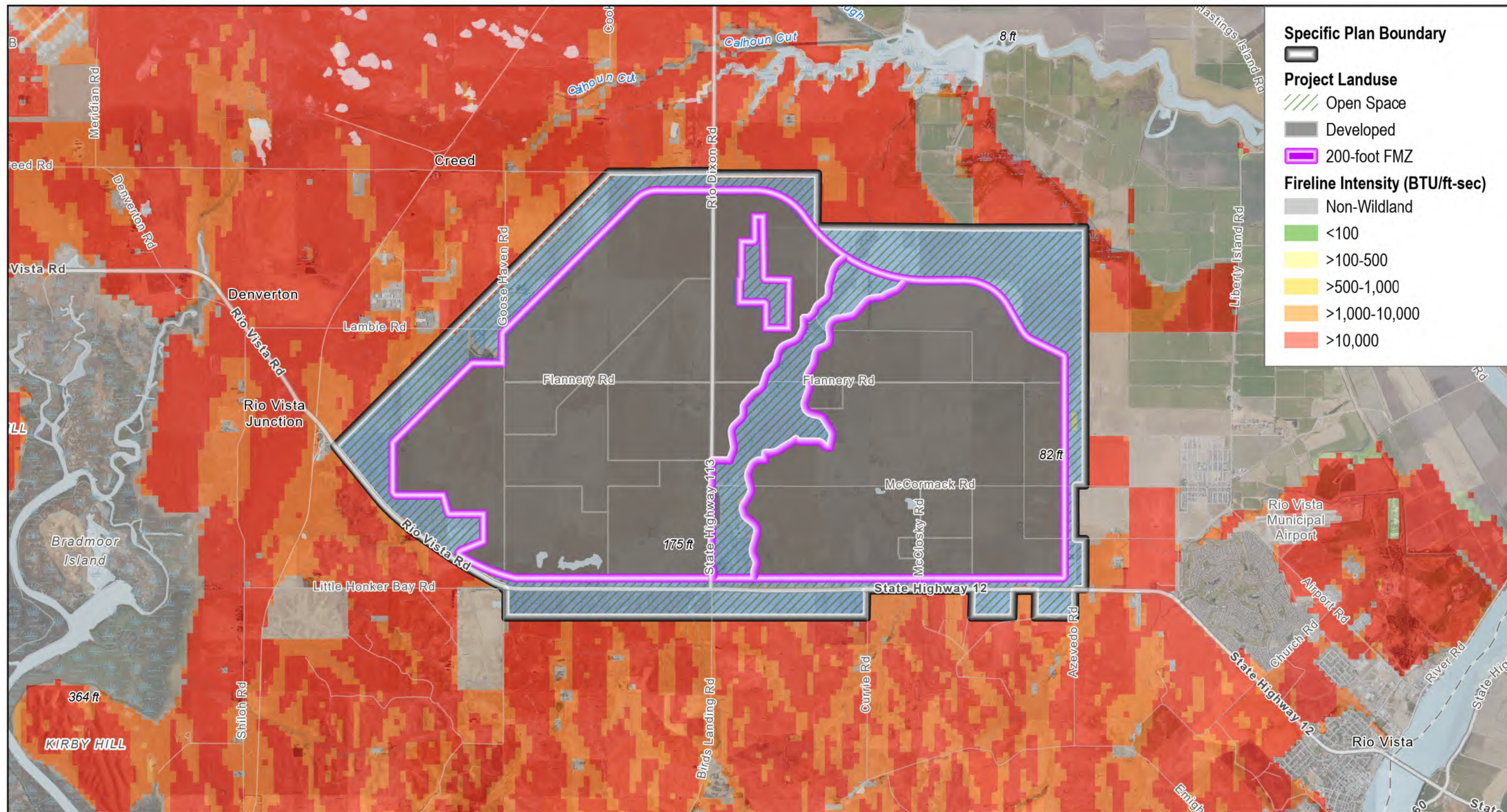


FIGURE 15

Full Buildout Flame Length - 97th Percentile Weather - Unmanaged Grasslands

Suisun Expansion Project

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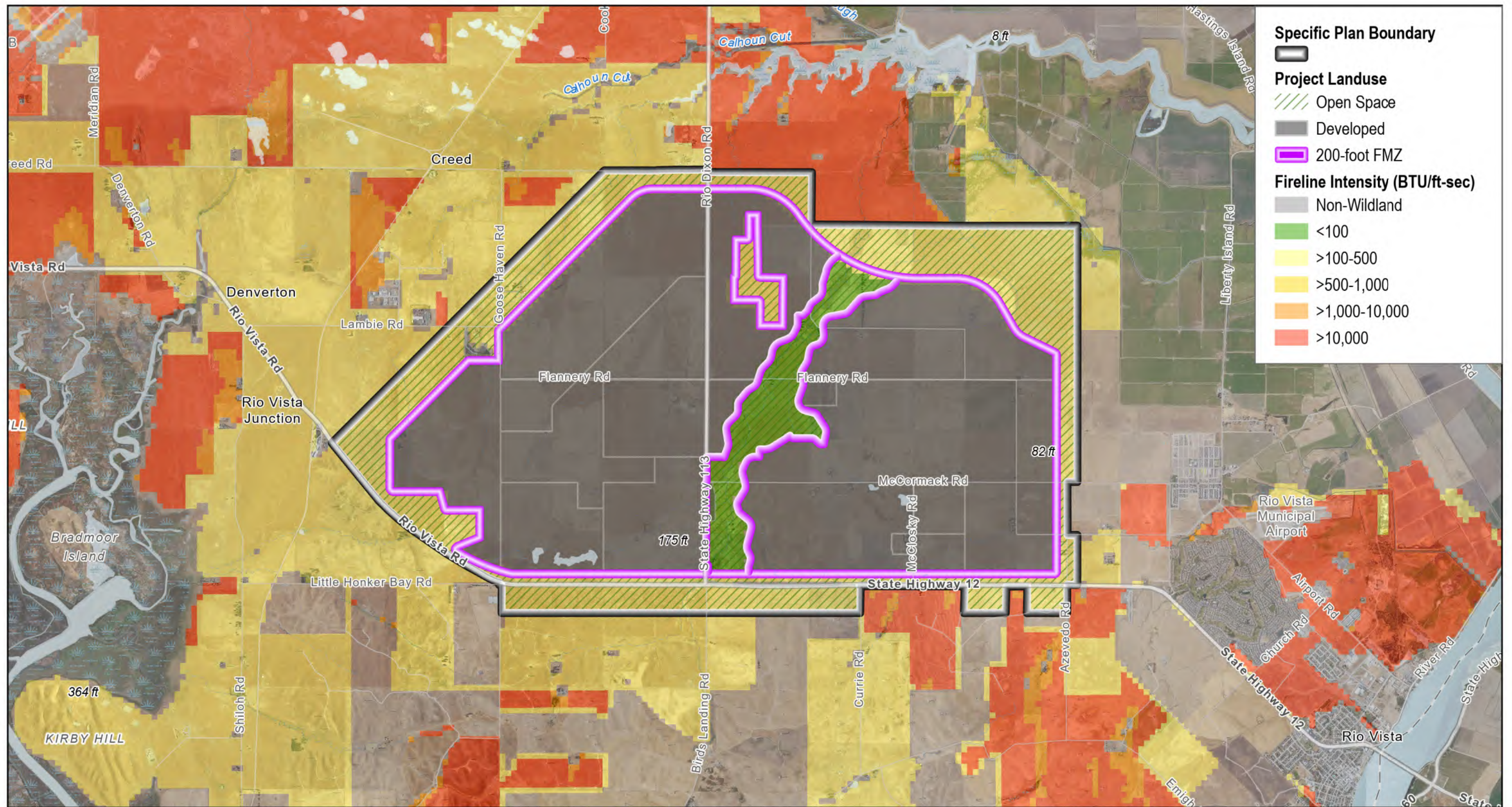


FIGURE 16

Full Buildout Fireline Intensity - 97th Percentile Weather - Managed Grasslands

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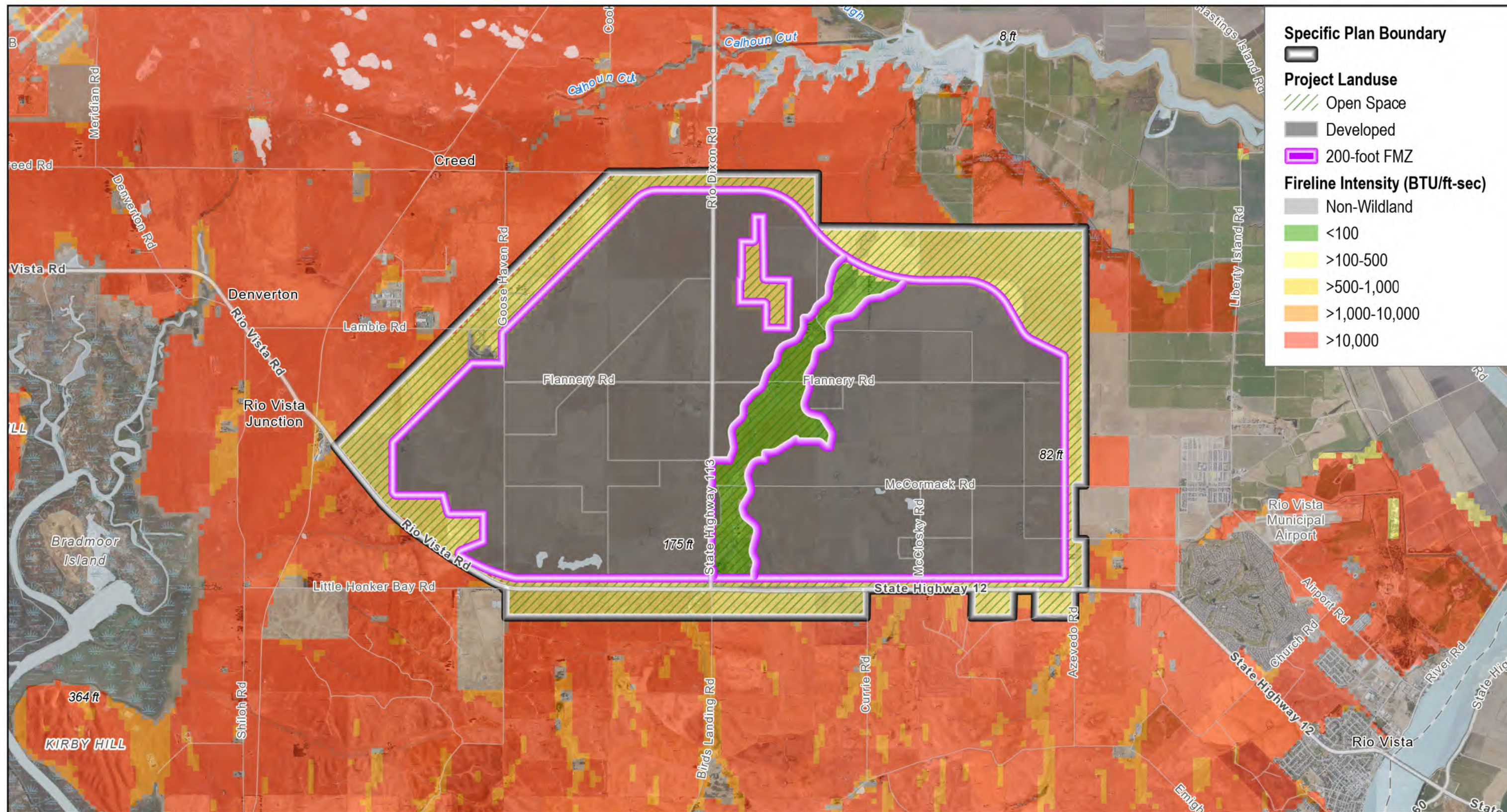


FIGURE 17

Full Buildout Fireline Intensity - 97th Percentile Weather - Unmanaged Grasslands

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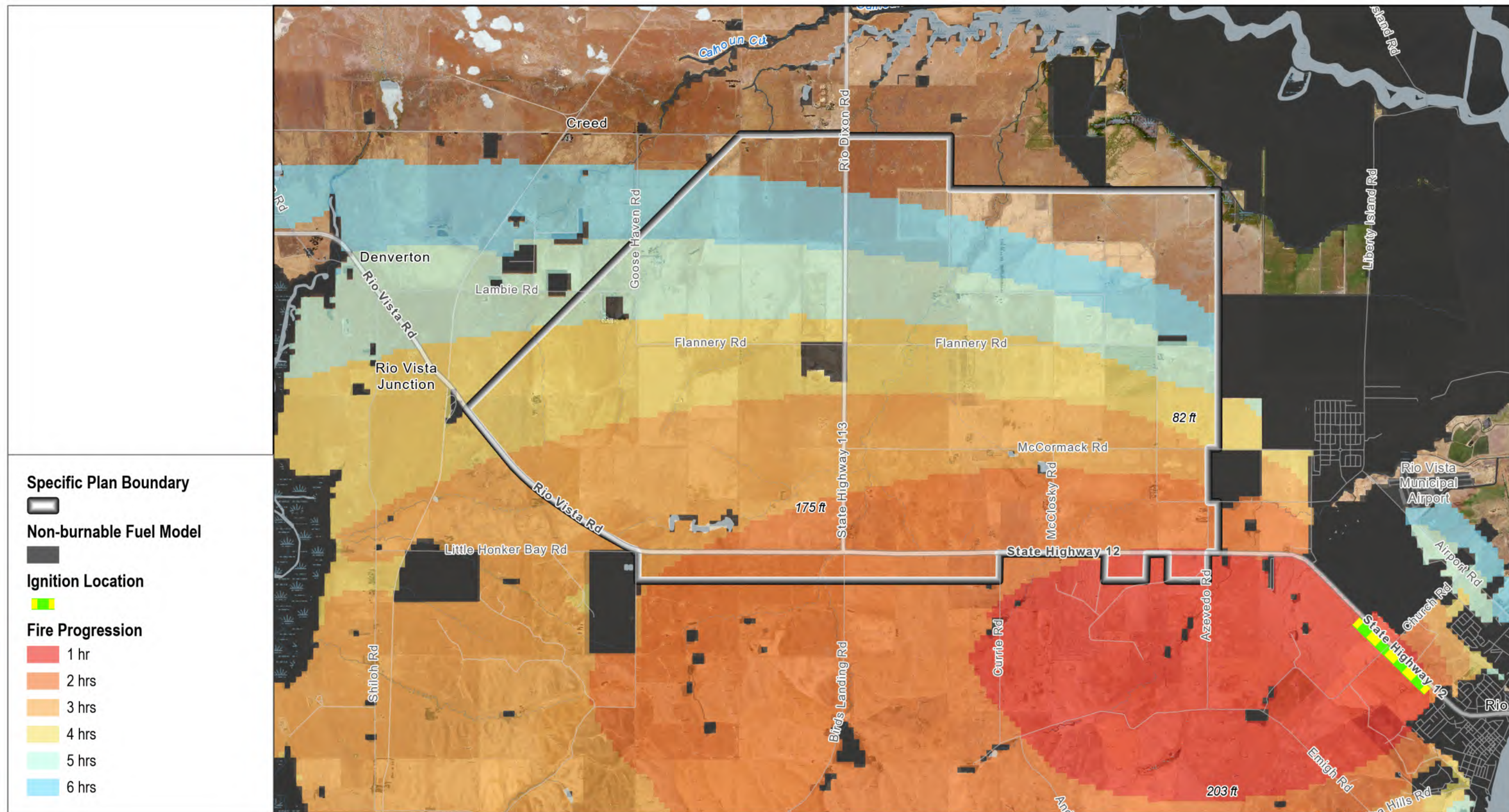


FIGURE 18

Fire Progression - 97th Percentile Weather - East Wind - Unmanaged Grasslands

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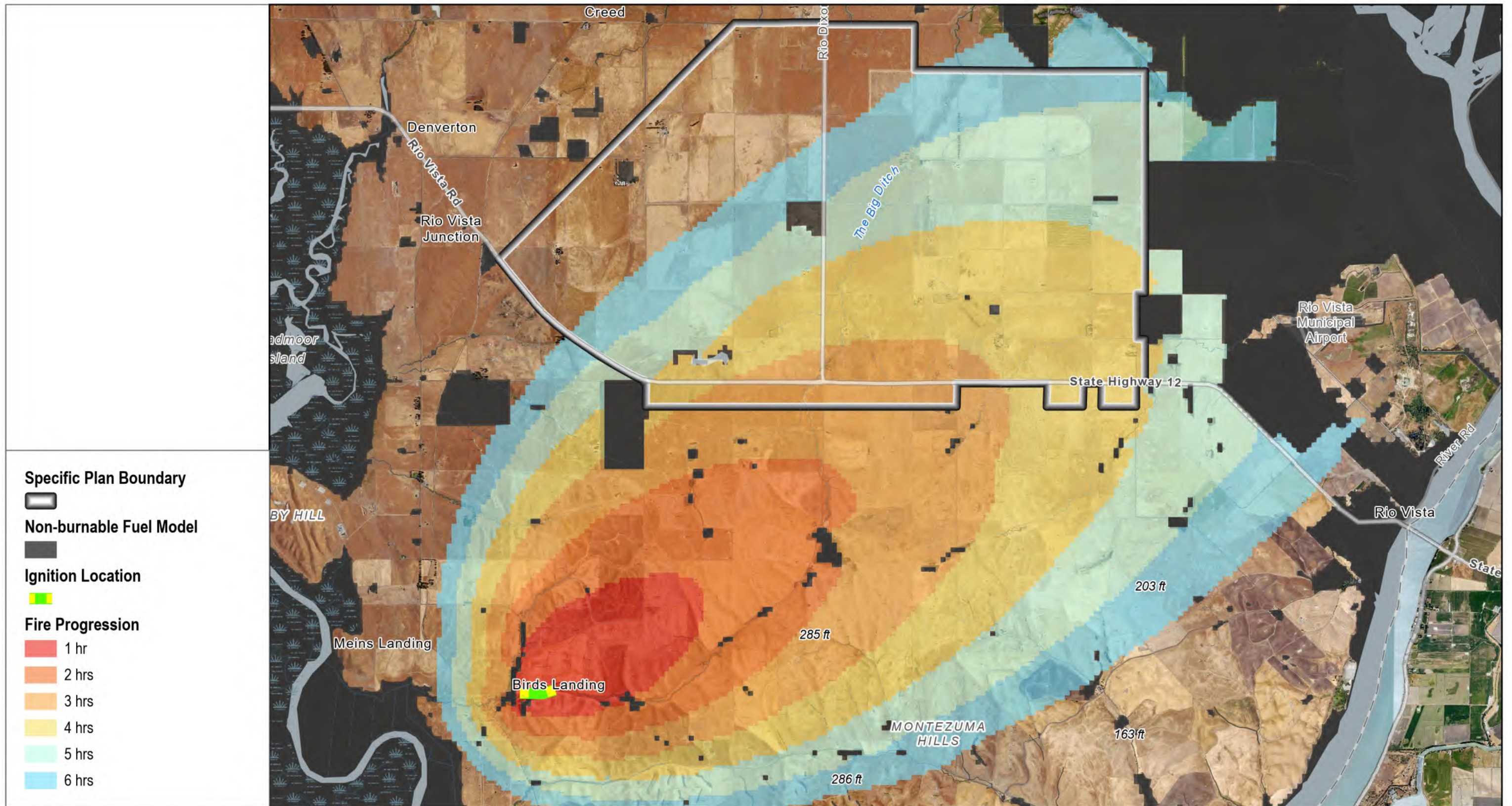


FIGURE 19

Fire Progression - 50th Percentile Weather - Southwest Wind - Unmanaged Grasslands

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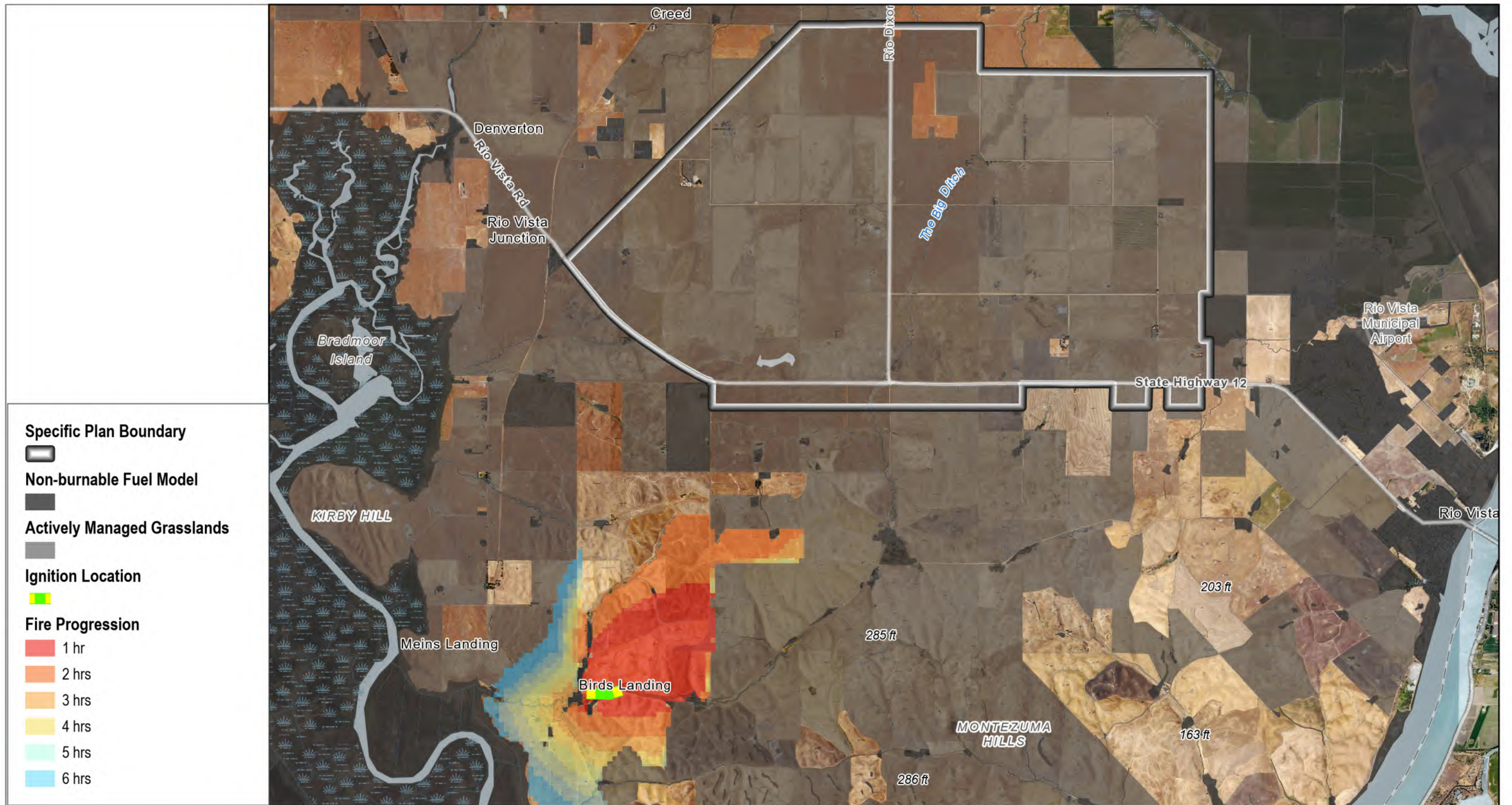


FIGURE 20

Fire Progression - 50th Percentile Weather - Southwest Wind - Managed Grasslands

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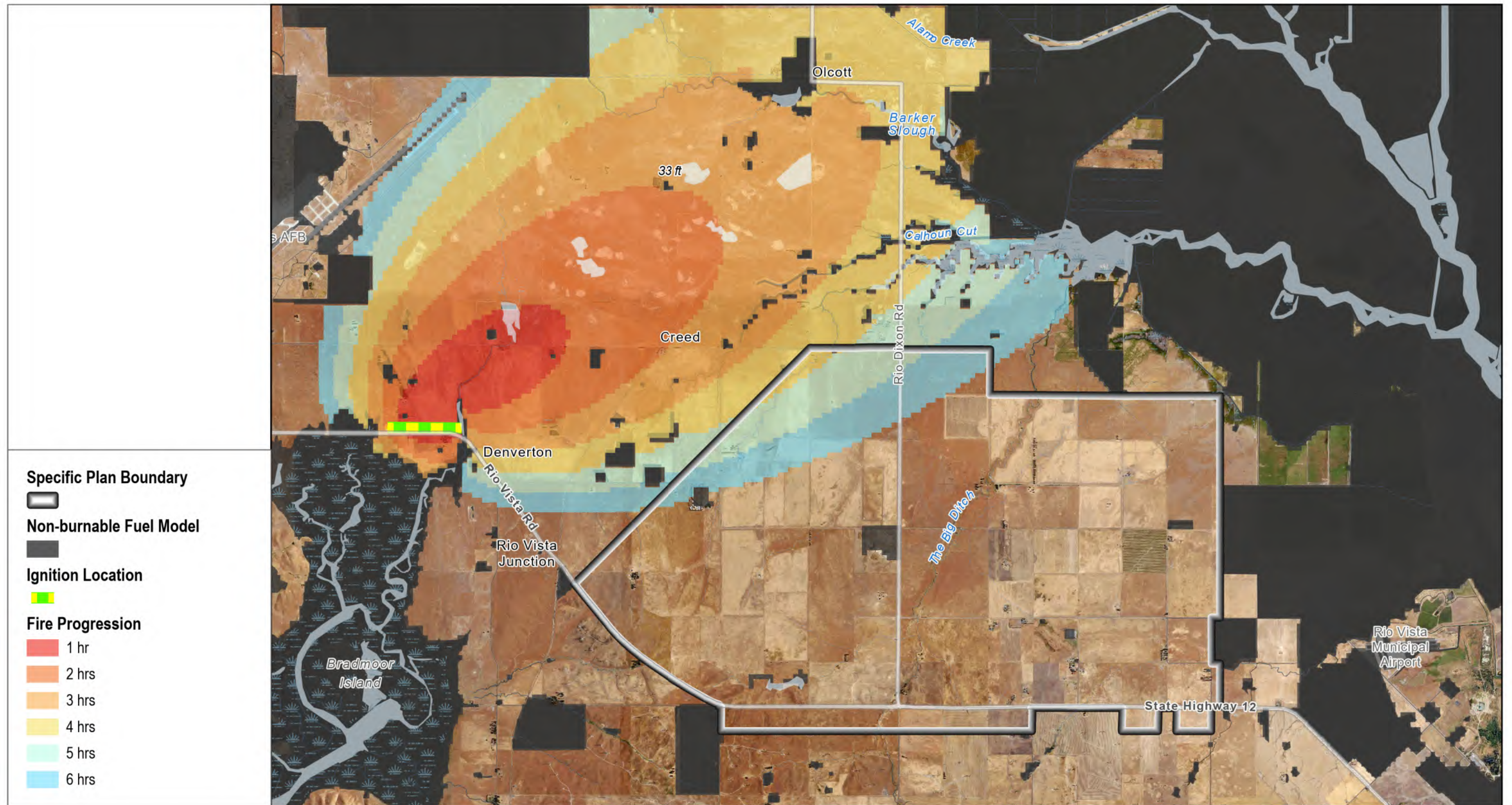


FIGURE 21

Fire Progression - 50th Percentile Weather - Southwest Wind - Unmanaged Grasslands

Suisun Expansion Project

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FIGURE 22

Fire Progression - 50th Percentile Weather - Southwest Wind - Managed Grasslands

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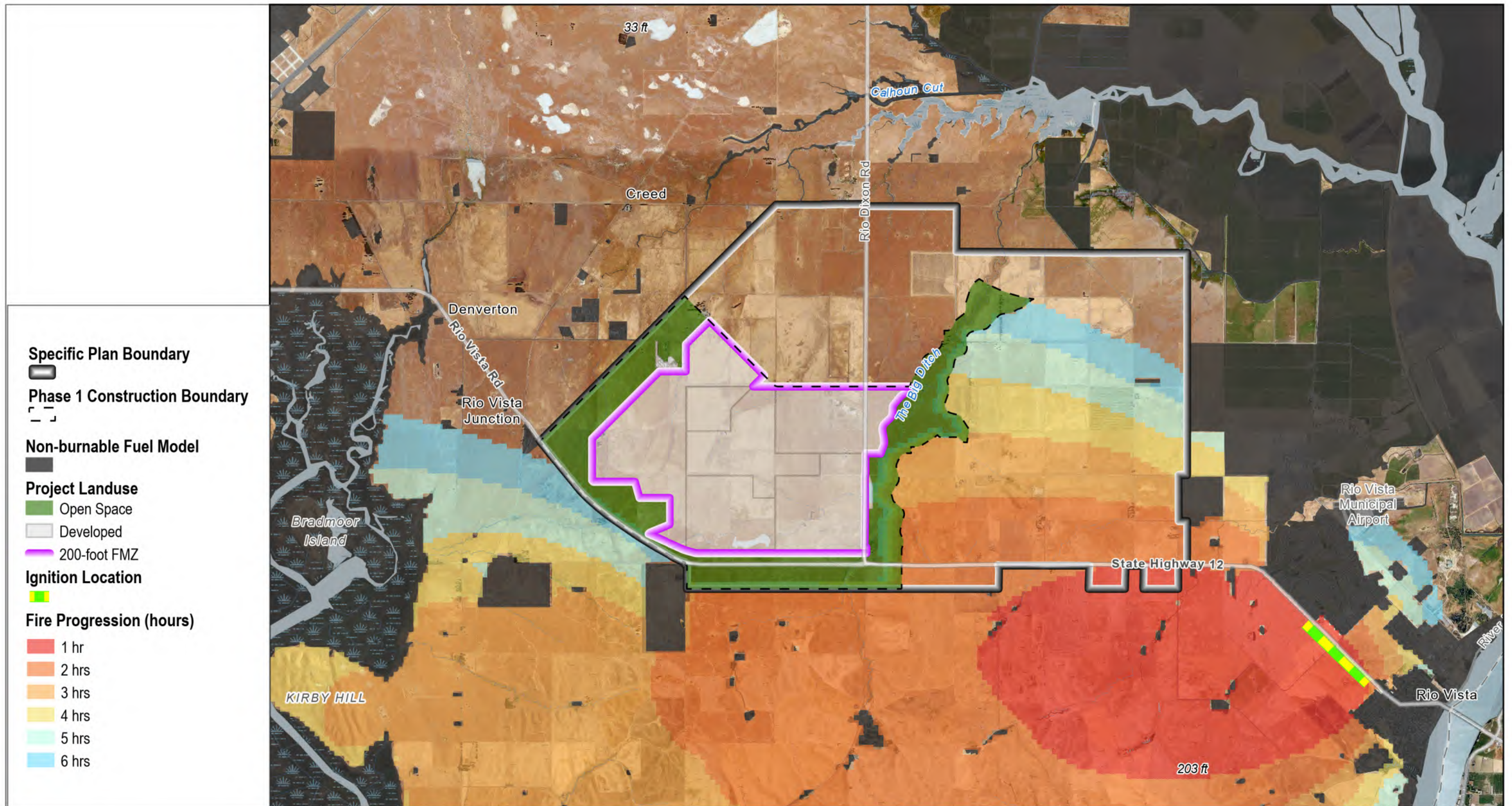


FIGURE 23

Fire Progression - Phase 1 - 97th Percentile Weather - East Wind - Unmanaged Grasslands

Suisun Expansion Project

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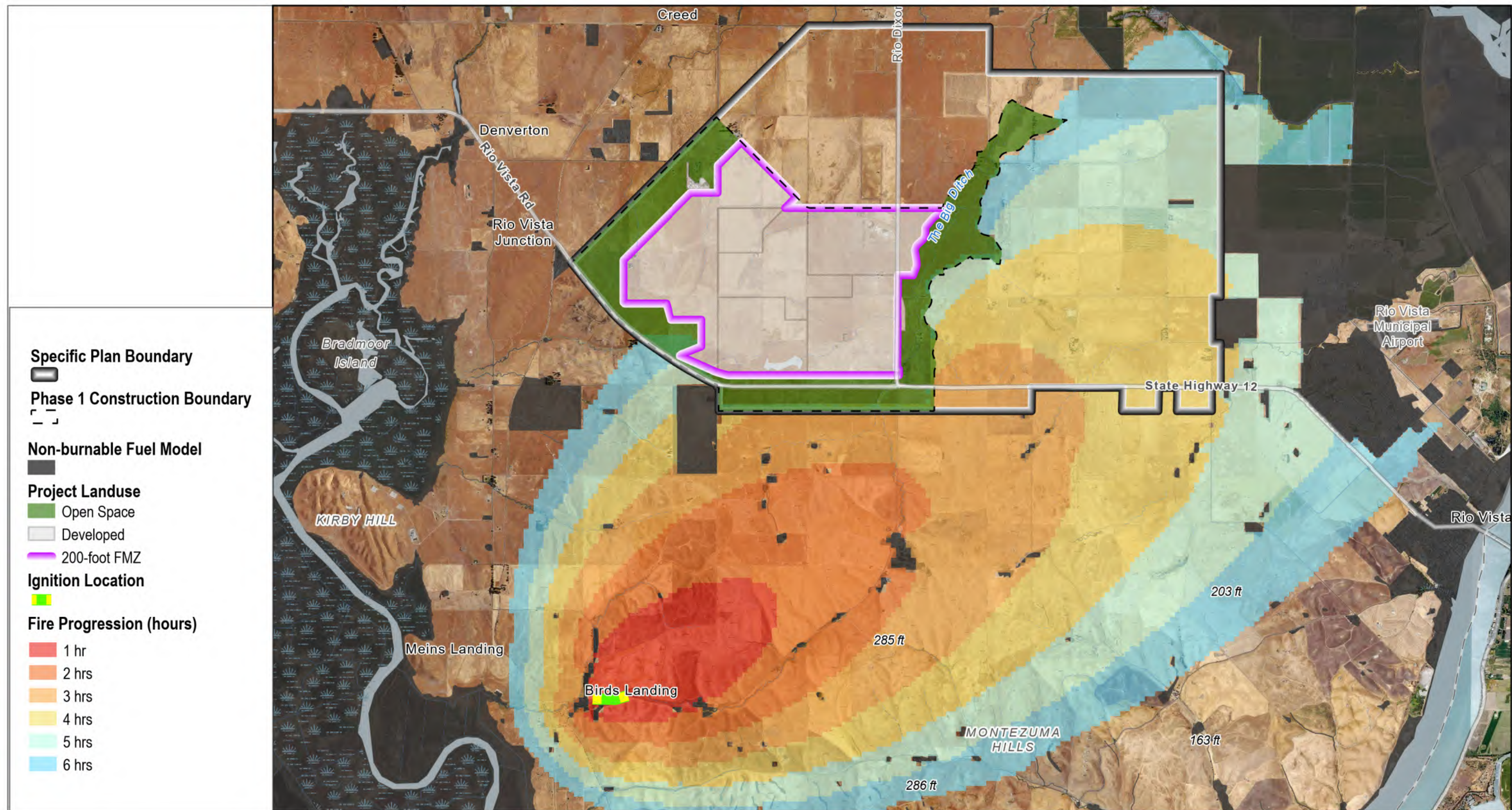


FIGURE 24
 Fire Progression - Phase 1 - 50th Percentile Weather - Southwest Wind - Unmanaged Grasslands

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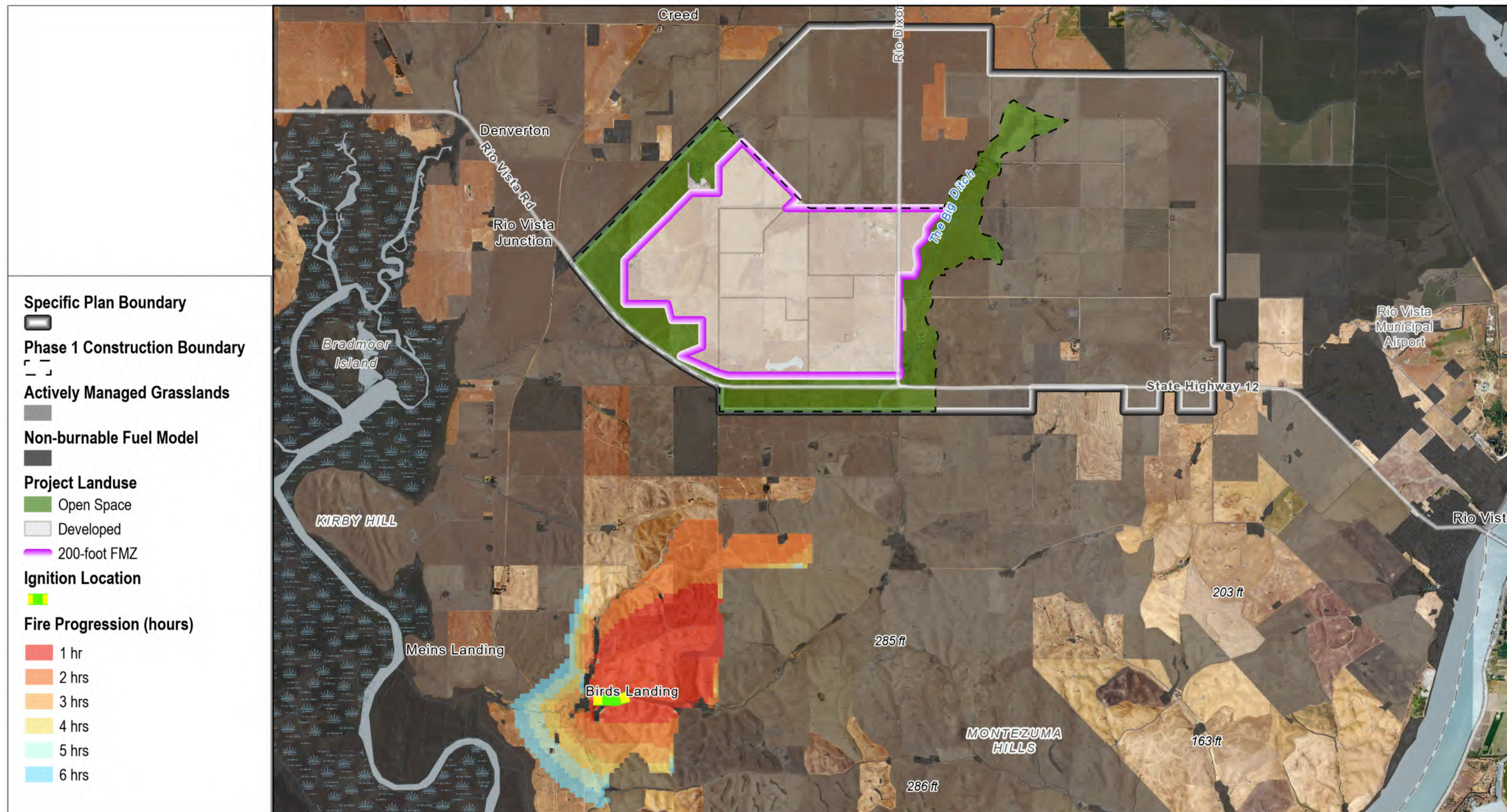


FIGURE 25
 Fire Progression - Phase 1 - 50th Percentile Weather - Southwest Wind - Managed Grasslands

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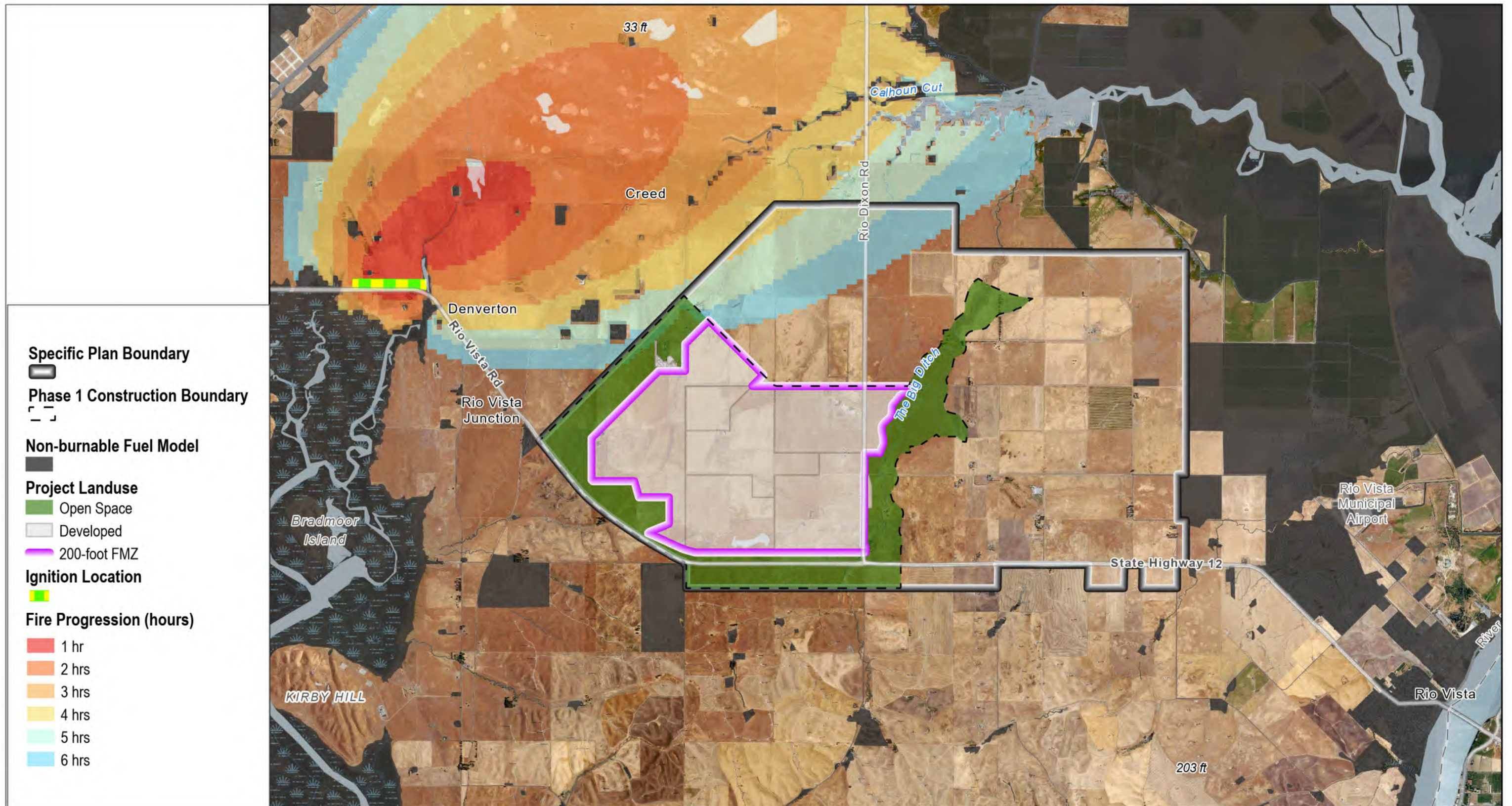


FIGURE 26

Fire Progression - Phase 1 - 50th Percentile Weather - Southwest Wind - Unmanaged Grasslands

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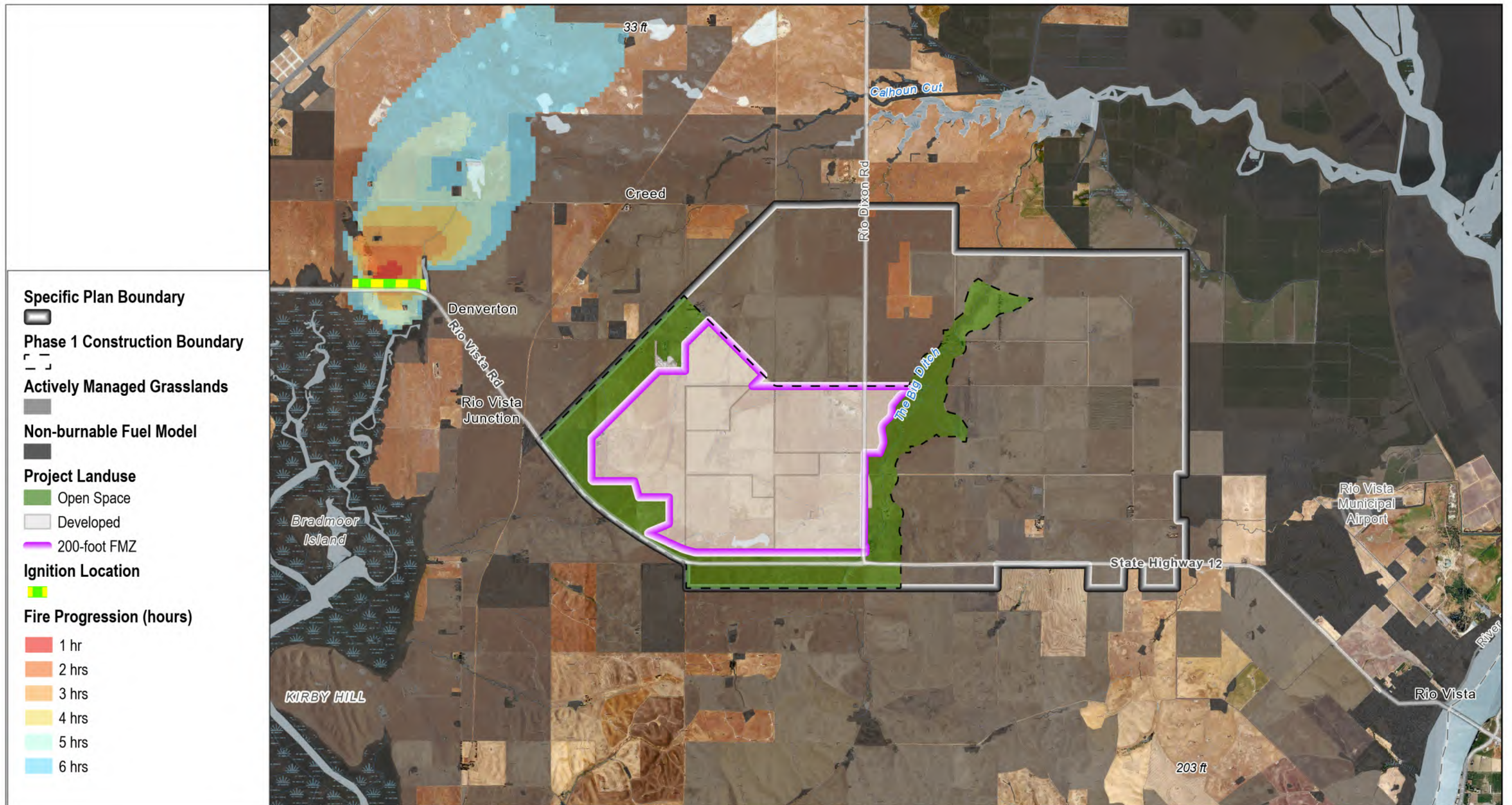


FIGURE 27
 Fire Progression - Phase 1 - 50th Percentile Weather - Southwest Wind - Managed Grasslands

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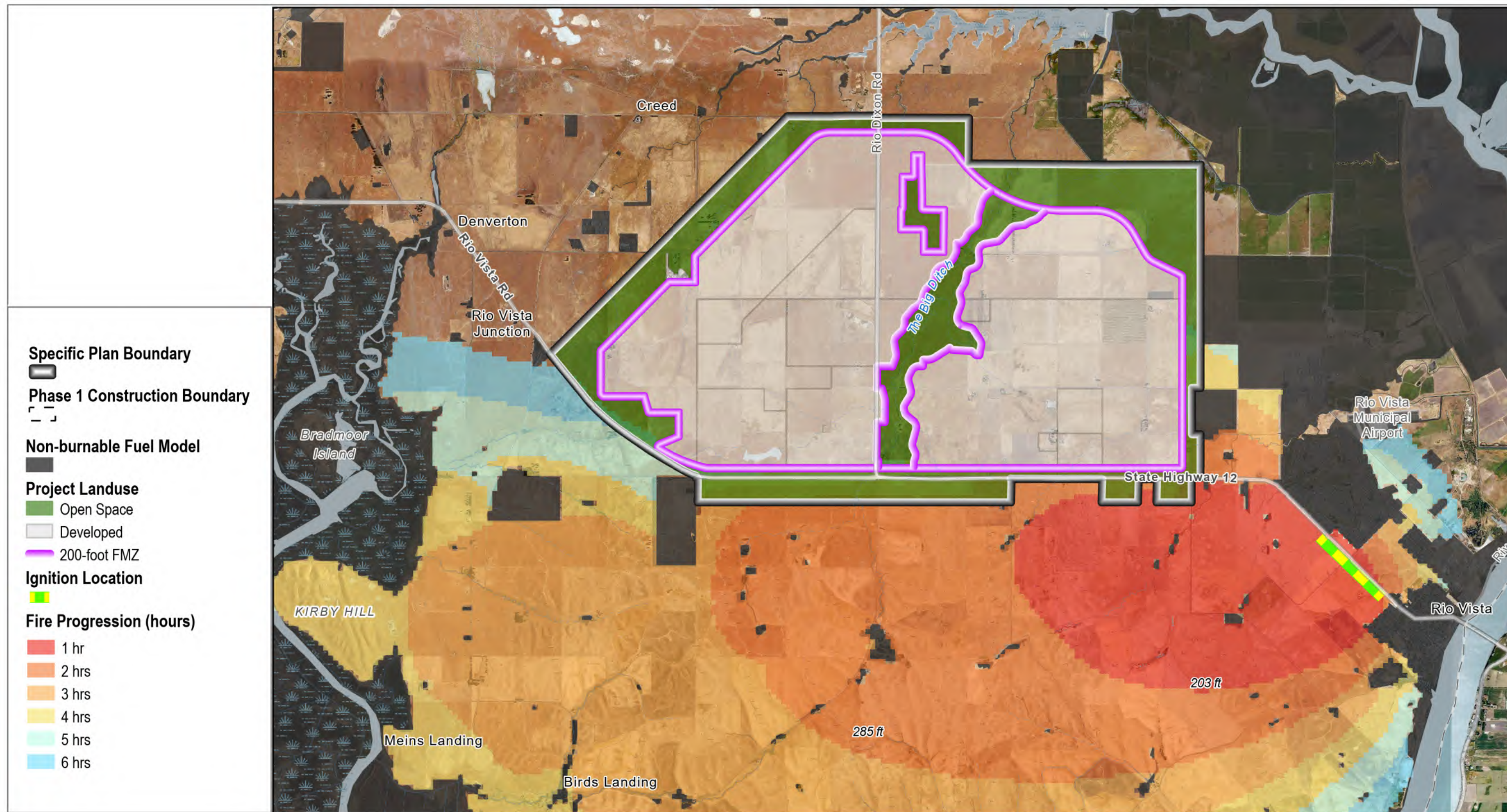


FIGURE 28

Fire Progression - Full Buildout - 97th Percentile Weather - East Wind - Unmanaged Grasslands

Suisun Expansion Project

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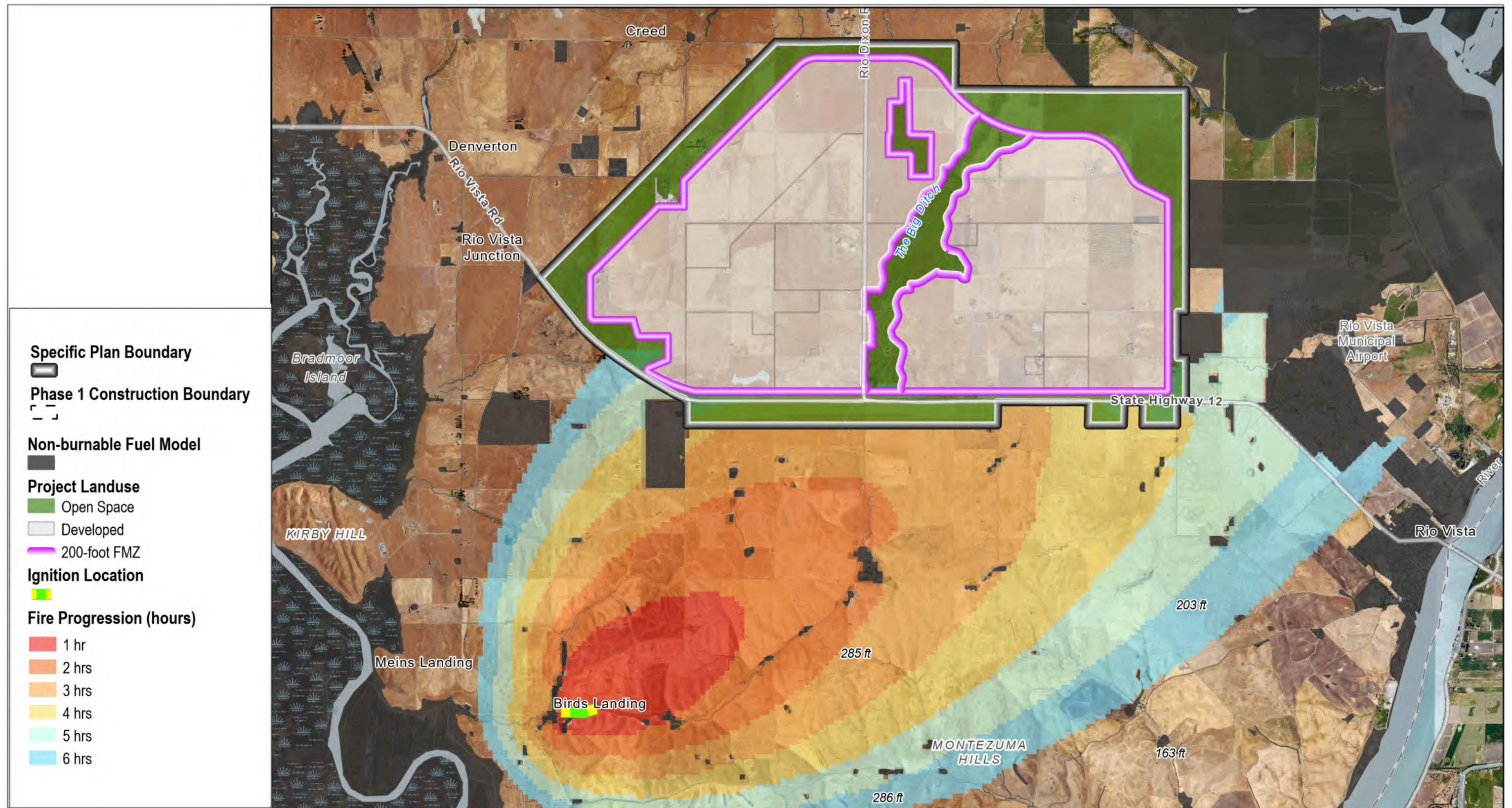


FIGURE 29

Fire Progression - Full Buildout - 50th Percentile Weather - Southwest Wind - Unmanaged Grasslands

Suisun Expansion Project

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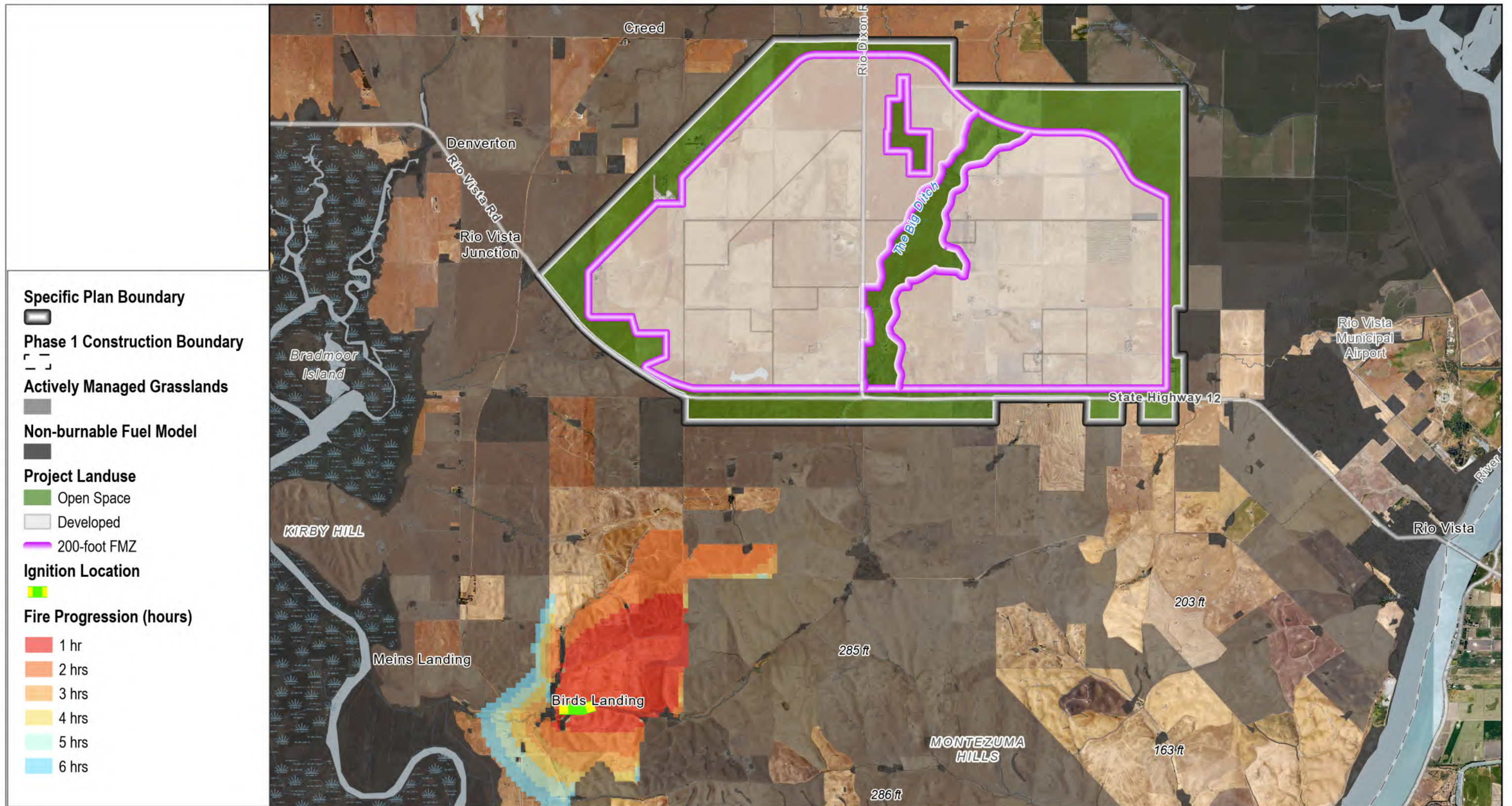


FIGURE 30

Fire Progression - Full Buildout - 50th Percentile Weather - Southwest Wind - Managed Grasslands

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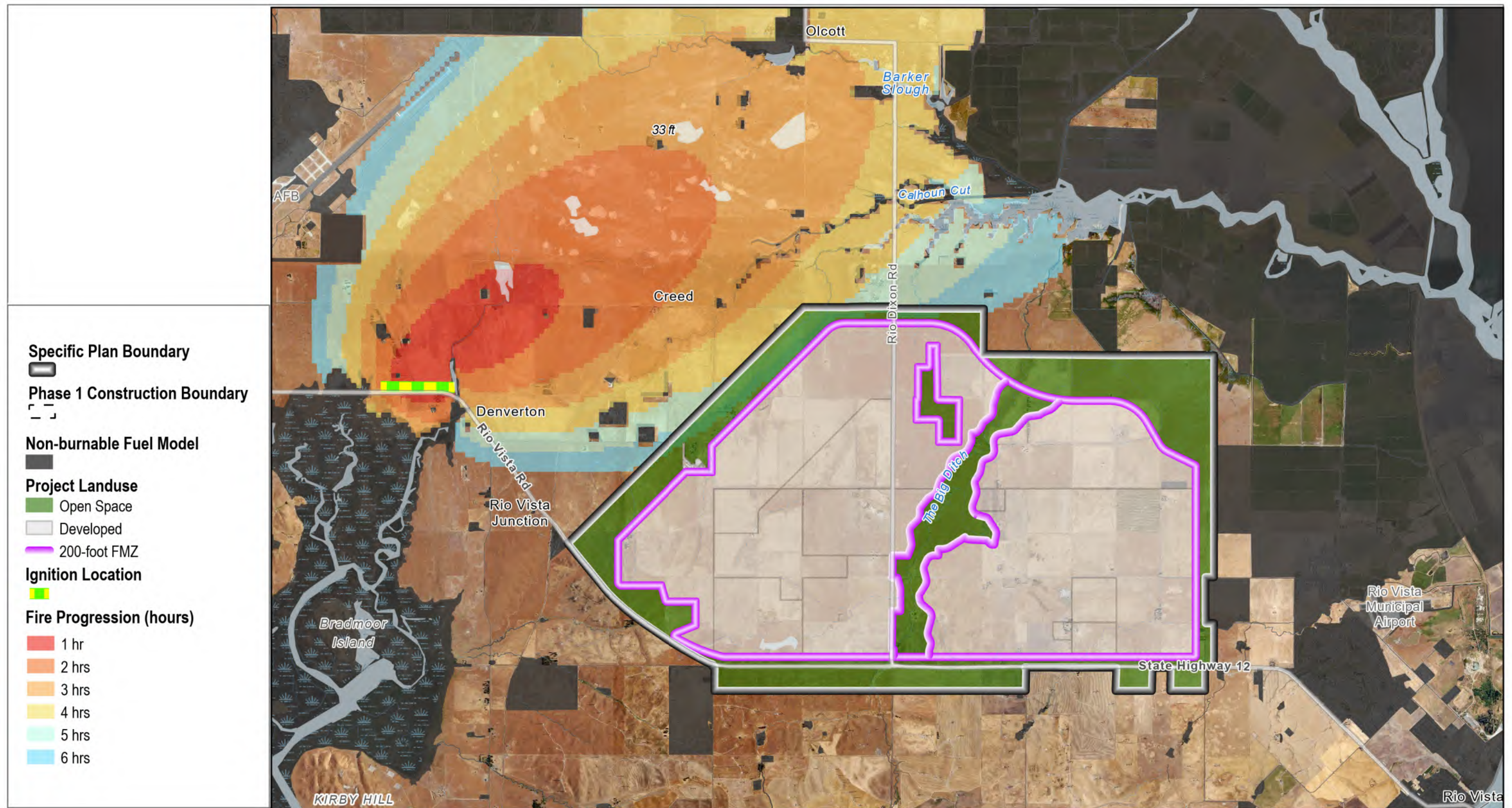


FIGURE 31

Fire Progression - Full Buildout - 50th Percentile Weather - Southwest Wind - Unmanaged Grasslands

Suisun Expansion Project

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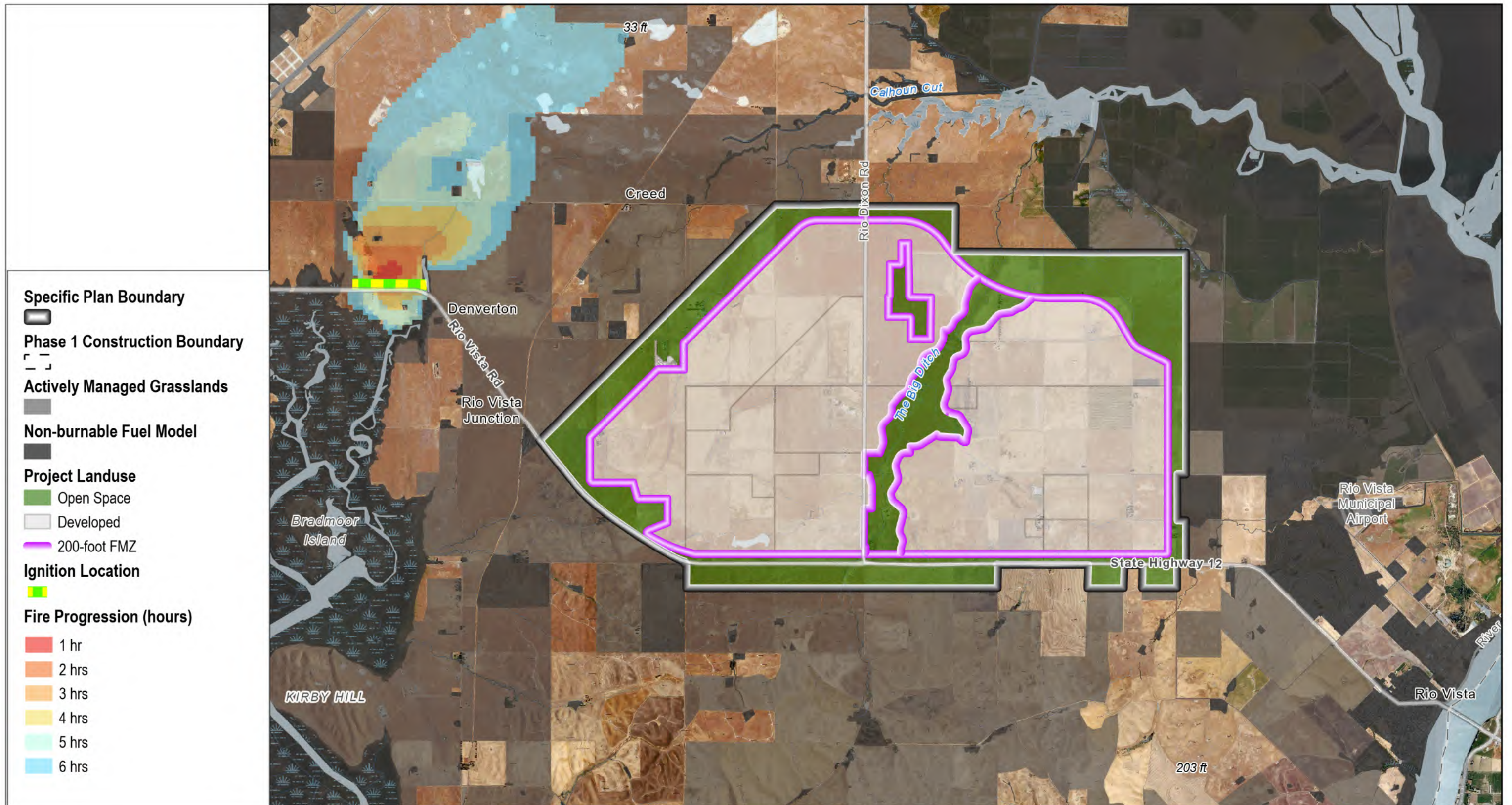
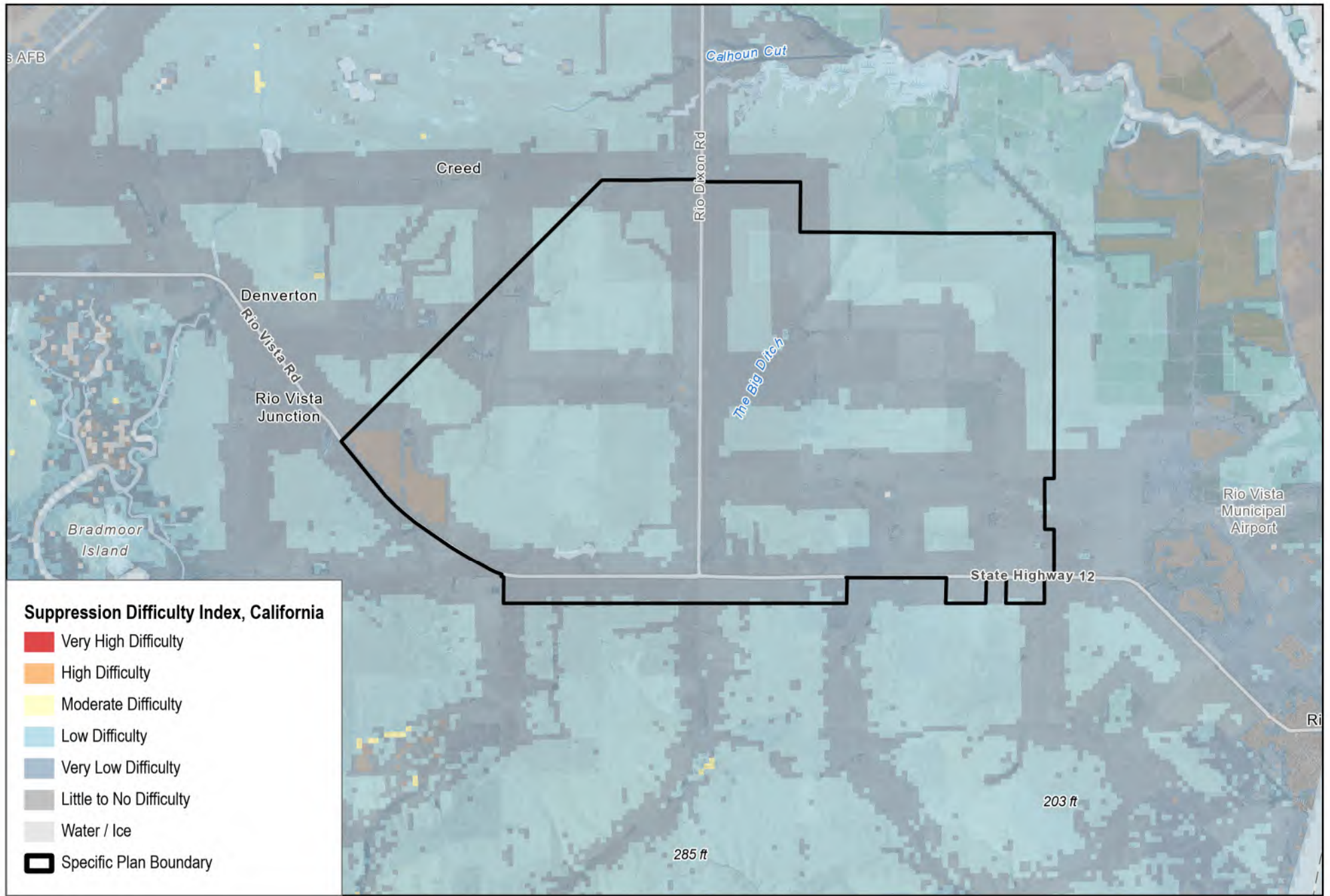


FIGURE 32

Fire Progression - Full Buildout - 50th Percentile Weather - Southwest Wind - Managed Grasslands

Suisun Expansion Project

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SOURCE: PYROLOGIX, 2021

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5 Emergency Response and Service

The Specific Plan site is presently served by the Montezuma Fire Protection District (MFPD), a mostly volunteer fire department with two stations. Due to the magnitude of the Specific Plan, additional fire stations are planned throughout the Specific Plan area that will provide adequate resources to handle all calls within desired workload capacity while responding within the 4-minute travel time recommended by NFPA 1710. A Fire Department Infrastructure Plan (FDIP) has been prepared for the Specific Plan that considers the anticipated land uses throughout the Specific Plan, the population served, the density of population, and the unique characteristics of the Specific Plan to recommend a minimum adequate number of fire stations, firefighting personnel, ambulance personnel, and dispatch needs. This section of the Fire Protection Plan evaluates existing MFPD resources and draws on the FDIP for future expansion of staffing.

5.1 Current Jurisdiction, Fire Station Locations, and Response Times

Upon annexation into Suisun City, it is anticipated that the fire protection for the Specific Plan area, which would be constructed with multiple fire stations capable of providing substantial emergency service resources, will transfer from the MFPD to the Suisun City Fire Department (SCFD). The applicable mutual aid agreement provides for assigning the closest available unit to respond across jurisdictional boundaries. To provide a comprehensive emergency response and service analysis, information is provided about the current fire response to the Specific Plan site.

Montezuma Fire Protection District has two fire stations, station 51 and 52. Station 51 is located in Rio Vista approximately 6.38 miles from the intersection of SR-12 and SR-113, which is near the center of the Specific Plan. Station 52 is located near Bird’s Landing approximately 6.87 miles from the same location near the center of the Specific Plan. The City of Rio Vista also staffs fire station 55 from a facility directly adjacent to MFPD Station 51. Further, CAL FIRE houses and operates a wildland firefighting crew from the Delta Conservation Camp located within the proposed annexation area boundary. The Fire Camp would respond to wildland firefighting calls only within the region.⁴ See Figure 34, *Regional Fire Districts*.

Table 6. Closest Fire Stations Summary

Station	Location	Approx. Distance to SR12/SR113
MFPD Fire Station 52	2151 Collinsville Rd Birds Landing, California 94585	6.87 miles
MFPD Fire Station 51	21 N 4th St Rio Vista, California 94571	6.38 miles
Rio Vista Fire Station 55	350 Main St Rio Vista, California 94571	6.42 miles
CAL FIRE Delta Conservation Camp #8	6246 Lambie Road, Suisun City, California 94585	4.52 miles

Source: Solano County LAFCO, 2020

⁴ <https://www.cdcr.ca.gov/facility-locator/conservation-camps/delta/>

In an effort to understand existing fire department response capabilities, Dudek conducted an analysis of the travel time from the closest responding fire stations. The response time analysis was conducted using travel distances that were derived from Google Road data. Travel times were calculated applying the distance at speed limit formula ($T=(D/S) * 60$, where T=time, D=distance in miles, and S=speed in MPH) as well as the nationally recognized Insurance Services Office (ISO) Public Protection Classification Program's Response Time Standard formula ($T=0.65 + 1.7 D$, where T= time and D = distance) for comparison. Tables 7 and 8 present tabular results of the emergency response time analysis using the distance at speed formula and the Verisk formula, respectively.

Table 7. Specific Plan Emergency Response Analysis using Speed Limit Formula

Station	Travel Distance to SR 12/SR 113	Travel Time to SR 12/SR 113*	Total Response Time**
MFPD Station 52	6.87 miles	11 minutes 47 seconds	13 minutes 47 seconds
MFPD Station 51	6.38 miles	10 minutes 56 seconds	12 minutes 56 seconds
Rio Vista Fire Station 55	6.42 miles	11 minutes 0 seconds	13 minutes 0 seconds

Notes:

* Assumes travel distance and time to the Specific Plan site into the development for the respective fire station. Also assumes application of the distance at speed limit formula ($T=(D/S) * 60$, where T=time, D=distance in miles, and S=speed in MPH), a 35-mph travel speed, and does not include turnout time.

** Assumes travel distance and time to the Specific Plan site from the respective fire station, and application of the distance at speed limit formula ($T=(D/S) * 60$, where T=time, D=distance in miles, and S=speed in MPH), a 35 mph travel speed along with dispatch and turnout time, which can add an additional two minutes to travel time.

Delta Conservation Camp was excluded from this analysis as they would not be a traditional "first-in" unit

The Verisk response travel time formula discounts speed for intersections, vehicle deceleration, and acceleration, and does not include turnout time resulting in slightly greater travel time.

Table 8. Specific Plan Emergency Response Analysis using Verisk Formula

Station	Travel Distance to SR 12/SR 113	Travel Time to SR 12/SR 113	Total Response Time**
MFPD Station 52	6.87 miles	12 minutes 20 seconds	14 minutes 20 seconds
MFPD Station 51	6.38 miles	11 minutes 30 seconds	13 minutes 30 seconds
Rio Vista Fire Station 55	6.42 miles	11 minutes 34 seconds	13 minutes 34 seconds

Notes:

* Assumes travel distance and time to the Specific Plan site into the development for the respective fire station. Also assumes application of the Verisk formula, $T=0.65+1.7(\text{Distance})$, a 35-mph travel speed, and does not include turnout time.

** Assumes travel distance and time to the Specific Plan site from the respective fire station, and application of the distance at speed limit formula ($T=(D/S) * 60$, where T=time, D=distance in miles, and S=speed in MPH), a 35 mph travel speed along with dispatch and turnout time, which can add an additional two minutes to travel time.

Delta Conservation Camp was excluded from this analysis as they would not be a traditional "first-in" unit

Existing fire stations would be able to respond to the Intersection of SR 12 and SR 113 between a conservatively estimated 12 minutes 56 seconds and 13 minutes 30 seconds.

5.1.1 Planned Fire Stations

The Specific Plan proposes the development of 18 fire stations throughout the Specific Plan area at a rate of approximately 22,000 residents per station when the station houses only one unit, or 42,000 residents per station when the station houses two units. See Figure 35, *Proposed Fire Station Locations*. As described in the FDIP, the methodology of placing fire stations throughout the community dependent upon expected call volume allows planners to locate stations in a way that will not create an unrealistic workload on the fire units. Due to the population density of the Specific Plan area, locating the fire units in this manner also results in response times that are less than, and therefore exceed the national standard set by NFPA 1710. See Figure 36, *Street Network Overview*.

NFPA 1710 is the Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments that provides guidance regarding acceptable response times for different incident types which helps guide location of stations, acceptable staffing per apparatus which guides number of total staff, and appropriate resources for alarm type. Alarm types include single-family dwelling full-alarm, apartments full alarm, and high-rise full alarm amongst others. The totality of the call processing time, turnout time, and travel time are known as total response time, which is contextualized by various emergency time curves such as the amount of time available from the inception of a fire to flashover/full-room involvement or, in the case of emergency medical response, the amount of time until irreversible damage results from the lack of oxygen during a cardiovascular event or stroke. Mitigation measures such as fire sprinklers delay flashover/full room involvement allowing more time to respond, while bystander intervention in the form of CPR similarly prolongs circulation and oxygen saturation to allow additional time for first responders to arrive.

Travel time requirements from NFPA 1710 include:

- 240 seconds or less for the arrival of the first engine company at a fire incident.
- 360 seconds or less for the arrival of the second engine company at a fire incident.
- 480 seconds or less for the arrival of a full alarm assignment at a fire suppression incident (excluding high-rise).
- 610 seconds or less for the arrival of a full alarm assignment at a high-rise fire suppression incident.
- 240 seconds or less for the arrival of a first responder unit with an AED.

The planned fire stations for the Specific Plan were evaluated using modeling to determine travel times and verify that travel times met the minimum standards of NFPA 1710. Travel time was calculated using a posted speed limit approach where each of the planned street's posted speed limit as outlined in the below table was a factor in the travel time for each of the street segments. If the recommendation to equip each signal is with a traffic pre-emption device to control traffic lights to provide right of way to the emergency response vehicles is implemented, response time will further improve by decreasing travel times.

Table 9. Street Type and Speed Limit

Street Type	MPH
Movement Streets	10
Neighborhood Streets/Greenways	20
Arterial – Azevedo, Industrial, and Northern Parkways	45

Table 9. Street Type and Speed Limit

Street Type	MPH
Arterial – Minor	45
Arterial – Major	55
SR 113	35
SR 12	45

The results of the modelling indicate that all first-in fire apparatus will be able to travel to an incident within the 4-minute travel time, see Exhibit 9. Further, the strategic placement of five stations that will house an aerial fire apparatus results in a travel time of approximately 6 minutes for aerial fire apparatus, which is well within the 8 minutes recommended by NFPA 1710, see Exhibit 10.

Exhibit 9. Mean travel time all first-in units

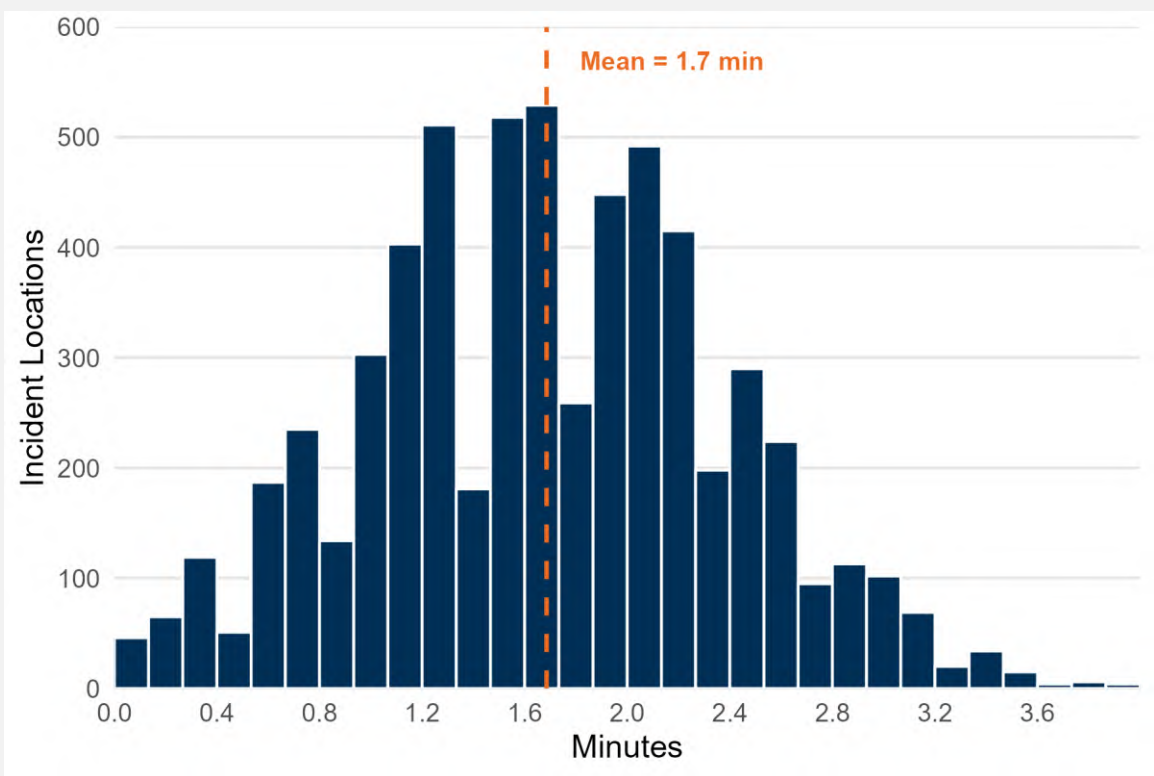
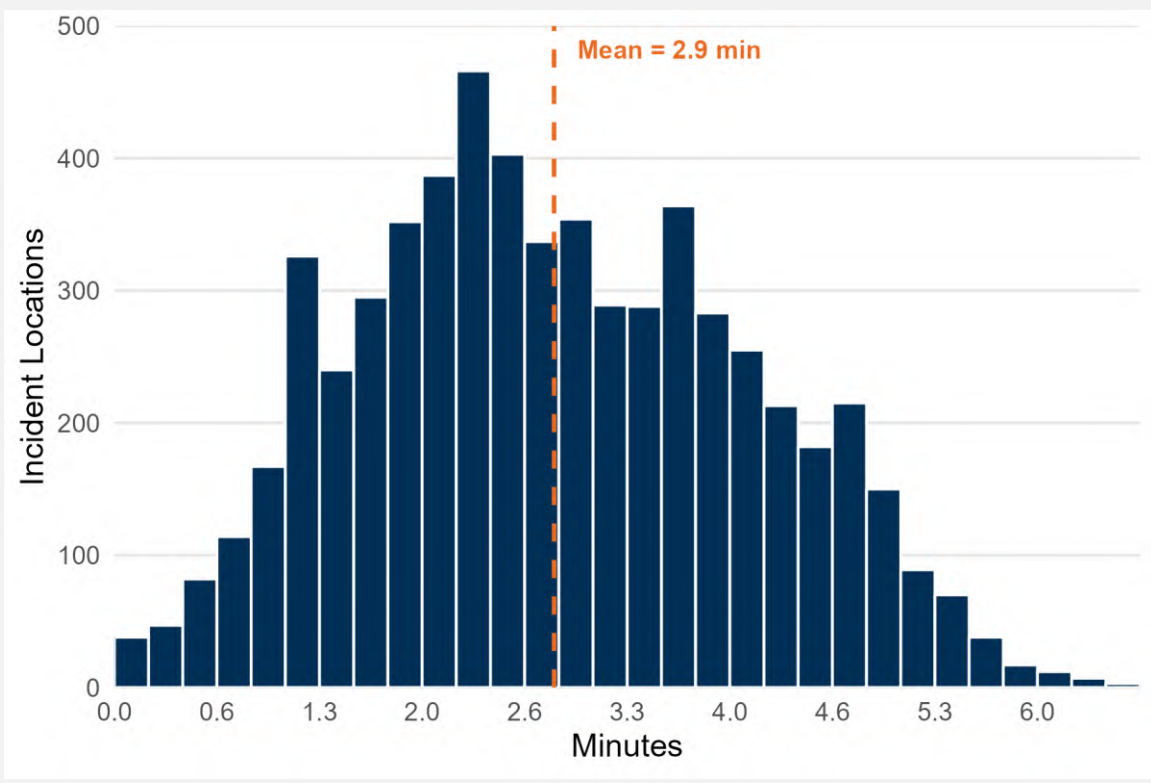


Exhibit 10. Mean travel time ladder truck response



5.2 Estimated Calls and Demand for Service

A typical development project is within an established city or county, and existing call volume ratios, i.e. the number of calls per resident, can be applied to the project to determine the number of calls expected to be generated by the project and the demand those additional calls for service will place on existing resources. In the case of this Specific Plan, it is accepted that the proposed development will double the population of Solano County. As such, call volume cannot be derived from existing populations, as it is expected that the population will be entirely new. However, the Specific Plan is committed to providing firefighting and emergency medical resources to the satisfaction of key decision makers and the future population of the Specific Plan area, as discussed further in the FDIP.

In the initial phases of development, the existing MFPD resources may be responsible for responding to calls related to construction within the Specific Plan area. The Specific Plan proposes a temporary fire station as necessary to handle the initial calls and to protect the structures under construction. The proposed fire service for the Specific Plan will need to be prepared to respond to calls of various types and, due to the population density, be able to respond to multiple incidents simultaneously. With the proposed amendments to the Fire Code as adopted by Suisun City, nearly every structure will be equipped with fire sprinklers, which will benefit the community by containing and possibly suppressing structure fires while the fire department is responding.

As further described in the FDIP, fire departments serving more densely populated urban areas tend to have higher call volumes as a percentage of population, however these cities also consist of construction dating back to the 19th century which does not have many of the modern fire protection systems and fire-resistant construction. For example, while San Francisco Fire Department is a suitable comparable department in many regards, the call volume rate for the City of Irvine is expected to be a good comparison for the Specific Plan due to Irvine's more modern structures as compared to the structures in San Francisco. When the annual number of calls for service in Irvine is compared to the population, the call volume rate is 8.9%, which means that there are nearly 9 calls for service per year per 100 people. . Therefore, in order to analyze the expected call volume for the Specific Plan at build-out, a call volume rate factor of 9% was tested. A call volume rate factor of 9% tested against an anticipated build-out daytime population for the Specific Plan of 467,000 results in 42,030 annual calls for service, or approximately 115 per day. Recalling from previous analysis that the maximum unit hour utilization should not exceed 30%, a reasonable workload per unit needed to be determined. As previously discussed, unit hour utilization is a function of how much time units spend each day responding to calls for service. The Sacramento Metropolitan Fire Department, which has done a deeper dive into its response data and reports than most fire departments, has reported, through various metrics, that the average duration of a call for service is 30 minutes. To maintain a unit hour utilization of 30% or less with an average call duration of 30 minutes, the maximum number of calls per day is 14.

Consistent with the high level of public safety set by the Specific Plan, it was determined to set the maximum desirable number of calls per day per unit at 5, which results in a unit hour utilization of 10.4% if the average duration of a call is 30 minutes. The number of emergency response units needed to maintain a maximum daily workload of 5 calls is 23 emergency response units. Therefore, 23 units became the minimum acceptable number of emergency response units for the Specific Plan. Some units can be housed in the same station when allowed by other considerations such as response time and allocating adequate firefighters per resident. Further, if the call volume rate increased to 15% resulting in 70,050 calls for service per year, the daily workload per unit would be 8.4 calls for service, which is less than the threshold value of 14 calls per unit per day that results in a unit hour utilization of 30%. Therefore, the currently proposed number of units housed in the currently proposed number of stations provides for increases in calls for service per year that are manageable.

5.3 Unique Specific Plan Emergency Response Considerations

To make urban-design communities walkable, a gridded system of small blocks provides for exceptional circulation. A well-connected street grid network is essential to good urbanism but can also shorten emergency response times, improving safety and quality of life. Strategically placed fire stations allow fire apparatus and other emergency vehicles specifically engineered for urban areas to easily maneuver the Specific Plan's gridded and interconnected street network that allows for multiple routes to emergencies within the Specific Plan area. This purposeful and holistic approach to providing emergency services efficiently is intended to result in response times that are lower than national standards. Robust staffing for the fire department's emergency, prevention, inspection, and community outreach services is brought together with state-of-the-art firefighting apparatus, progressive requirements for the installation of fire sprinkler systems, and a reliable water delivery service intended to achieve an ISO Class 1 designation.

Two primary objectives for determining the location of stations include placing units within a target population size so that units serve an appropriate population of residents and placing the stations in the community in a way that

allows the fire department to meet or exceed response time goals. Given the localized footprint of the Specific Plan, it was presumed that response times would be a secondary factor to providing adequate firefighters per resident, given that achievement of the primary objective would likely satisfy the secondary objective. Response times were then verified after first confirming that stations would be located within the community at a rate of approximately 1 station per 22,000 residents.

As previously noted, the Montezuma Fire Protection District along with Rio Vista and the CAL FIRE has been successful in wildland firefighting efforts in the area for years as demonstrated in Figure 37, *Fire History* which demonstrates no fires in the area have escaped initial containment. Despite being largely volunteer, MFPD covers 300 square miles of mostly farmland and pastures successfully. MFPD responds from Station 51 and Station 52 and has an ISO rating of 6/6Y. To ensure proper staffing and resources for the expected demand for service, the Specific Plan proposes the construction of 18 fire stations capable of meeting the requirements for an ISO Class 1 designation, the highest level of designation. The communities within the Specific Plan will be provided with an even more robust service than the ISO Class 6 rating of MFPD. Therefore, the Specific Plan will not adversely impact the response capabilities of nearby agencies, as the service provided by the stations within the Specific Plan area will offer a higher level of protection to not only the Specific Plan area, but also the adjacent land uses outside the Specific Plan.

As further described in the FDIP, 18 stations were determined to provide adequate coverage to respond well within a 4-minute travel time, with many occupants residing in locations within 2-3 minute travel times. The 18 stations would be staffed with between 4 and 9 firefighters per station typically staffing engines, aerial apparatus, and command vehicles. In addition to the primary response apparatus, the fire stations planned for the Specific Plan would house additional specialty apparatus such as a Hazardous Materials Unit, an Urban Search and Rescue unit, Brush Engines, Water Tenders, a Swift Water Rescue unit, and an Air/Rehab unit. Four Battalions keep span of control from four to five stations per Battalion Chief in accordance with the National Incident Management System. These resources are separate from the ambulance personnel who further bolster the workforce and provide transport of medical patients to the nearest appropriate medical facility. Key recommendations for ambulance staffing have been established including options for private ambulance under contract, or public ambulance staffed within the fire department. Lastly, recommendations for dispatch infrastructure have been established to ensure first responders are able to communicate with the dispatch center throughout the dense urban and metropolitan areas in accordance with the Fire Code requirements for emergency responder communication coverage.

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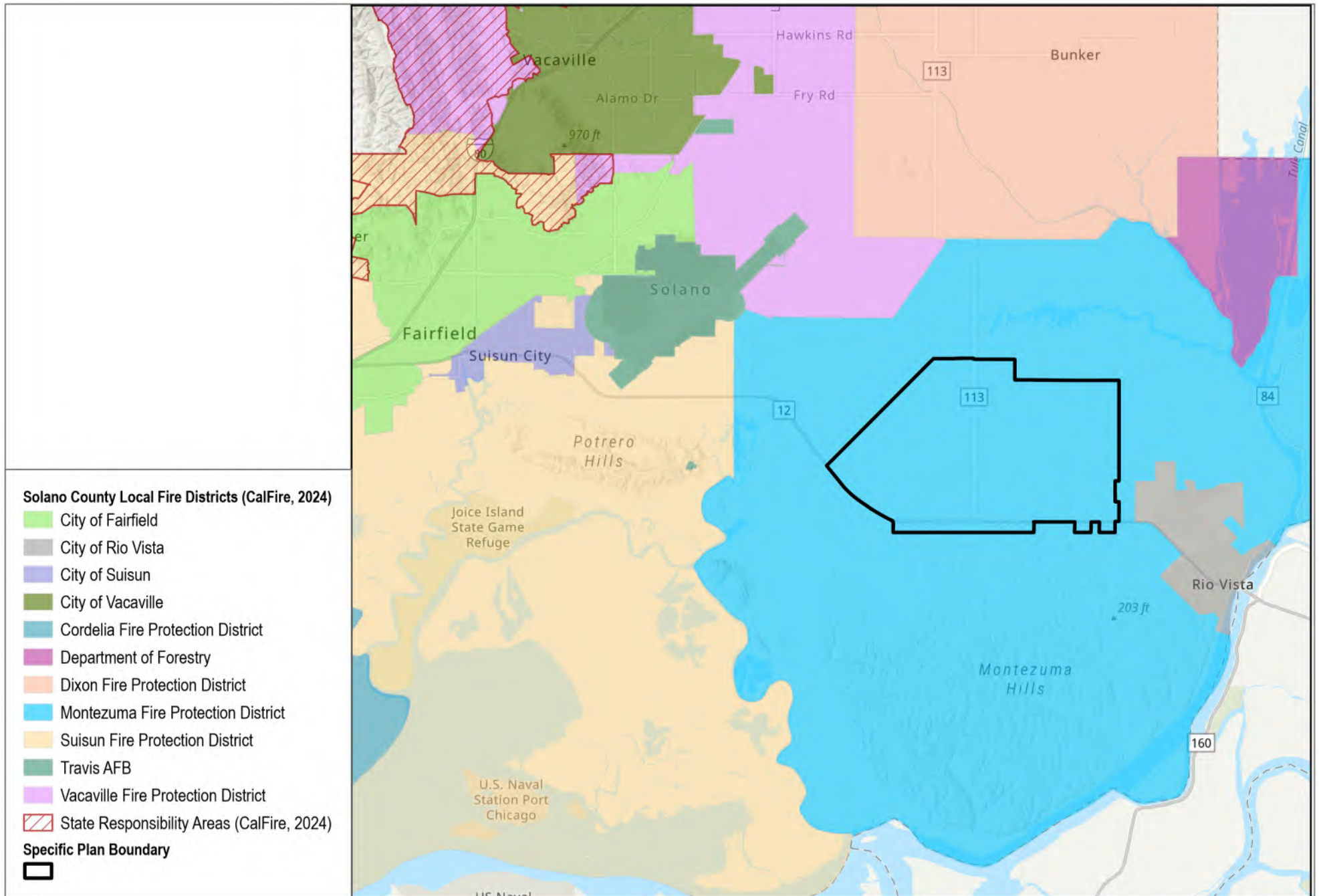
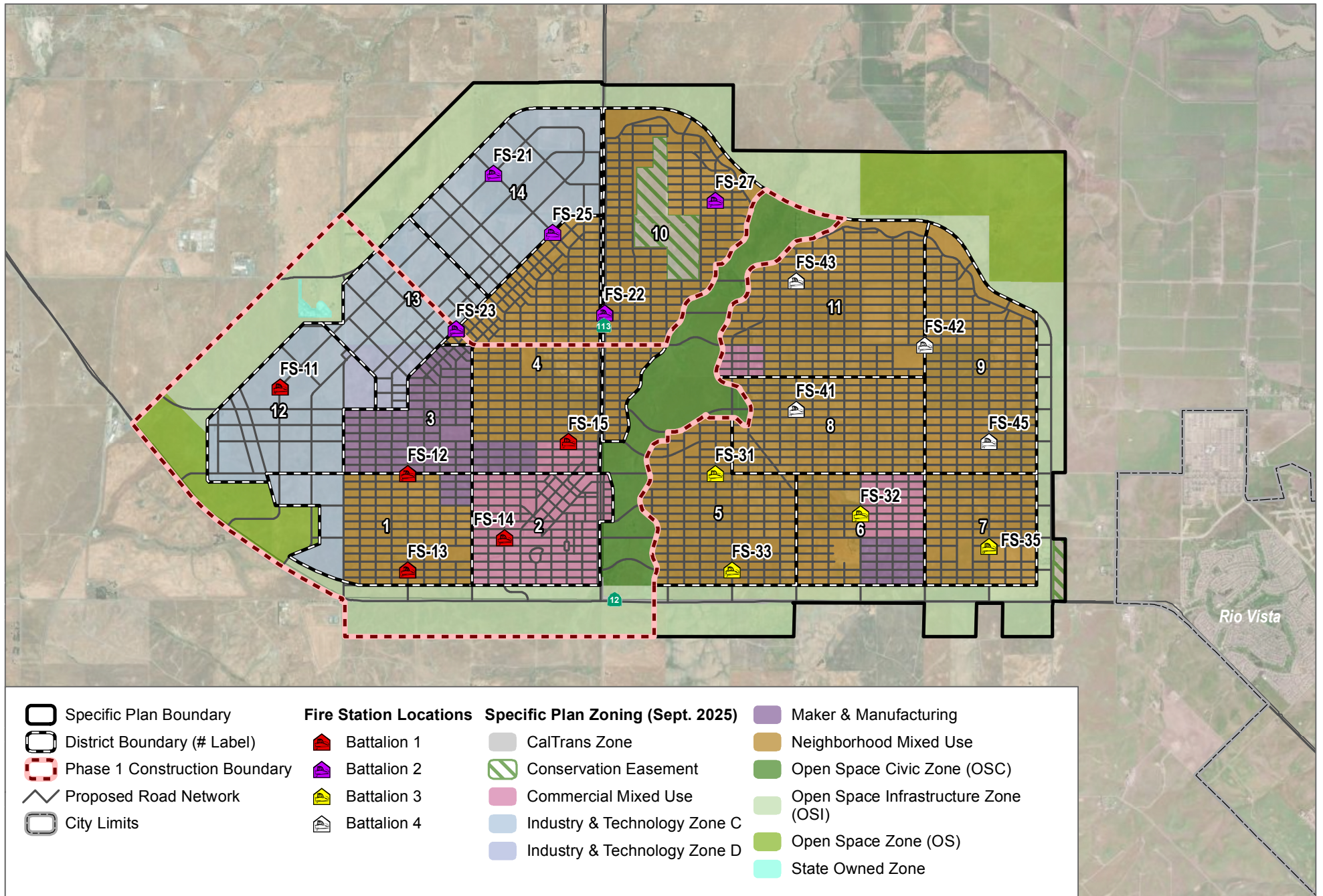


FIGURE 34
Regional Fire Districts
 Suisun Expansion Project

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SOURCE: ESRI Imagery 2024; SiteLab Urban Studios 2025

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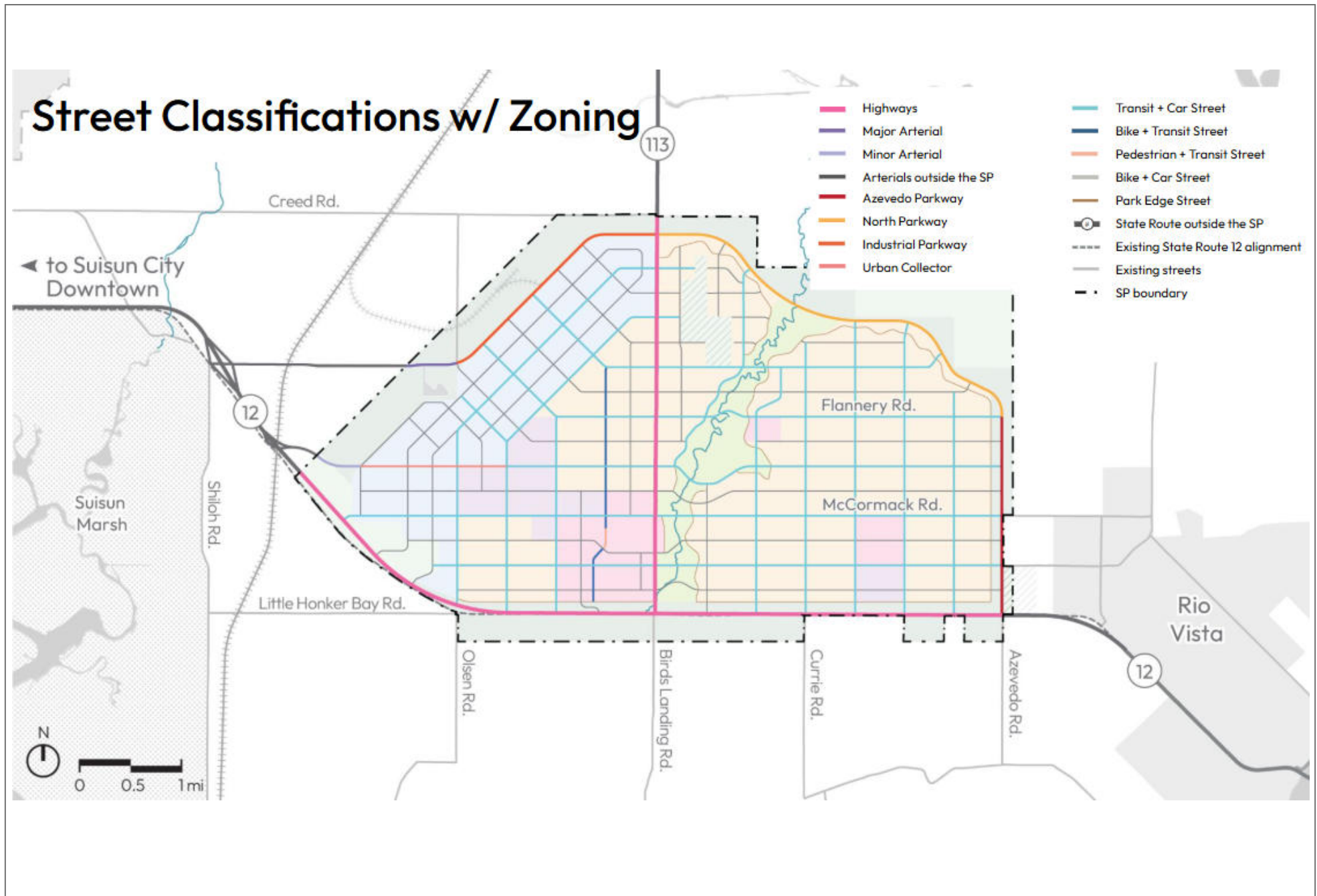
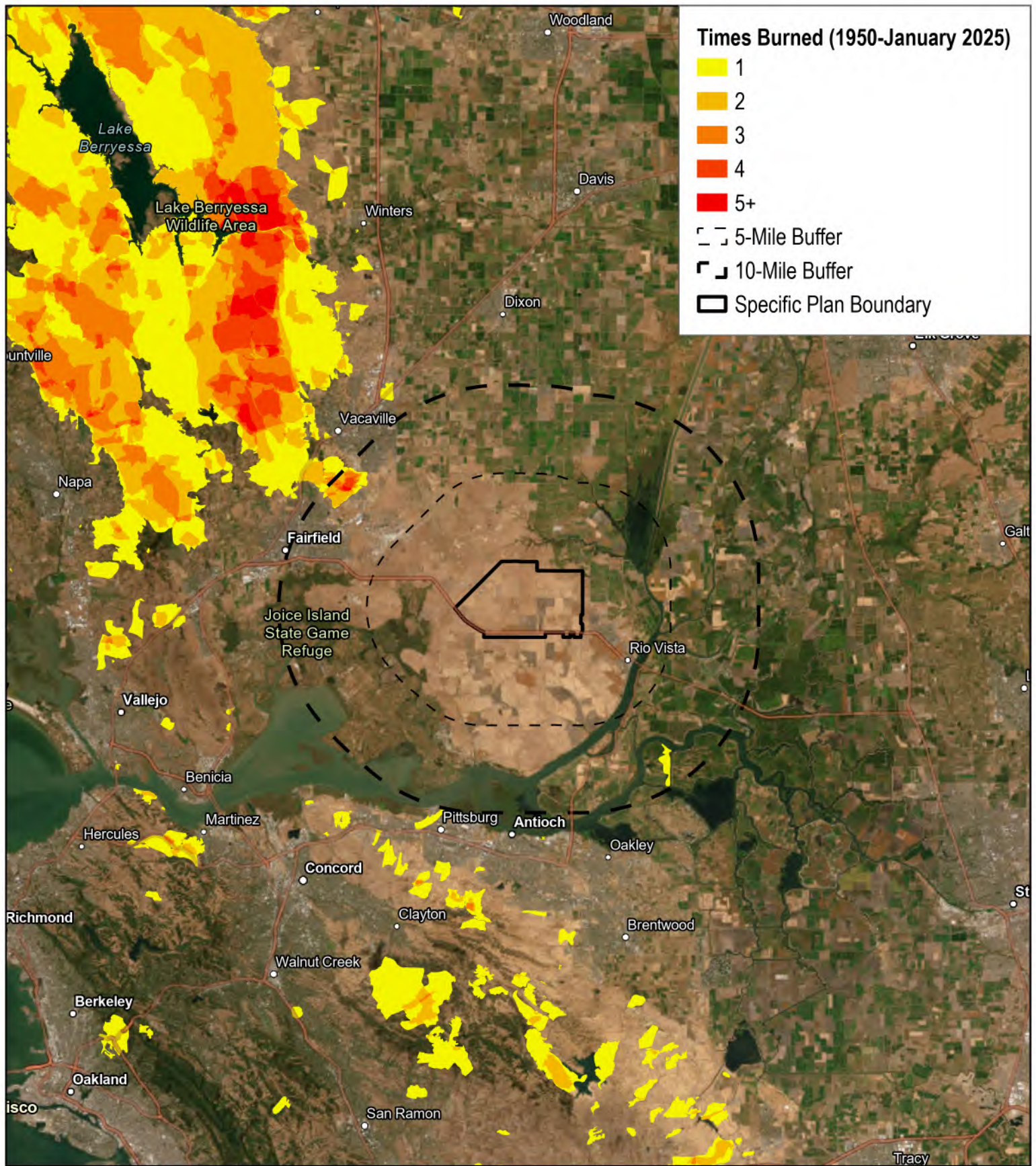


FIGURE 36

Street Network Overview

Fire Code Compliance Study - California Forever Project

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SOURCE: CAL FIRE, 2025

DUDEK

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Miles



FIGURE 37

Fire History

Suisun Expansion Project

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6 Defensible Space and Vegetative Fuel Management

Fire protection plans are typically prepared as a required document for projects within a LRA VHFHSZ or an SRA as dictated by CFC section 4903. However, this FPP has been voluntarily created for the Specific Plan despite not being situated within a LRA VHFHSZ in order to thoroughly assess all hazards related to wildland fire and memorialize fire safety requirements for the Specific Plan. The recently released CAL FIRE maps reclassify the Specific Plan site with 725 acres designated as a Moderate Fire hazard Severity Zone and 11,278 acres designated as a High Fire Hazard Severity Zone. The Specific Plan area is bounded by SR-12 to the south and by an arterial roadway on the remainder of the perimeter. These roadways would act as fuel breaks since they would provide a wide, non-combustible area.

6.1 Fuel Modification Zones

An important component of the fire protection for the Specific Plan is the provision of fire-resistant landscapes and vegetation buffers. Fuel modification zones (FMZs) are designed to provide vegetation buffers that gradually reduce fire intensity and flame lengths from advancing fire by strategically placing thinning zones and irrigated zones adjacent to each other on the perimeter of the WUI exposed structures. FMZs not only help protect new communities and structures from external wildfire risks, but FMZs also reduce the risk of fire originating from such new communities or structures and spreading to surrounding natural resources/habitat areas (Braziunas et al., 2021; Cochrane et al., 2012; Price et al., 2021). FMZs thereby provide a dual benefit of buffering communities and structures from encroaching wildfires while separating the new community and structures (and potential introduction of new ignition sources associated with the new community) from surrounding open space, fuel sources, or habitat areas (Bhandary & Muller, 2009; Braziunas et al., 2021; Cochrane et al., 2012; Fox et al., 2018). Research has also indicated that the likelihood of ignitions occurring in a given location is significantly influenced by the existing vegetation/fuel available (Elia et al., 2019). In addition to protecting structures, fuel treatments, and defensible space, when utilized in conjunction with place-based fire-hardened design also act as a buffer for natural areas and surrounding communities (Safford et al., 2009a; Scott et al., 2016).

Based on the post-development modeled extreme weather flame lengths for the Specific Plan area, average wildfire flame lengths in the un-maintained fuel beds are projected to be up to 18.5 feet high in grasslands adjacent to the Project development footprints. For the Specific Plan, the FMZ widths between the naturally vegetated open space areas and all combustible structures are proposed to be a minimum of 200 feet, approximately 10 times the modeled flame lengths based on the fuel type represented adjacent to the Specific Plan area. The fire behavior modeling system used to predict these flame lengths was not intended to determine sufficient FMZ widths, but it does provide the average predicted length of the flames, which is a key element for determining defensible space distances for providing firefighters with room to work and minimizing structure ignition. Implementing defensible space can reduce the likelihood of structural ignition and support landscape-level risk reduction (Mockrin et al., 2020; Warziniack et al., 2019). Defensible space also serves to decrease the chance of spot fires and allows firefighters to operate around the home (Price et al., 2021).

Although FMZs are very important for structure setbacks from adjacent unmaintained fuels, embers provide an additional pathway for fire to transmit to the structures. As discussed previously, the grass fuels are not expected

to have sufficient heat energy to ignite structures. Nonetheless, the Specific Plan, based on its location and ember potential, is required to include the latest ignition and ember resistant construction materials and methods for roof assemblies, walls, vents, windows, and appendages, as mandated by the SCFD and the California Building Code.

As modeled and described previously in the FPP, the Specific Plan FMZs will be effective given the expected flame lengths. The Specific Plan's design inherently provides more than the required FMZ, offering additional protection.

6.2 CAL FIRE Defensible Space Requirements

SCFD enforces the same requirements as established by CAL FIRE, which include specific requirements for fuel modification for zones at prescribed distances measured outwards from structures. Exhibit 11 demonstrates how zones are measured outward from structures. The requirements work to gradually reduce fuels as they get closer to the structure in a proverbial decrescendo as opposed to a complete cessation of fuel.

Zone 0 extends 0 to 5 feet from buildings, structures, decks, etc.

Zone 0 is key for wildfire defense and preventing fires from spreading to the home. The current guidelines are as follows:

- Use gravel, pavers, or concrete instead of combustible mulch.
- Clear dead weeds, grass, and debris; check roofs, gutters, and outdoor areas.
- Keep branches trimmed 10 feet away from chimneys and stovepipes.
- Minimize combustible items like furniture and planters on decks.
- Move firewood and lumber to Zone 2 for safety.
- Replace combustible fencing and gates with fire-resistant materials.
- Shift garbage and recycling containers to a safer area outside this zone.
- Relocate boats, RVs, and vehicles away from this zone to reduce fire risks.

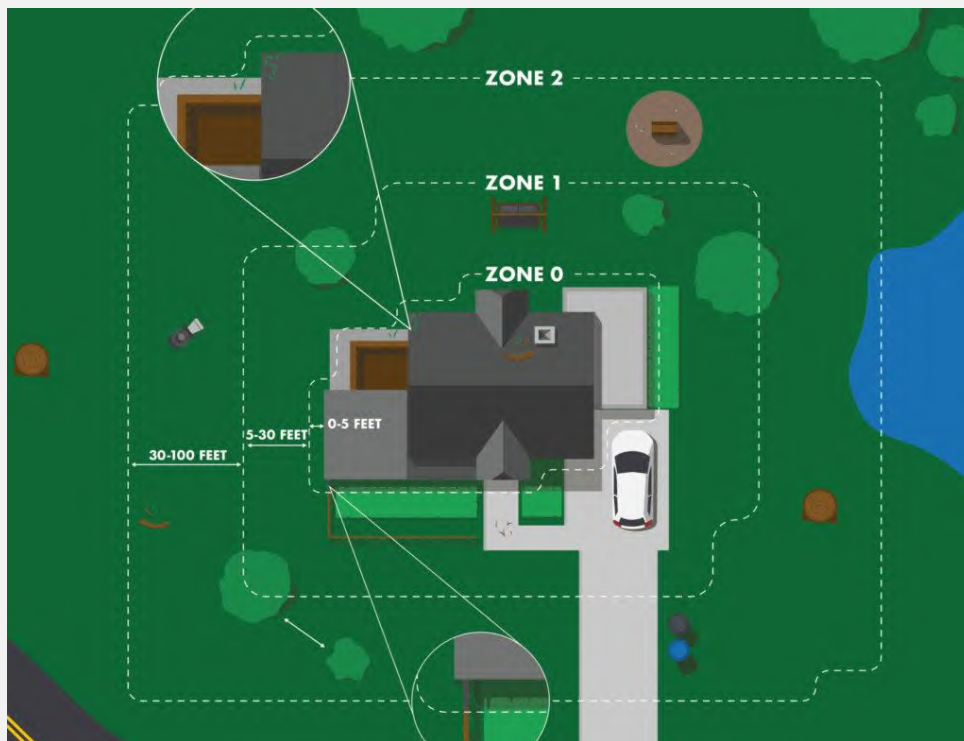
Zone 1 extends 5 to 30 feet from buildings, structures, decks, etc. towards the wildland.

- Clear all dead plants, grass, and weeds.
- Landscape plantings shall be irrigated.
- Remove dead leaves and pine needles from your yard, roof, and gutters.
- Trim overhanging branches and keep them 10 feet from the chimney.
- Regularly trim trees to maintain a 10-foot gap from others.
- Move wood piles to Zone 2.
- Prune flammable plants and shrubs near windows.
- Clear flammable vegetation and items from under decks, balconies, and stairs.
- Maintain space between trees, shrubs, and flammable items like patio furniture and wood piles.
- Ensure outbuildings and LPG tanks have 10 feet of clear space to bare soil and no flammable vegetation within an additional 10 feet around them.

Zone 2 extends 30 to 100 feet from buildings, structures, decks, etc. towards the wildland.

- Trim annual grass to a maximum height of 4 inches
- Space out shrubs and trees horizontally to prevent fuel continuity.
- Ensure vertical spacing between grass, shrubs, and trees to prevent ladder fuels.
- Remove fallen leaves, needles, and small branches, but can leave up to 3 inches in depth.
- Keep exposed wood piles at least 10 feet clear from surroundings, down to the soil.
- Ensure outbuildings and LPG tanks have 10 feet of clear space to bare soil and no flammable vegetation within an additional 10 feet around them.

Exhibit 11. Example Zone 0-2 from <https://readyforwildfire.org/prepare-for-wildfire/defensible-space/>



6.3 200-Foot Fuel Modification Zone

The Specific Plan will exceed CAL FIRE's requirements by expanding the perimeter FMZ to 200 feet, 100 feet larger than the minimum required. Some fire agencies throughout the state, such as Los Angeles County and Los Angeles City, have similarly expanded their minimum requirements to 200 feet to provide additional assurance against wildfire. The Specific Plan's 200-foot FMZ will be measured from the structures outwards into the open space as indicated on Figures 38 and 39. The 200-foot FMZ will be maintained completely void of any grasses, weeds, or other non-irrigated combustible vegetation, and will be extended as needed to buffer Pro Specific Plan related construction from the grasslands. As parkway/streetscape landscaping is established, it is required be irrigated

and installed in accordance with CAL FIRE's requirements. The FMZ is expected to be maintained through grazing and mechanical abatement. Roadways and hardscape areas that fall within the 200-foot buffer are considered to be code-exceeding as they are completely void of any combustibles. The 200-foot FMZ will require:

- The removal of all grasses, weeds, and combustible vegetation that is not irrigated.
- Irrigation of all landscape planting.
- All landscape plantings to meet or exceed the CAL FIRE requirements.
- All landscape plantings to be reviewed by the SCFD to verify fire-resistance.
- Ongoing maintenance to occur annually prior to the grasses drying, curing, and being susceptible to ignition.

6.3.1 Roadside Fuel Modification Zones

All Specific Plan related roadways that interact with non-Specific Plan related open space or Specific Plan related Open Space land uses are required to provide 20 feet of fuel modification on either side of the roadway. The vegetation should be maintained in accordance with Zone 1 of the CAL FIRE requirements. Sidewalks and similar hardscape along the roadways exceed the requirements of Zone 1 and are expected to be a common occurrence given the Specific Plan's dedication to providing walking and cycling paths.

6.4 Fuel Modification Maintenance

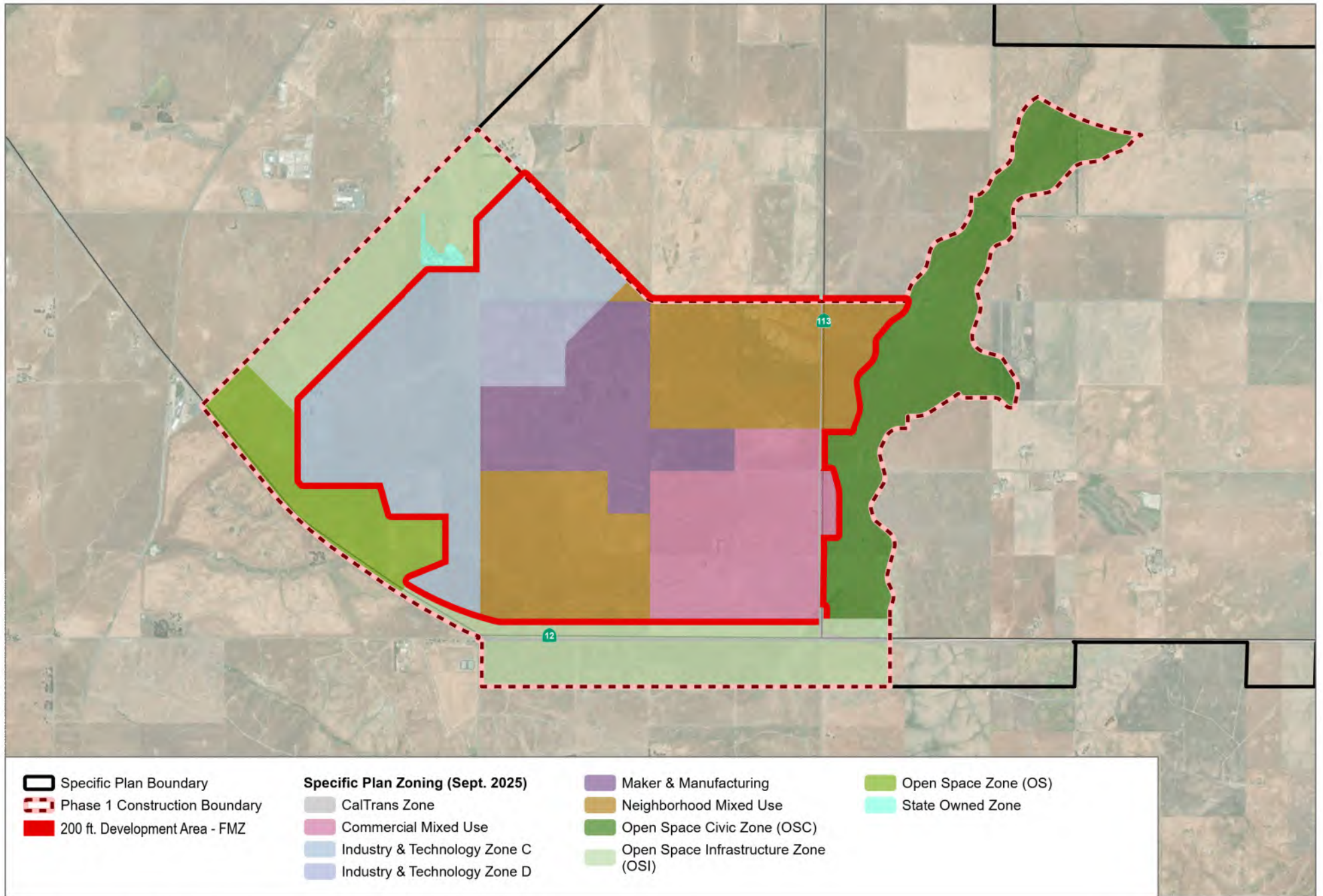
All fuel modification area vegetation management within the FMZs shall be completed prior to the grasses drying, curing, and being susceptible to ignition and more often as needed for fire safety, as determined by the SCFD.

If necessary to support SCFD, to confirm that the Specific Plan's FMZs and landscape areas are being maintained according to this FPP and the fuel modification guidelines, the Specific Plan will require a FMZ inspection and report from an approved 3rd party inspector in May or June of each year certifying that vegetation management activities throughout the Specific Plan site have been performed. If the FMZ areas are not compliant, a specified period to correct any noted issues will be provided so that a re-inspection can occur and certification can be achieved. Annual inspection fees are subject to the current Fire Department Fee Schedule.

6.5 Construction Phase Fire Protection

As indicated throughout this FPP, water supply sufficient to provide the required fire flow and fire apparatus access should be provided to all portions of developing areas prior to lumber being brought to the site, so that firefighting personnel have the water supply and roadways necessary to respond to a potential fire. Further, vegetation management is recommended at commencement and throughout each of the construction phases. Adequate fuel breaks should be created around all grading, site work, and other construction activities in areas where there is flammable vegetation. Combustible construction materials will not be brought on-site without prior fire department approval.

Chapter 33 of the California Fire Code requires a Fire Safety Plan/Construction Fire Prevention Plan to be created in order to point out potential ignition risks associated with construction and instruct the site supervisors on mitigation and prevention activities. Such a plan would be provided for each tract, structure, or block as deemed necessary by SCFD. A Specific Plan CFPP has been created by Dudek and establishes a baseline for fire-wise construction in the open space, including maintenance of a 200-foot buffer around all construction operations that grows with the development of the Specific Plan (Dudek, 2025).



SOURCE: ESRI Imagery 2024; SiteLab Urban Studios 2025

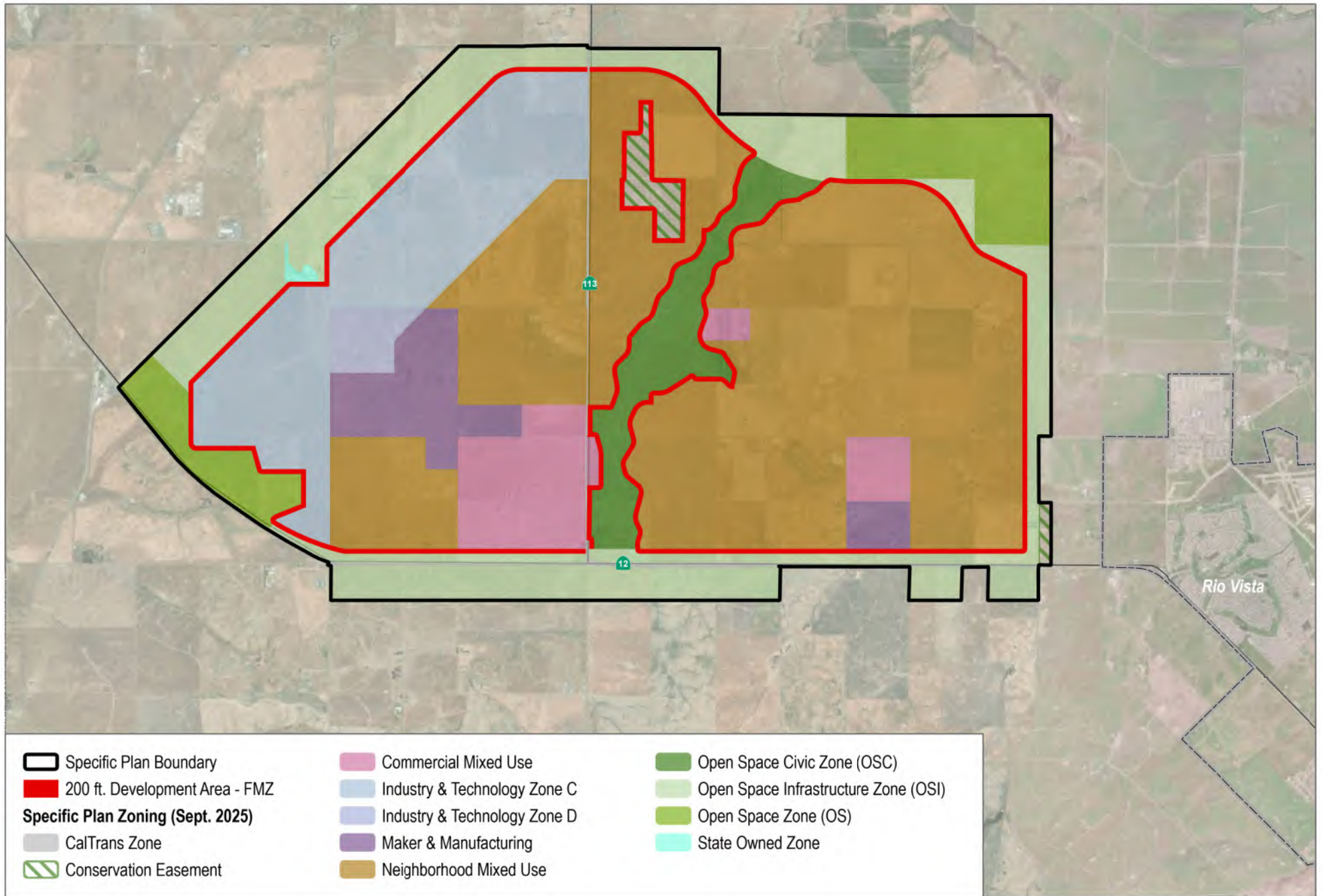
DUDEK



0 2,000 4,000
Feet

FIGURE 38
200 ft. Buffer at 150k/20 Year
Suisun Expansion Project

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SOURCE: ESRI Imagery 2024; SiteLab Urban Studios 2025

DUDEK



0 0.5 1
Miles

FIGURE 39
200 ft. Buffer at Buildout
Suisun Expansion Project

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7 Specific Plan Risk Analysis

Dudek Fire Protection Planners relied on available digital information about the Specific Plan site, including topography, vegetation types, fire history, and the Specific Plan's development footprint, in order to confirm and acquire additional site information, and document existing site conditions to complete a risk analysis for the Specific Plan. Utilizing the available data, including data provided by the Specific Plan's development team, the area's topography, natural vegetation, fuel loading, surrounding land use, and general susceptibility to wildfire were assessed. The field tasks that were completed for the risk analysis included:

- Topography evaluation
- Vegetation/fuel assessments
- Evaluation of the existing condition through an established photograph log.
- Confirmation/verification of hazard assumptions
- Off-site, adjacent property fuel and topography conditions
- Surrounding land use confirmations
- Necessary fire behavior modeling data collection
- Ingress/egress evaluation

Photographs of the Specific Plan site were collected (see Appendix A Representative Site Photographs), and fuel conditions were mapped using aerial images. Compiled site data was utilized in generating the fire behavior models and formulating the requirements and recommendations detailed in this FPP.

7.1 Wildfire History

Fire history is an important component of risk analysis. Fire history data provides valuable information regarding fire spread, fire frequency, ignition sources, and vegetation/fuel mosaics across a given landscape. One important use for this information is as a tool for pre-planning. It is advantageous to know which areas may have burned recently and therefore may provide a tactical defense position, what type of fire burned on the site, and how a fire may spread.

Fire history represented in this FPP uses the California Department of Forestry and Fire Protection (CAL FIRE) Fire and Resource Assessment Program (FRAP) database. FRAP summarizes fire perimeter data dating to the late 1800s, but it is incomplete because it only includes fires over 10 acres in size and has incomplete perimeter data, especially for the first half of the 20th century (Syphard and Keeley 2016). However, the data does provide a summary of recorded fires and can be used to show whether large fires have occurred in the Specific Plan site, which indicates an increased probability of future wildfires.

According to available data from CAL FIRE in the FRAP database⁵, no fires greater than 10 acres have burned within 5 miles of the Specific Plan since the beginning of the historical fire data record. A five-mile buffer distance is the standard for this type of analysis, but to better show the lack of fire history for the Specific Plan, for this analysis

⁵ Based on polygon GIS data from CAL FIRE's FRAP, which includes data from CAL FIRE, USDA Forest Service Region 5, BLM, NPS, Contract Counties and other agencies. The data set is a comprehensive fire perimeter GIS layer for public and private lands throughout the state and covers fires 10 acres and greater between 1878–2023.

the search area was expanded to 10 miles from the Specific Plan boundary. Doing so yielded only 6 fires that have burned within 10 miles of the Specific Plan. The nearest fire, the 2010 Bradford Fire, burned approximately 7.5 miles away from the Specific Plan boundary to the southeast, separated from the Specific Plan site by the Sacramento and San Joaquin Rivers. The rest of the fires occurred in the same area, northwest of Vacaville Junction, approximately 8.5 miles from the Specific Plan boundary. The largest of these fires was the 2018 Nelson Fire that burned approximately 2,158 acres. It should be also noted that the 2020 LNU Lightning Complex that consumed 363,220 acres burned within approximately 10.3 miles to the northwest of the Specific Plan boundary.

Table 10. Fire History within Ten Miles of the Specific Plan

Year	Fire Name	Distance From Specific Plan (miles)	Approximate Size of Fire (acres)
1972	Cement Hill	8.5	1,724.02
1992	Cement	8.5	1,221.47
2004	Cement	8.5	1,006.85
2010	Bradford	7.5	511.54
2011	Beacon	8.5	702.77
2018	Nelson	8.5	2,158.43
Total	6 Wildfires	—	Average Fire Size: 1,220.85

Source: FRAP

Fire history for the general vicinity of the annexation area is illustrated in Figure 37, *Fire History*. The lack of fires having occurred near the Specific Plan during the historical record can be largely attributed to the extensive agricultural land usage. Irrigatable crops are not readily combustible due to their moisture content, so ignition is unlikely, and fire spread even less likely. Ranching operations also reduce fire hazard by reducing fuel loading through grazing. The generally flat topography also aids fire suppression and reduces the likelihood that any ignition would grow to be a threatening fire. Flat lands can be accessed by fire engines and heavy equipment to more rapidly contain and suppress a fire and hand crews can also work more rapidly in comparison to more complex terrain. Further, since the area is currently sparsely populated, there are likely less human-caused ignitions compared to a more populated area. For a wildland fire to be a realistic threat to the Specific Plan, large, continuous lands would likely have to be left fallow and not ranched to support surface fire spread that outpaces fire suppression efforts.

7.2 Existing Fire Hazard

Based on the existing conditions, the likelihood of wildfire in the Specific Plan area is low. The current conditions as they relate to topography, climate, land use, and vegetation have a low potential to facilitate wildfire ignitions and spread. Additionally, as described above in the Wildfire History section, there have been only six wildfires within a 10-mile radius of the Suisun Expansion Project, with none that have burned any portion of the Specific Plan site. The most recent wildfire within the described 10-mile radius was in 2018. Further, it is expected the low prevalence of wildfires in the area will continue within the Specific Plan area's vicinity once it is completed.

Fire Hazard Severity Zones depict wildfire hazard based on wildfire intensity and likelihood. The Specific Plan's potential wildfire hazard is mapped by CAL FIRE as primarily High Fire Hazard Severity, with some Moderate Fire hazard Severity, and small portions with no fire hazard severity designation. It is important to emphasize that this

designation is in no way intended to prevent development in hazardous fire areas. Uses of Fire Hazard Severity Zone maps, as determined by the Office of the State Fire Marshal, are summarized below.

- Designate areas where California's wildland urban interface building codes apply to new buildings.
- Included into real estate disclosures.
- Guide planning, prevention, and mitigation activities/requirements that reduce risk.
- Considered by local governments in General Plans
- Evaluate hazard, not risk. Fire hazard severity maps are like flood zone maps. Hazard is based on the physical conditions that create a likelihood that an area will burn without considering modifications such as fuel reduction efforts. Risk is the potential damage a fire can do to the area under existing conditions, including any modifications such as defensible space, irrigation, fire sprinkler systems, and ignition-resistant building construction.

While CAL FIRE's Fire Hazard Severity Zone map is utilized as a tool for quantifying the likelihood of severe wildfire behavior, it does not allow for an accurate portrayal of community risks as it does not consider vital attributes of community wildfire resiliency including but not limited to:

- Home construction materials and methods (roofing material, siding material, vent style, etc.)
- Defensible space and vegetative fuel modification
- Urban fuels and vegetation
- Community design (wildland intermix or interface)
- Emergency response capacity
- Early wildfire detection potential
- Evacuation capacity

In California's 2019-2020 regular legislative session, Senate Bill 474 titled *Very high fire hazard severity zone: state responsibility area: development prohibition*, was proposed. The bill intended to prohibit the creation or approval of new development within SRA defined Very High Fire Hazard Severity Zones. The Bill was not approved as it did not align with the intended use of Fire Hazard Severity Zones in addition to the fact that many existing communities are in their entirety within a Very High Fire Hazard Severity Zone. Evidence suggests that new-development can be built safely, even within Very High Fire Hazard Severity Zones which is a higher fire severity designation than that of the Specific Plan, if communities are built in compliance with the latest codes and regulations that have been proven effective in mitigating wildfire risks. Although the Specific Plan is not within a designated VHFHSZ, wildfire safety provisions such construction with materials and methods specifically for wildfire hazard areas and defensible space vegetative fuel modification have been incorporated into the Specific Plan.

Master-planned communities built to modern ignition resistant standards provide passive fire protection that is highly successful at minimizing damage and loss of structures (CBIA, 2022). The State Fire Marshal's statistics demonstrate that construction in accordance with California Building Code Chapter 7A standards effectively reduces fire risks to homes built in the wildland urban interface (WUI) and fire hazard severity zones (CBIA, 2022). Remarkably, when those homes are built as part of a properly planned and hazard-mitigated master-planned community, the risk of significant structural loss is extremely low (FEMA, 2023). Despite the headlines in recent years about the loss of homes to California wildfires, it has gone substantially unreported that no master-planned community built after the adoption of California Building Code Chapter 7A has suffered extensive structural losses as evidenced in the OSFM Property Loss [Data](#).

The evidence demonstrates that California's wildland fire structure losses come from the existing home stock built before Chapter 7A standards were adopted. Extensive analysis of State Fire Marshal data regarding recent impacts from California's mega-fires has been conducted and the data shows overwhelmingly that over 98.5% of structural damage or loss occurs with homes built before the adoption of Chapter 7A standards. Even of those new homes that were damaged, most involved isolated new construction surrounded by existing, high-risk homes located in high-risk areas. High-risk homes are those that are commonly built in the WUI and are overgrown by many drought-ridden fuel types (brush, shrubs, trees, etc.) that are ready to burn rapidly. Many of these communities have narrow roads, inadequate fire access and evacuation routes, and inadequate water supplies. In stark contrast, new master-planned communities must go through a strenuous environmental review under the California Environmental Quality Act and are typically planned, approved, and implemented with numerous fire-safety features and measures, such as:

- Fire-hardened homes built to the latest Chapter 7A standards.
- Community-wide fuel breaks, fire-resistant landscaping, and green belting.
- Active grazing on undeveloped lands to reduce and manage flashy fuels.
- Perpetual funding, maintenance, and enforcement.
- Appropriate and reliable fire access and evacuation routes.
- Adequate water supplies.
- Residential fire sprinklers.
- Undergrounded utilities.
- Community design and siting to minimize fire risks (e.g., slope setbacks).
- Code-compliant emergency response times.

On average, for the nine worst property-loss fires dating back to 2017, only approximately 1% of the homes and apartments destroyed, damaged, or affected were new dwellings built after January 1, 2010, even though new dwellings make up roughly 7% of the state's total housing stock (CBIA, 2022). New homes fared extremely well compared with older neighborhoods during those major fires. Of the 31,000 data points analyzed from the State Fire Marshal, it was extremely rare to see more than two new homes on the same street destroyed or affected by the fires, while it was commonplace for entire neighborhoods of older dwellings to be destroyed. As opposed to custom home production where a single home is constructed separately from others, production-style home development is completed in phases, usually 8-15 homes at a time. This typical production-style construction creates blocks or areas of fire-resistant homes, which are much more effective at withstanding wildfire intrusion and decreasing home-to-home spread. Notably, Dudek is not aware of any master-planned community in California constructed after January 1, 2010 (i.e., a planned community with all new homes and typically including measures such as fuel breaks) suffering significant structural loss even during extreme fire events.

7.3 On-Site Wildfire Risk

In California, humans play a significant role in ignitions by influencing the timing and spatial pattern of fires (Keeley & Syphard, 2018). As a result, humans account for approximately 95% of ignitions in the region (Keeley & Syphard, 2018). The relationship between human activities and natural dynamics has contributed to altering fire regimes (Syphard et al., 2007). One alteration is that urban development increases the risk of repeated fires on the landscape (Syphard, Clarke, et al., 2007). As humans move into landscapes, patterns of ignitions change as well (Syphard, Clarke, et al., 2007). However, the number of ignitions and the area burned varies by an ignition source

(Syphard & Keeley, 2015). Overall, human-caused ignitions peaked in 1980 and have since dropped likely due to increased efficiencies in fire prevention, changes in infrastructure, a decline in smoking, neighborhood watch programs, increased penalties for arsonists, and new developmental rules (Keeley & Syphard, 2018). However, while the number of ignitions has decreased, the area burned has not changed, indicating while fires are fewer, they are larger in magnitude (Keeley & Syphard, 2018). The relationship between ignitions and human development is complex. While human-caused ignitions increase as populations and development expand into the wildland-urban interface, this increase reaches a peak and then declines at the point at which development or impervious surfaces (hardscape) outweigh the wildland fuels (Keeley & Syphard, 2018).

By analyzing all wildfire ignitions included in CAL FIRE's Fire and Resource Assessment Program (FRAP) database dating back over 100 years it was found that in San Diego County, equipment-caused fires were by far the most numerous (Syphard & Keeley, 2015). These ignitions accounted for most of the area burned, followed closely by the area burned by power line fires (Syphard & Keeley, 2015). This pattern is consistent beyond San Diego County and is applicable in other parts of California such as Solano County. Ignitions that are classified as equipment caused resulted from exhaust or sparks from power saws or other equipment with gas or electric motors, such as lawnmowers, trimmers, or tractors. Powerline-based ignitions that have caused or contributed to recent fires, such as the Camp Fire in 2018, have demonstrated how the presence of powerlines (particularly the lower height distribution lines) can result in ignitions that result in large wildfire events. According to CAL FIRE data, the 2018 Camp Fire, as of the preparation of this FPP, is the most destructive wildfire in California history. Part of the challenge is that as humans push into wildland-urban interface areas, powerlines are often located in areas where access is difficult creating challenges for firefighting tactics (Syphard & Keeley, 2015). Research has indicated that important factors in structure loss are the coincidence of human-caused ignitions with severe weather and the location and pattern of housing development (Schwartz & Syphard, 2021). However, it is important to note that often these themes are researched in isolation with small proportions studying two more themes limiting the understanding of the interactions and dependencies (Price et al., 2021).

7.3.1 Powerlines

Common ignition sources in California are related to powerlines and many destructive fires across the State have been caused by powerlines (Keeley & Syphard, 2018). However, this risk can be mitigated by undergrounding powerlines. The Specific Plan will underground all new powerlines. As previously noted, the most destructive wildfire in California as of the preparation of this FPP is the 2018 Camp Fire in Butte County. The wildfire was caused by a failing powerline and despite the fire being reported quickly, critical fire weather conditions with low relative humidities, historically dry fuels and strong gusty winds created extreme fire growth conditions. The 2018 Camp Fire burned approximately 153,336 acres, destroyed 18,804 structures, and resulted in 85 deaths. Other notable fires caused by powerlines include the 2007 Witch Fire in San Diego County (approximately 197,990 acres and 1,650 structures destroyed), the 2017 Nuns Fire (approximately 54,382 acres and 1,355 structures destroyed), the 2021 Dixie Fire (approximately 963,309 acres and 1,311 structures destroyed), and the 2017 Thomas Fire (approximately 281,893 acres and 1,063 structures destroyed). However, this risk can be effectively mitigated by undergrounding powerlines.

7.3.2 Vehicles

A potential source of vegetation ignitions in the annexation area is the existing SR-12 and SR-113, and other roads in the region. The Specific Plan provides roadside fuel modification via the removal of flammable vegetation and provisions for landscaping along roads it controls. Additionally, the ongoing grazing program in areas adjacent to

the Specific Plan reduces fuel loads adjacent to roads. The Specific Plan includes provisions for creating increased separation from potential roadside ignition sources and potential fuel beds that will not only protect the Specific Plan site but also adjacent communities. These efforts reduce or minimize the ability of a vehicle-related spark, catalytic converter failure, or another ignition source to ignite and spread fire from the roadsides into unmaintained fuels. While the Specific Plan will lead to an increase of vehicle traffic on off-site roadways, ongoing maintenance along SR-12 and SR-113 is anticipated to reduce vehicle-related ignitions. The Specific Plan provides for maintenance of the roadside fuel modification zones along the roadways created in the External Specific Plan Improvements when those fuel modification zones overlay Specific Plan land. Otherwise, Caltrans will be responsible for maintenance, and intervals of maintenance currently provided by Caltrans are expected to continue, if not increase in frequency, as part of overall fire reduction efforts that are beyond the control of the Specific Plan. The City will work cooperatively with Caltrans to ensure that roadside vegetation management of off-site roadways is being performed annually.

Caltrans's Integrated Vegetation Management (IVM) program utilizes various methods of vegetation control to meet specific roadside vegetation control goals of SR-12 and SR-113, including herbicides, mowing, weed whacking, targeted grazing, and hand removal. As such, the Specific Plan is not expected to significantly increase the already known fire risk associated with the existing roads. The on-site roadways will comply with all fire department access requirements roadside-adjacent fuel modification. Further, the interior roadways are also not expected to result in significant vehicle ignitions due to roadside landscaping that would minimize receptive fuel beds for sparks or hot metal from vehicles. Therefore, even if ignition were to occur within the Specific Plan, it is highly unlikely it would be sustained or spread beyond the Specific Plan site due to the code-compliant landscapes, hardscape, and adjacent fuel modifications areas. Additionally, the Fire Department Infrastructure Plan locates fire units such that they would be within a 4-minute travel time of any location within the Specific Plan and thus be able to mitigate fire spread from an ignition source such as a house or vehicle to the vegetation.

7.3.3 Machinery

The use of equipment in wildland-urban interface areas is another common source of modern-day human-caused ignitions. This is due to heated machinery, sparks, hot fluids, or exhaust igniting vegetation. Potential ignitions due to equipment use can occur during construction activities and are an ongoing operational risk. Use of machinery during construction will be buffered from open space and receptive fuels by 200-foot fuel modification zones which will be maintained throughout construction, reducing the possibility of an ignition generated by the machinery to contact suitable fuels. Further, upon build-out, the Specific Plan area will be buffered from the open space by maintained open spaces serving as fuel modification zones.

7.3.4 Construction Activities

Construction activities associated with the Specific Plan would introduce potential ignition sources. However, the Specific Plan would comply with Suisun City Fire Department and California Fire Code requirements for activities in hazardous fire areas. Spark arrestors would be required on all equipment with an internal combustion engine used within the Specific Plan site. Further, construction activities would comply with California Fire Code Chapter 33 for Fire Safety During Construction and Demolition. Per Section 3304, precautions to prevent ignitions, such as but not limited to prohibiting smoking except in approved areas, preventing the accumulation of and removing combustible debris, implementing fire watch personnel where required by the fire code official, having approved water supply onsite, and maintaining vehicle access for firefighting to all construction and demolition areas would be required. Additionally, a Project-specific Construction Fire Prevention Plan (CFPP) will address fire safety practices to reduce

the possibility of fire during construction activities as required by Chapter 33 of the California Fire Code. Prior to combustible materials being brought on-site, utilities, access roads, and fuel modification zones would be established. The design features and regulatory requirements would reduce the risk of construction-related wildfire ignition and spread.

7.3.5 Operational Activities

Operational activities associated with maintenance of the Specific Plan's open spaces also have the potential to cause ignitions. The maintenance work would also be required to comply with the California Fire Code's fire safety requirements for the type of equipment being used and the work being done. Operational activities would also comply with SCFD requirements for activities in fire hazard areas. The surrounding open space, required buffer, and landscaping within the Specific Plan site would be subject to ongoing maintenance in compliance with all applicable fire safety requirements regarding equipment, the timing of maintenance, and fire suppression capabilities further outlined herein. Additionally, maintaining the fuel modification zones and defensible space landscaping would allow these areas to continue their function of reducing potential ignition and fire spread both from fire onsite and offsite in origin.

7.3.6 Fire Transitioning from On-Site to Off-Site

The same construction methods and materials required to protect structures from wildfire exposure, along with defensible space vegetative fuel modification and management, also serve to reduce the risk of a fire originating within a Specific Plan structure or perimeter buffer zone and spreading to the native vegetative fuels or the agricultural areas. Fires that originate in structures are expected to be quickly contained or extinguished by the required fire sprinkler systems. As previously noted, Suisun City has amended the California Fire Code to require fire sprinkler systems in a larger number of buildings than the code as adopted by the State Fire Marshal. Exterior doors and windows designed to prevent the intrusion of embers and glazing failure due to wildfire heat exposure will perform equally well with preventing interior fires from escaping the building envelope.

Similarly, fires that occur outside of buildings, such as vehicle fires or fires ignited in ornamental landscaping are expected to be contained and extinguished quickly. Positioning fire stations in a manner designed to achieve a 4-minute travel time ensures that firefighters can arrive at fire incidents while fires are generally still in the incipient phase. The use of defensible space landscaping principles reduces the amount of vegetative fuels and provides spacing within the landscaping that slows the spread of vegetative fires. In addition, the fuel modification buffer zones along the perimeter of the Specific Plan will assist with the slowing or stopping an on-site fire from transitioning to an off-site fire by limiting available fire fuels and providing open areas that facilitate firefighter access.

7.3.6.1 Historical Wildfires Caused by Structure Fires

CAL FIRE maintains fire history data throughout the state and includes ignition causes when available (CAL FRAP, 2023). According to the historical fire record, wildfires caused by structure fires account for only <1% percent of all wildfires where the cause is known. Wildfires by cause in California is summarized below in Table 11.

Table 11. Wildfire Occurrences in California by Cause

Fire Cause	Frequency	Percent of All Causes
1 - Lightning	3483	22%
9 - Miscellaneous	3458	22%
2 - Equipment Use	1325	8%
7 - Arson	945	6%
5 - Debris	757	5%
10 - Vehicle	534	3%
11 - Powerline	444	3%
4 - Campfire	391	3%
3 - Smoking	337	2%
8 - Playing with fire	192	1%
18 - Escaped Prescribed Burn	103	1%
6 - Railroad	78	<1%
15 - Structure	27	<1%
19 - Illegal Alien Campfire	17	<1%
16 - Aircraft	15	<1%
13 - Non-Firefighter Training	11	<1%
12 - Firefighter Training	5	<1%

Note: Does not include wildfires with Unknown cause

Source: CAL FIRE FRAP, 2022

Through a detailed assessment of these fires, clear patterns and characteristics related to community design and the surrounding landscape that are more likely to result in a fire ignition that results in a wildfire are revealed. These include:

- Wildland Urban Intermix style development with substantial vegetation surrounding structures.
- Limited setback from wildland vegetation with structures located in close proximity to unmaintained natural vegetation.
- Adjacent wildland vegetation often resembles heavy fuels. Vegetation surrounding structures is rarely herbaceous.
- Surrounding terrain is often steep with structures located on steep slopes.
- Structures are often positioned atop slopes.
- Development can be described as rural, with structures located far from existing communities or fire stations.
- Structure age is considered old.

The Specific Plan is not designed with these characteristics and instead features a clustered master plan design with code compliant construction and landscaping features that minimize the potential for on-site structure fires to result in off-site ignitions. The Specific Plan's development footprint does not include unmaintained vegetation intermixed with or near structures. Structures will be constructed in accordance with the latest building code requirements for fire safety and each structure will be equipped with automatic interior fire sprinklers. Development edges feature one, continuous interface between development and off-site grassland fuels buffered by a maintained fuel modification zone, peripheral roadways, and open space land uses that meet the intent of fuel

modification . The proposed development is not located on steep terrain or on ridgelines. Further, the Specific Plan proposes to include several on-site fire stations to ensure rapid response to potential onsite structure fires. As proposed, the Specific Plan does not include conditions that increase the potential for off-site ignitions caused by on-site structure fires.

7.3.6.2 Potential for Firebrand Production from Structure Fires in Modern Master Planned Communities

Airborne embers produced by a fire, commonly referred to as firebrands, are pieces of burning materials which become airborne in the fire's thermal column, and which are carried for some distance in an airstream (Babrauskas 2020). It is possible for structure fires to produce firebrands when the structures are assembled with combustible materials (Manzello and Suzuki, 2023). However, firebrand production from structure fires is highly dependent on fire safety features, building construction, and structure fire intensity.

The installation of interior automatic fire sprinklers is understood as the single most effective tool for containing and extinguishing structure fires in their early stages (NFPA, 2021). Structural fire suppression aims to extinguish fires early or contain the fire to its original point of origin without spreading to additional portions of the structure. In buildings equipped with automatic fire sprinklers, 95% of fires were confined to their room of origin, a 24% increase compared to buildings without automatic fire sprinklers. In addition, structure losses have been reduced by up to 68% when equipped with automatic fire sprinklers (NFPA, 2021). Firebrand production from structure fires is most likely to occur when the structure becomes engulfed in flames. When fires are confined to the interior of the structure, it is not likely that firebrands will escape its interior. Therefore, automatic fire sprinkler systems are an effective way to prevent firebrand production from structure fires.

As with vegetative fuels, characteristics of structure fuels influence ember production, transport, and off-site ignitions. Heydayati et al. (2020) found that a modern wall assembly utilizing fiber cement siding produced 28.6% fewer firebrands under high winds than a wall assembly utilizing cedar siding. Suzuki and Manzello (2016) found that firebrands produced by cedar siding had large projected areas and low mass that caused them to be easily lofted long distances under applied wind as compared to assemblies with only studs and sheathing. Roofing characteristics have been observed to substantially influence firebrand production from structure fires. Wood-shake roof shingles are notorious for producing large firebrands that can travel long distances. The maximum spotting distance recorded from untreated wood shake roofs was 8 miles (Wilson 1962). This figure stemmed from a large-scale conflagration known as the Bel Air Fire that created significant convective air currents capable of lofting firebrands far in advance of the flaming front. However, constructing buildings with fire-resistant building materials reduces the potential for ember production from structure fires.

As described above, the potential for firebrand production from structure fires is influenced by fire safety building design features, building construction, and structure fire intensity. Modern master planned, code-compliant communities do not include design features that are likely to contribute to high intensity structure fires that may ignite off-site wildfires.

The Specific Plan proposes Fire Code amendments to require the protection of nearly all structures with interior automatic fire sprinklers which have been shown to effectively keep fires from spreading beyond their room of origin (NFPA 2021). Approved automatic sprinkler systems in new buildings and structures, in which the total floor area of all floors exceeds one thousand (1,000) square feet is the standard proposed by the Specific Plan. Therefore, if structure fires do occur, they are unlikely to reach high intensities that may result in active combustion of the entire structure, which leads to firebrand production.

As described, greater fire intensity is found to increase firebrand production. In an urban environment, fire intensity and fire suppression difficulties increase dramatically when multiple structures are burning simultaneously. This phenomenon is referred to as an urban conflagration when off-site wildfires encroach upon communities and ignite multiple structures in one event. Code-compliant master-planned communities are designed to prevent the occurrence of urban conflagration as proven in multiple studies (FEMA, 2023). Code compliance across structures, fire department access, and community design create a layered approach towards reducing the potential for conflagrations. Preventing conflagrations, started by either off-site or on-site fires, and confining structure fires to their room of origin helps to decrease the number of firebrands produced from structure fires.

7.4 Off-Site Wildfire Risk

Wildfire hazard potential classifies wildfire hazard based on the likelihood of fire to occur and wildfire intensity. Areas with higher hazard potential are more likely to experience high intensity wildfires. This dataset is a combination of landscape burn probability, which maps the relative likelihood of wildfire to occur in a particular location, as well as flame length probabilities, based on localized weather and vegetation conditions.

Wildfire Hazard Potential data was obtained from Pyrologix and the USDA Forest Service's Contemporary Wildfire Hazard Across California⁶. As presented in Figure 40, *Wildfire Hazard Potential*, wildfire hazard is predominantly mapped as low and very low within and near the annexation area. These results indicate that the Specific Plan site and surrounding landscapes are unlikely to experience large-scale, high intensity wildfires.

The wildfire risk assessment for the Specific Plan utilized fire behavior modeling to predict the intensity, spread, and potential suppression difficulty of wildfires in the area, based on factors such as vegetation, topography, and climate conditions.

7.4.1 Fire Transitioning from Off-Site to On-Site

The greatest risk to the Specific Plan from a wildfire event in the region is an off-site fire reaching the Specific Plan site and becoming an on-site fire that ignites structures. When a wildfire burning in off-site vegetative fuels transitions to burning structures in an urban or suburban community, the fire becomes an urban conflagration. As described by Prell in RedZone (2025), Urban conflagrations

are large, uncontrollable fires that rapidly spread through densely populated areas, causing widespread destruction. Unlike wildfires in rural or forested regions, urban conflagrations thrive in tightly packed buildings and infrastructure, often fueled by high winds, flammable materials, and inadequate fire control measures.

These devastating fires usually happen under conditions where fire suppression efforts are overwhelmed. Factors such as prolonged dry weather, outdated building materials, and rapid urbanization contribute to their occurrence. High winds can further accelerate their spread, as seen in major historical events. The risk of urban conflagration increases during natural disasters like earthquakes, which can rupture gas lines and create ignition points.

⁶ <https://pyrologix.com/reports/Contemporary-Wildfire-Hazard-Across-California.pdf>

In modern times, improved building codes and firefighting technology have reduced their frequency. However, with climate change intensifying extreme weather conditions, the risk remains significant, especially in older cities with dense populations and aging infrastructure.⁷

It is important to note that wildland fire may transition to urban fire if structures are receptive to ignition and located in a way that makes them susceptible to ignition. Structure ignition depends on a variety of factors and can be prevented through a layered system of protective features including fire-resistive landscapes directly adjacent to the structure(s), application of known ignition-resistant materials and methods, and suitable infrastructure for firefighting purposes. Understanding the existing wildland vegetation and urban fuel conditions on and adjacent to the Specific Plan site is necessary to understand the potential for a wildfire event. Measures to reduce the risk of wildfires to the Specific Plan are discussed below.

7.5 Hazard Mitigation and Risk Reduction

Given the number and intensity of wildfires in recent years, there has been an increasing focus on wildfires and reducing the size of wildfires (Syphard et al., 2014). However, addressing wildfires in the wildland-urban interface (WUI) with fuels reduction and prescribed burning is often faced with challenges related to private property constrictions (Schwartz & Syphard, 2021). Studies have shown that land-use decision-making, defensible space, homeowner preparation, and ignition prevention can complement traditional management in reducing wildfires and addressing fuels management (Schwartz & Syphard, 2021; Syphard et al., 2017). Further, given the importance of the WUI and often the lack of capacity for large-scale fuels reduction such as grazing, creating safer spaces within the WUI is critical (Schwartz & Syphard, 2021). Because most fires are caused by humans, ignition reduction is a powerful management strategy (Syphard & Keeley, 2015). Given that future development is increasingly being located in wildfire hazard areas and fires are increasing in occurrence and severity, land-use planning and ignition prevention represent the most effective long term solutions while traditional management and fuel breaks still play a role in addressing the coincidence of human-caused ignitions and severe fire weather (Schwartz & Syphard, 2021; Syphard et al., 2017).

To minimize the negative effects, the Specific Plan has designed multi-scaled fire protection features to address the existing fire hazard, reduce ignition probability, and lower the fire risk for the Specific Plan area. As discussed above, one of the most effective solutions to wildfire problems in the WUI is to address the wildfire hazard through land-use planning and ignition prevention. The Specific Plan would result in the conversion of ignitable fuels, such as the surrounding grass fuels, to irrigated/thinned landscaping and development, thus substantially reducing the amount of available fire fuels in the Specific Plan area. Notably, the Specific Plan minimizes ignition risk by incorporating a 200-foot perimeter fuel modification zone throughout each stage of construction, which will provide defensible space and reduce fire intensity and flame lengths in the event of ignition occurring. This fuel modification zone, which is based on Suisun City and California Fire Code requirements, will be implemented by knowledgeable professionals, inspected by third-party inspectors, and maintained in perpetuity in accordance with the Specific Plan.

Additionally, other fuel modification/landscaping requirements like the Specific Plan's roadway fuel modification zones and the prohibition of certain highly flammable plants will further reduce the risk of fire ignition and spread despite the introduction of development to the area. Critically, Project structures will be built in accordance with the

⁷ Prell, A. 2025. *Understanding Urban Conflagration: Causes and Historic Events*. Published in RedZone. <https://www.redzone.co/2025/02/10/urban-conflagration/#:~:text=Urban%20conflagration%20refers%20to%20large,a%20lasting%20mark%20on%20history.>

most state-of-the-art, ignition-resistant construction standards and building codes adopted by Suisun City and the State Fire Marshal, including Chapter 7A of the California Building Code, which requires that the buildings are resistant to ignitions from direct flames, heat, and embers. Other structural requirements include fire-resistant roofing, vent covering and opening limitations, non-combustible or ignition-resistant exterior walls, ignition-resistant eaves, and porch ceilings, insulated windows and exterior doors, and other measures that have proven to substantially reduce the risk of building ignition and fire spread (CBSC, 2022). Finally, a key component of reducing the chances of fire ignition and spread involves educating residents to have a high fire risk awareness. In this respect, it is recommended that the Specific Plan includes a robust education awareness program that will provide residents with wildfire safety information and create greater risk awareness for occupants and their employees. Through this program, residents will learn about necessary landscape maintenance, activities in a wildfire risk area, preventing wildfires, structural-based fire protection features, and wildfire evacuation information.

As evidenced by these measures and the other measures described below in Code Compliance Analysis section, the Specific Plan has outlined steps in which it will implement ignition reduction from common anthropogenic ignition sources, leverage its capacity for implementing fuels reduction including defensible space, and consider both onsite and offsite wildfire risk.

Clustered Developments

Community design and density directly influences susceptibility to fire. For example, in clustered developments such as the Specific Plan there is one interface (the community perimeter) with the wildlands, whereas lower density development creates more structural exposure to wildlands, less or no ongoing landscape maintenance (an intermix rather than interface), and consequently more difficulty for limited fire resources to protect well-spaced homes. Research indicates that clustered developments with one perimeter interface are not associated with increased vegetation ignitions (Syphard & Keeley, 2015). In contrast to clustered developments, low density developments have more extensive gaps between structures where there are intermixed fuels available for surface fire to spread between and engulf structures. The intermix includes housing amongst the unmaintained fuels, whereas the Specific Plan converts all fuels within the footprint and provides a wide, managed open space area separating structures from unmaintained fuel, creating a condition that facilitates defense. Syphard and Keeley (2015) go on to state that “The WUI, where housing density is low to intermediate is an apparent influence in most ignition maps” further enforcing the conclusion that lower density, interspersed housing poses a higher ignition risk than higher density, clustered communities. They also state that “Development of low-density, exurban housing may also lead to more homes being destroyed by fire” (Syphard et al. 2013). As discussed in detail throughout this FPP, the Specific Plan would be a master planned community designed to include professionally managed and maintained fire protection components and modern fire code compliant safety features.

Code Exceeding Perimeter Fuel Breaks

Fire spreads through reliable methods of heat transfer including convective, radiant, and conductive heating. Convective heating refers to the lifting of hot gases from a fire, which carries heat to unburned fuel situated directly above burning fuel. Without winds, this convective heat transfer would only spread vertically. With winds, this heat transfer will move upward and in the direction of the wind, which can affect fires on hills as the wind pushes the convective heat along the slope and ignites unburned fuels situated above burning fuel. Radiant heat, otherwise known as thermal radiation, describes heat flux that spreads outwards in all directions from a burning fuel through electromagnetic waves. This allows fire to spread horizontally to unburned fuel even when convective heat is not impacting the fuel. Lastly, fire can spread through conductive heat. Conductive heating occurs when a conductive

material such as metal is contacted by a fire. The fire can then heat the conductive material to a degree that causes ignition to other fuels in contact with the conductive material. Convective and radiant heat transfer are the primary methods of heat transfer in a wildfire scenario.

With the methods of heat transfer and therefore fire spread being reliable and defined, the methods of discontinuing fire spread can be deduced. If a burning parcel of fuel cannot transfer heat through one of the heat transfer methods to a suitable fuel, then the fire will not spread. As a result of this principle, ignition risk can be verified. With fuels in the surrounding land areas consistently removed/reduced through grazing and farming, it is unlikely that a fire will rapidly spread across the landscape and threaten the Specific Plan site. Prior to contacting developed areas, a fire would encounter the maintained open spaces that surround the Specific Plan area which are up to half a mile in width. The intended use and land management for each open space is further described in Environmental Setting section. Beyond the maintained open spaces, major roadways define the perimeter of the Specific Plan area. The major roadways are up to 200 feet in width and are entirely void of fuels, representing a complete fuel break. If in a worst-case scenario a fire were to burn into or start within the maintained open spaces, the irrigated landscaping, vegetative fuel modification, primarily grass vegetative fuels suitable for grazing, and trails that provide fuel breaks prevent vegetation in sufficient quantity, density, and continuity to produce enough radiant heat to ignite structures.

These same principles apply when evaluating whether the Specific Plan will result in potential ignition risk to the surrounding areas. The developed areas with increased human presence and therefore increased ignition capability as discussed above, consist of dense fire-resistant construction and abundant fire protection systems. Should a fire start within or adjacent to the Specific Plan area, the construction methods and fire protection systems along with abundant fire service resources are expected to contain and extinguish a fire within the room of origin.

Additionally, the Specific Plan incorporates a 200-foot Fuel Modification Zone along the boundary between open space and developed areas. This zone includes strategic thinning, spacing, and planting to reduce available fuels and create defensible space for fire suppression. Together, the managed grasslands, fire-resilient open space areas, and Fuel Modification Zone form a robust buffer system that minimizes wildfire hazards and significantly limits the potential for high-intensity fire behavior near developed portions of the site.

Fire Prevention and Grazing Program

The historic and ongoing agricultural and grazing operations in the annexation area have the additional benefit of further reducing wildfire risks to the Specific Plan site and surrounding areas, thereby providing additional environmental benefits with respect to wildfire prevention. Actively grazed landscapes help to assure sustainability and limit the severity of wildfire because grassland fuel loads are reduced. The grazing program for Specific Plan is explained in the Fire Prevention and Active Grazing Plan (Appendix C). The sustainable grazing operation employed will continue to effectively reduce the grass fuels on an ongoing basis reducing the potential for ignitions and for rapid fire spread.

7.6 Communities Designed to Protect Against Wildfire

When communities incorporate the regulatory requirements and wildfire-resistance measures like the ones described above, they can offer a safer landscape that is resistant to fire disasters. Researchers and fire professionals are increasingly emphasizing the importance of not only fire-resilient homes but also fire-resilient neighborhoods, which can be achieved through planned development that is less vulnerable to fire (Moritz & Bustic,

2020; Ewing & Maier, 2016). Wildfire impacts on neighborhoods can be mitigated through the pattern and layout of new developments, the incorporation of community-wide design features and protective measures, and compliance with modern fire-protective building codes (Barrett, 2019; Ewing & Maier, 2016). Data from past wildfire events supports that mitigation induced by modern building codes yields significant benefits to neighboring structures, which can decrease structure-to-structure spread (Baylis & Boomhower, 2021).

Case Study 1 - The 2017 Thomas Fire in Santa Barbara and Ventura Counties consumed over 1,000 homes predominately during the high wind events in the first few days of the incident (Kolden & Henson, 2019) and forced the evacuation of nearly 105,000 people (CAL FIRE, 2017). The unincorporated area of Montecito is classified as VHFHSZ and has significant fire history inclusive of home loss (Kolden & Henson, 2019). Two decades prior to the Thomas Fire, the Montecito Fire Protection District started to address wildfire vulnerability in the community using place-based reduction strategies (Kolden & Henson, 2019). These strategies focused on recurring structural ignition potential, fire-resistant materials, structural modifications, increasing defensible space, fire scaping, and developing a fire protection code (Kolden & Henson, 2019). As a result, when the Thomas Fire, during Sundowner winds, spread to Montecito the area experienced minimal damage and was largely passed over (Kolden & Henson, 2019). By having mitigation not be isolated to wildland areas or just to homes, but implemented on multiple scales, Montecito was able to effectively protect not just the WUI areas, but the entire community.

Case Study 2 - The 2007 Witch Creek fire was one of the most destructive fires in California's history and destroyed thousands of homes in San Diego County (Mutch et al., 2011). More than 500,000 people lived in the areas evacuated, making the evacuation the largest in San Diego County history (City of San Diego, 2022). However, after the 1990 Paint Fire in Santa Barbara County and the 1991 Oakland Hills Tunnel Fire, the San Diego community started efforts to become adaptive to a very high fire hazard environment (Mutch et al., 2011). Developers of five master-planned communities (the Bridges, the Crosby, Cielo, Santa Fe Valley, and 4S Ranch) worked with the Rancho Santa Fe Fire Protection District to build the communities specifically with wildfire in mind (IBHS, 2008). They implemented fire codes, and developed restricted defensible space rules, home hardening measures, and vegetation restrictions; all of which were maintained and enforced by the HOA (Mutch et al., 2011). As a result, when the Witch Creek fire spread to Rancho Santa Fe in the five communities that adopted this approach no homes were lost versus the older communities which were heavily impacted (Mutch et al., 2011).

Additionally, the following communities which feature similar fire protection measures as the Specific Plan, have experienced minimal to no fire encroachment as a result of their design:

- Casino Ridge, Yorba Linda (2008 Freeway Complex Fire)⁸
- Serrano Heights, Anaheim Hills (2007 Santiago Fire)⁹
- Cielo, Rancho Santa Fe (2007 Witch Creek Fire)¹⁰
- 4S Ranch, San Diego (2016 brush fire, 2007 Witch Creek Fire)¹¹
- Stevenson Ranch Fire, Santa Clarita (2003 Simi Fire)¹²
- Orchard Hills, Irvine (2020 Silverado Fire)

⁸ (Orange County Fire Authority, 2008)

⁹ (FEMA, n.d.)

¹⁰ (Mutch et al., 2011)

¹¹ (Audencial, 2016)

¹² (Murphy 2003)

This data supports that master-planned wildfire-resilient communities built to modern standards provide resilient and fire-resistant housing. Design features that comply with Chapter 7A of the California Building Code decrease the wildfire vulnerability of individual buildings (Quarles & Pohl, 2019). When these features are adopted on a community-wide scale, and coupled with fuel modification zones and community-level buffers, the features enhance overall wildfire resilience of the community (IBHS, 2021). This community-wide approach is critical in reducing fire risk because of the importance of preventing structure-to-structure ignition within a neighborhood in order to prevent conflagrations (Moritz & Bustic, 2020).

Analysis of the State Fire Marshal's statistics also indicates that homes built to CBC Chapter 7A standards effectively reduce fire risks for homes built in the WUI. A study that focused on the 2018 Camp Fire found that homes built in 1997 or later fared substantially better than homes built prior to 1997 (Valachovic et al., 2021). Another source indicates that a 2008 or newer home in California is substantially less likely to be destroyed than a 1990 home experiencing identical wildfire exposure, and that there is strong evidence that these effects are due to state and local building code changes (Baylis & Boomhower, 2021).

New master-planned wildfire-resilient communities in fire hazard severity zones are planned, approved and implemented with numerous fire-safety features and measures. These fire safety features and measures contrast with some older built environments impacted by the 2025 fires in Los Angeles County. See Exhibit 12, which evaluates risk factors associated with some older built environments impacted by the 2025 fires in Los Angeles County and distinguishes those risk factors with wildfire resistance measures in a modern, master-planned wildfire-resilient community (Orchard Hills) that did not suffer significant structural damage despite being directly impacted by the 2020 Silverado Fire during an extreme wind event.¹³ As shown in Exhibit 12, modern, master-planned wildfire-resilient communities in very high fire hazard severity zones within the County include key wildfire safety features and measures, such as:

- Chapter 7A ignition resistant construction
- Annually maintained fuel modification zone
- Ember resistant chapter 7A structures
- Modern code compliant roadways
- Multiple ingress/egress points
- Modern code compliant turnarounds
- HOA maintained landscaping
- Minimal vegetation between structures
- Irrigated landscaping
- Modern code compliant road widths that allow emergency access

In contrast, some of the older built environments impacted by the 2025 fires lacked many of these safety features and were characterized by higher-risk attributes, such as:

- Non-modern structures that lack ember resistance
- Construction not designed for exterior wildfire exposure or resistance to embers

¹³ Exhibits 13 and 14 specifically evaluate the 2025 Palisades Fire and Eaton Fire due to the extreme damages from these fires. Exhibits 13 and 14 are also representative of potential risk factors to other older built communities.

- No fuel modification zones or lack of fuel modification zone maintenance
- Lack of interior landscaping area maintenance
- Narrow road widths (non-compliant with modern codes)
- Hazardous vegetation between structures

In sum, the Specific Plan site is designed and planned as a master-planned, wildfire-resilient community that will be implemented and maintained compliant with regulatory requirements and mitigation under the oversight of SCFD. The Specific Plan takes a multi-scaled approach to fire protection through wildfire education, ignition prevention, fuels management, increased response capacity, and ignition-resistant construction. The Specific Plan has been designed to ensure adequate water supply to ensure consistency for fire protection purposes. The water supply system would be installed and maintained according to state and NFPA standards and would be capable of providing the required fire flow. The dual benefit of creating a development that can prevent a fire is that it offers protection to the surrounding communities and the environment. The requirements and recommendations outlined in the FPP have been designed specifically for the proposed construction and can significantly reduce the potential threat to offsite areas.

Exhibit 12. Planned Wildfire Resilient Community Features

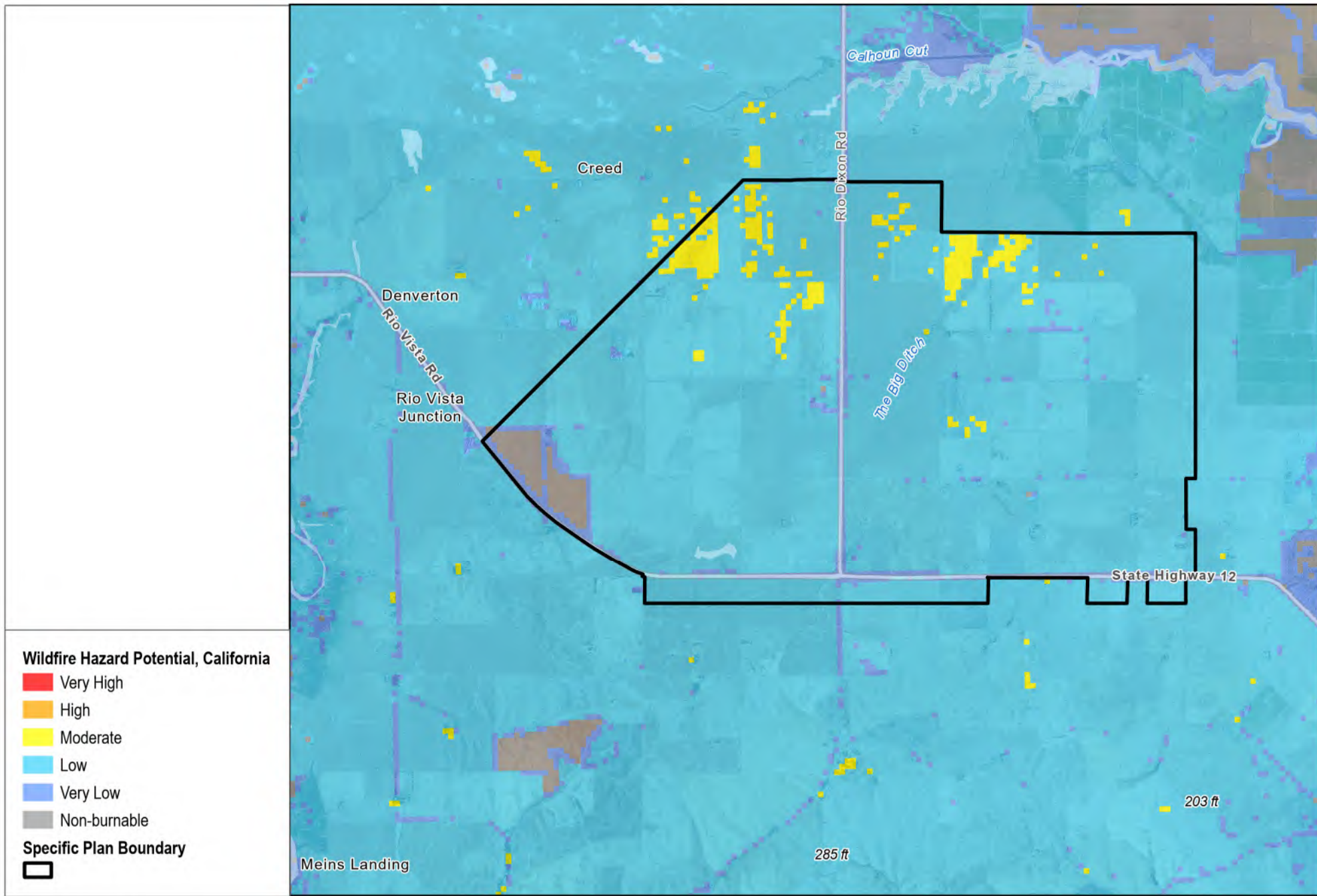


Exhibit 13. Palisades Community Features



Exhibit 14. Eaton Community Features





SOURCE: PYROLOGIX, 2021

DUDEK

0 0.5 1 2 Miles



FIGURE 40
Wildfire Hazard Potential
Suisun Expansion Project

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8 Wildfire-Related Evacuation

Evacuation is defined by the State of California as the organized, phased and supervised withdrawal, dispersal, or removal of civilians from dangerous or potentially dangerous areas and their reception and care in safe areas (Cal OES, 2017). This section provides a review of the regional, county, and local plans referenced in the Regulatory Setting with regard to evacuation plans and procedures. This section provides information about evacuation organization, planning and preparedness, contingencies, potential shelter-in-place, and other related topics along with an analysis of how the Specific Plan can integrate with existing evacuation plans. The relevant content of plans referenced in the Regulatory Setting of this FPP are reproduced in this section in order to provide a comprehensive analysis of wildfire-related evacuation as it pertains to the Specific Plan.

8.1 Regional, County, and Local Evacuation Planning

Regional, county, and local emergency planning has been designed to be fully integrated and support the management of disasters and emergencies depending on the geographical extent of the event, the complexity of the management of the event, and the number of people affected or potentially affected by the event.

8.1.1 Regional Emergency Coordination Plan

The Regional Emergency Coordination Plan provides an all-hazards framework for collaboration among responsible entities and coordination during emergencies in the San Francisco Bay Area. The Regional Emergency Coordination Plan defines procedures for regional coordination, collaboration, decision-making, and resource sharing among emergency response agencies in the Bay Area.

During a regional emergency or disaster, the Governor's Coastal Region Office of Emergency Services is responsible for allocating and tracking resources in response to requests from "Operational Areas" (i.e., a county and all political subdivisions located within the county, including special districts) and coordinating the activities of the Operational Areas in situations such as an evacuation in which the actions of an individual Operational Area may affect other Operational Areas.

8.1.2 Solano County Emergency Operations Plan

The intent of the Solano County Emergency Operations Plan (Solano EOP) is to provide direction on how to respond to an emergency from the outset through an extended response, and into the recovery process. With regard to evacuations, the Solano EOP states that evacuations should be implemented by authorities whenever wildfire poses a threat to life and infrastructure. Evacuation support resources and all public information messaging regarding the evacuation must be accessible and culturally competent. The Solano EOP requires evacuations to remain in place until experts have certified that the threat has ceased.

The Solano EOP notes that residents and visitors may be advised to shelter-in-place and to create a clean air room within their home or facility to reduce exposure to wildfire smoke. Clean air shelters may be established at public facilities to provide safety from wildfire smoke for those unable to create clean air rooms of their own.

8.1.3 Solano County Multi-Jurisdictional Hazard Mitigation Plan

The Solano County Multi-Jurisdictional Hazard Mitigation Plan (Solano MJHMP) was prepared to guide county and city officials in protecting people and property in the event of natural disasters. It provides an explanation of prevalent hazards in Solano County and describes how such hazards may affect the county and participating jurisdictions different depending on each jurisdiction's relationship to natural hazards. The MJHMP identifies wildfires as one of the primary hazards in the county. The Solano MJHMP notes that if a fire does break out and spread rapidly, residents may need to evacuate within days or hours. Once a fire has started, fire alerting is reasonably rapid in most cases due to the proliferation of cellular and two-way radio communications in recent years, which has contributed to a significant improvement in warning time.

In the Statements of Problems associated with the wildfire hazard, the Solano MJHMP notes that the County does not have identified evacuation zones to facilitate evacuation in the event of a wildfire.

8.1.4 Suisun City Emergency Operations Plan Evacuation Annex

The most comprehensive resource for emergency incident evacuations is the City of Suisun City Emergency Operations Plan Evacuation Annex. A wildfire near the city is among the events identified as potentially requiring an evacuation. The content of this section is derived from the City of Suisun City Emergency Operations Plan Evacuation Annex.

The City of Suisun City Evacuation Annex (Annex) applies to mass evacuation preparedness, response, and recovery operations during local emergencies or major disasters and to all City of Suisun City public, private, and non-governmental organizations (NGOs) with operational responsibilities in a mass evacuation event.

The Annex is intended to provide evacuation strategies and protocols for Medium Level (Partial) to High-Level (Multi-Zone or Complete) evacuation events in the City of Suisun City and is developed with consideration to predominant threats and hazards impacting the City of Suisun City.

The Annex is intended to support the activation of the City of Suisun City Emergency Operations Centers and the Solano County Emergency Operations Centers. The Annex also provides overall operational guidance for public alert, warning, public information, and movement of evacuees; it provides a concept of operations and provides the roles of key departments and agencies during an evacuation. It does not provide or replace operational plans for specific departments or specific functions, such as shelter management.

The decision to evacuate will normally be made at the incident level by on-scene police or fire supervisors and in accordance with existing plans and protocols. An accurate assessment of the need to initiate the mass evacuation process will be based on situational analysis of factors including the type and duration of the threat, potential for the incident to expand and trigger secondary incidents, roadway conditions, health and safety issues and sheltering capacity. The decision to evacuate will depend entirely upon the nature, scope, and severity of the emergency; the number of people affected; and what actions are necessary to protect the public. The determination to evacuate will be made on a case-by-case basis, upon the recommendation of an Incident Commander, City Manager, other public safety chief or their designee.

If an incident escalates beyond the capability of the city of Suisun City, then the Solano County Emergency Operations Center may be activated to provide support. Should support or coordination with any other County

resources be required, Solano County Emergency Operations Center will facilitate this coordination as required under SEMS and NIMS. If the event impacts multiple jurisdictions within the county, then the response will be managed and coordinated through the Solano County Emergency Operations Center and closely coordinated with the affected jurisdictional emergency operations centers.

In a major disaster, mass evacuation operations will require an influx of resources from outside the area to be fully operational. A full complement of resources will be contingent on the severity of the incident, impact to transportation infrastructure, and the ability to move resources into and within the affected area. A mass evacuation operation may cause evacuees to cross jurisdictional boundaries, requiring a regional response.

As soon as evacuations orders are implemented it is vital that sheltering support agencies like the Red Cross, Salvation Army, and Solano County Health and Social Services Department are notified and integrated into the planning.

The Annex notes that the overall objectives of emergency evacuation operations and notifications are to:

- Expedite the timely movement of persons from hazardous areas and entry access for first responders and evacuation support transportation.
- Institute access control measures to prevent unauthorized persons from entering vacated, or partially vacated areas. The Suisun City Police Department may use discretion in allowing access for caregivers, personal care assistants, or other support personnel on a case-by-case basis as determined by the incident commander.
- Provide for evacuation to appropriate transportation points, evacuation points, and shelters.
- Provide adequate means of transportation for vulnerable populations including individuals with disabilities and access and functional needs, older adults, children, and individuals who are transportation disadvantaged.
- Provide for the procurement, allocation, and use of necessary transportation and law enforcement resources by means of mutual aid or other agreements.
- Control evacuation traffic.
- Account for the needs of individuals with household pets and service animals prior to, during, and following a major disaster or emergency.
- Provide initial notification, ongoing, and re-entry communications to the public through the Joint Information Center (JIC).
- Ensure the safe re-entry of the evacuated persons.

The Annex also notes that the principal responsibility for planning and responding to an evacuation event resides with the community in which the incident has occurred. Each member of the community, whether residents of, or workers in the community, is responsible for preparing their own personal emergency plans. Topics should include the possible need to evacuate on short notice. The City has made a commitment to providing public education to assist in preparing personal emergency plans. With regard to evacuation, the Annex states that procedures in the evacuation plan will work in coordination with the evacuation procedures of Solano County and adjacent cities, and are aligned with regional planning concepts and procedures.

Currently, the geographic area of the city has been divided into three evacuation zones to allow flexibility in designating and communicating evacuation requirements. The City recognizes three levels of evacuation: Low-Level (Local) Evacuation, Medium-Level (Partial) Evacuation, and High-Level (Multi-Zone or Complete) Evacuation.

A Low-Level (Local) Evacuation is an evacuation of a single or several residential or commercial neighborhoods or blocks as needed for a localized flood incident, residential or commercial fire, crime scene, or small hazardous materials incident. It is typically a localized evacuation of a neighborhood to a different area within the city. It typically involves an evacuation of less than 1 mile.

A Medium-Level (Partial) Evacuation is an evacuation of a larger area of the city or an identified City Evacuation Zone for a larger incident requiring the movement of a portion of the city. It is typically a non-routine type of evacuation and needed to initiate a wide-area evacuation involving multiple neighborhoods within the city and may require a need to evacuate people to areas outside the city depending on the threat location. Mutual aid may be needed, as well as some support from County or State agencies. Medium-level activations typically involve an evacuation of no more than 1.5 miles, and the movement of up to 5,000 people. An uncontrolled wildland fire approaching the city limits is an example of when a medium-level evacuation may be needed.

A High-Level (Multi-Zone or Complete) Evacuation is an evacuation requiring a multi-zone or complete evacuation of the city for a major or catastrophic incident. This incident would require a large portion of the population to evacuate outside the city limits to an evacuation arrival point or shelter. This type of evacuation could be required in the event of a large wildfire, earthquake, serious hazardous materials release, major flooding, terrorist threat or, state of war emergency. A high-level or complete/city-wide evacuation response typically involves a catastrophic emergency and massive numbers of people needing to evacuate. It involves the movement of more than 25,000 people and requires the sheltering, transportation, and resources to accommodate an evacuation to multiple counties.

The Annex notes that any emergency resulting in the evacuation and sheltering of people will result in impacts to livestock and animals within the impacted area. Ensuring evacuation, transportation, care, and sheltering of animals is an important factor in evacuation planning. Many people will refuse to evacuate their homes if they cannot take their pets with them. Therefore, it is imperative that evacuation plans address pet evacuation and sheltering procedures to protect both human and animal health and safety. In most cases, the American Red Cross, the Solano County Sheriff's Animal Control and the Suisun City or Solano EOC will coordinate and attempt to collocate animal shelters with people shelters. Animal owners are primarily responsible for the evacuation and sheltering of their animals. It is the responsibility of each pet owner to develop and carry out their individual evacuation plan for their animal.

The Annex anticipates the use of Evacuation Pick-Up Points and Evacuation Arrival Points. Evacuation Pick-Up Points are local sites within the impact area for picking up members of the evacuating population who require transportation and/or other assistance in evacuating. Select schools, parks, and Solano Transit bus stops within each Evacuation Zone will be identified with signage as Evacuation Pick-up Points. Evacuation Arrival Points are sites located outside the city that are determined to be a safe refuge to receive evacuees. Currently, the City has designated Solano Community College and the Solano County Fairgrounds as Evacuation Arrival Points.

8.2 Shelter-In-Place and On-Site Relocation

As both the Solano County Emergency Operations Plan and the City of Suisun City Emergency Operations Plan Evacuation Annex note, there may be circumstances in which it is safer for residents, workers, and visitors to shelter in place or relocate within the Specific Plan area rather than evacuating to an off-site location. The decision to shelter in place versus evacuation with regard to a wildfire event will be made based on situational analysis that includes the expected duration of the threat, roadway conditions, health and safety issues, and sheltering capacity. Shelter-in-place may often be the better decision for some types of emergencies, as mass evacuations pose inherent risks, especially in moving those who are medically fragile.

Sheltering in place is defined as the act of seeking safety within the building one already occupies. The building could be a home, an office, or a school. On-site relocation is differentiated from sheltering in place in that on-site requires leaving the building one currently occupies in favor of seeking safety nearby in a building or place more suited to withstanding the immediate threat. Similarly, evacuation is differentiated from on-site relocation generally by the magnitude of the movement of people. An evacuation is commonly associated with the movement of large number of people over long distances in order to adequately reduce the threat of injury or death presented by an existing or anticipated emergency.

The City of Suisun City Emergency Operations Plan Evacuation Annex states that a shelter-in-place order shall only be used if an evacuation will cause a higher potential for loss of life or threat to health or safety. The Annex further states that sheltering in place may be effective for residential dwellings in the immediately impacted areas, or for large facilities that house a high percentage of non-ambulatory persons, such as hospitals and convalescent homes. Sheltering in place attempts to provide a safe haven within the impacted area. The Annex notes that the strategy is not practical when the incident involves uncontrolled fire, flooding, or other impacts that threaten the safety of structures being used for sheltering-in-place.

The Annex provides the framework of a decision-making model for public safety officials by stating:

The decision whether to evacuate or shelter-in-place must be carefully considered with the timing and nature of the incident. This decision is made by first responders in the field at the Incident Command Post, generally with input from both fire and law enforcement personnel. An evacuation effort involves an organized and supervised effort to relocate people from an area of danger to a safe location. Although evacuation is an effective means of moving people out of a dangerous area, due to its complexity and the stress it causes to systems and people, it should be considered a last resort option.

When people are not directly in harm's way, or not anticipated to be directly in harm's way, sheltering in place provides the advantage over evacuation in that it allows families, schools, or businesses to stay in familiar surroundings, with easy access to media reports, phones, internet, food, water, and medications. Shelter-in-place operations also provide the advantage of reducing congestion on major roadways and reducing the strain on mass transportation systems. On-site relocation offers many of the same benefits of shelter in place in that relocating on-site generally involves a relatively small number of people, such as a neighborhood, to a nearby place that is safer. As with sheltering in place, on-site relocation also has the advantage reducing the impacts on roadways that are associated with evacuation.

As mentioned in the Regulatory Setting and Code Compliance Analysis sections, the construction materials and methods of the buildings within the Specific Plan area will comply with the code provisions for protection against exterior wildfire exposure, which results in ignition-resistant buildings. Additionally, providing vegetative fuel modification and management throughout the Specific Plan area that complies with fire hazard severity zone standards provides additional protection against wildfires. As the fire behavior modeling shows, landscaping that incorporates defensible space fuel modification and management along with a code-exceeding 200-foot perimeter fuel modification zone results in reduced in fireline intensity as a wildfire approaches the Specific Plan boundary. In some of the post-development modeling, an advancing wildfire does not reach the Specific Plan boundary due to lack of available vegetative fuel.

Given the ignition-resistant construction required for the Specific Plan's buildings, the prescriptive requirements for landscaping, and the perimeter fuel modification zone, it is highly improbable that either an evacuation order or

shelter-in-place order would be issued as a result of the lack of available fuels for Wildfire to burn around the community. In lieu of an actual wildfire threat, it is most probable that emergency managers would advise occupants to avoid the wildfire area. If emergency managers feel that an order is necessary, the safest order would be a shelter-in-place order so as to not place occupants on evacuation routes. The Specific Plan is ideally designed to safely offer emergency officials with the option to shelter residents, workers, and visitors in place during wildfire events that could be burning beyond the Specific Plan boundary.

8.3 Specific Plan Integration with Existing Evacuation Plans

While some degree of evacuation planning exists at the regional, county, and city levels, as mentioned, the most comprehensive plan is the City of Suisun City Emergency Operations Plan Evacuation Annex. The Specific Plan will not require regional and county evacuation plans to be updated since those plans are more high level and conceptual, primarily offering a framework for large-scale evacuations. The City of Suisun City Emergency Operations Plan Evacuation Annex should be updated to include the Specific Plan area. For example, the city currently has a population of approximately 30,000 people and has defined three evacuation zones for the entire city and does not consider the Specific Plan area. However, the update would be expected to address the fire resilience of the Specific Plan and likely designate it as a safe area during regional wildfire events given the Specific Plan features that protect it from wildfires such as the ignition-resistant construction, the prescriptive requirements for landscaping, and the perimeter fuel modification zone. The update should consider the External Specific Plan Improvements that facilitate regional traffic flow.

Since the Specific Plan is of a design that makes sheltering in place and on-site relocation preferable options to full-scale evacuations in the event of a wildfire, the City of Suisun City Emergency Operations Plan Evacuation Annex should develop guidelines for public safety officials to aid in the decision-making process that considers sheltering in place, on-site relocation, and evacuation. Additionally, community preparedness would be well served by identifying viable locations for on-site relocation. Such locations could include schools, community centers, and places of worship.

8.4 Specific Plan Fire Resiliency

As discussed throughout this FPP, while portions of the Specific Plan area have recently been designated as moderate or high FHSZs, the wildfire history and fire behavior modeling herein demonstrate that the hazard is and has been mitigated to a low risk level through historical and ongoing land uses. The Specific Plan proposes features that will further reduce the risk for occupants of the Specific Plan area, such as ignition-resistant construction, code-compliant landscaping, a peripheral fuel modification buffer that includes roads and maintained landscapes, and a robust firefighting force. Additionally, the Specific Plan area does not intermix with unmaintained fuels that could allow uncontrolled wildfire to progress into the Specific Plan area but instead provides a single interface and more than adequate fuels reduction at that interface given the modeled and historical fire behavior in the area. For these reasons, it is not likely that an evacuation order would be issued for the Specific Plan site or even a portion of the Specific Plan site.

9 Conclusion

This fire protection plan (FPP) for the Suisun Expansion Project Specific Plan (Specific Plan) evaluates the wildland fire environment in the region including the Specific Plan area and analyzes the effectiveness of the Specific Plan features at reducing the risk of impact from wildfires. Further, this FPP sets forth the minimum requirements that will be in effect throughout construction and occupancy of the Specific Plan area. As described, CAL FIRE has designated portions of the Specific Plan site as a Local Responsibility Area (LRA) Moderate Fire Hazard Severity Zone and High Fire Hazard Severity Zone. While Moderate and High fire hazard severity zones within a LRA do not require defensible space vegetative fuel management or construction materials and methods for exterior wildfire exposure, the Specific Plan is electing to provide defensible space landscaping along with vegetative fuels reduction measures in the form of roadside vegetation management and maintained open spaces on the periphery of the Specific Plan area which provide a buffer between vegetative fuels in the surrounding open space and structures within the Specific Plan site. All buildings will be built to wildfire safety ignition-resistant construction codes. A minimum 200-foot fuel modification zone will be provided at all times as an added layer of redundancy for safety.

The requirements and recommendations provided in this FPP have been designed specifically for the Specific Plan. This analysis and its fire protection justifications are supported by fire science research, results from previous wildfire incidents, and fire agencies that have approved these concepts. The Specific Plan design provides a level of safety that mitigates the wildfire hazard and reduces the wildfire risk to acceptable levels. Development and occupancy of the Specific Plan site area is considered to represent a low wildfire risk to residents, workers, and visitors based on the evaluation of fire behavior and various fire protection features such as vegetative fuel modification, hardened structures, and extensive maintained open space and peripheral roadways that buffer the Specific Plan area from adjacent off-site open space, which is primarily agricultural land. Under the conditions evaluated herein, structures are not expected to be subjected to heat or flames produced by a wildfire event.

Ultimately, it is the intent of this FPP to guide the fire protection efforts for the Specific Plan in a comprehensive manner. Implementation of the measures detailed in this FPP will reduce the risk of wildfire spreading from the Specific Plan site into surrounding areas and will improve the ability of firefighters to fight fires within the Specific Plan area and neighboring properties, irrespective of the cause or location of ignition.

It must be noted that during unforeseeable extreme fire conditions, there are no guarantees that a given structure will not be exposed to wildfire or embers. Precautions and minimizing actions identified in this FPP are designed to reduce the likelihood that foreseeable fire will impinge upon the Specific Plan's assets or threaten its visitors. Additionally, there are no guarantees that fire will not occur in the area or that fire will not damage property or cause harm to persons or their property. Implementation of the required enhanced construction features provided by the applicable codes will reduce the Specific Plan site's vulnerability to wildfire and help to limit the spread of fire from the Specific Plan area to surrounding areas. It will also help accomplish the goal of this FPP to assist firefighters in their efforts to defend structures.

It is recommended that the Specific Plan maintain a conservative approach to fire safety. This approach must include maintaining the landscape and structural design components according to the appropriate standards. As a result of the low risk to structures, the fire agencies and/or law enforcement officials are unlikely to order an evacuation due to the layers of fire protection provided. Although the Specific Plan is located within moderate and high fire hazard severity zones, the wildfire risk is low. It is unlikely that off-site evacuations will be carried out as a result of a wildfire. Residents, workers, and visitors are expected to be able to safely shelter in place or relocate within the Specific Plan boundaries during wildfire events.

The goal of the Specific Plan's fire protection features, both code-required and code-exceeding, is to provide Specific Plan structures and occupants with the ability to survive a wildland fire with little intervention from firefighting forces. Preventing ignition of structures results in a reduction of the exposure of firefighters and occupants to hazards that threaten personal safety. It will also reduce property damage and losses. Mitigating ignition hazards and fire spread potential reduces the threat to structures and can help the fire department optimize the deployment of personnel and apparatus during a wildfire event. With implementation of the requirements and recommendations of this FPP, impacts relating to wildland fires would be less than significant.

10 Limitations

This is a conceptual plan intended to outline the generally accepted protocols into the final site-specific plan for the Suisun Expansion Project's Specific Plan. As a greater level of design is implemented, it should adhere to these principles.

As fire is a dynamic and often unpredictable occurrence, it cannot be guaranteed that, despite precautionary measures, a fire will not occur or that it will not result in injury, loss of life, or damage to or loss of property. No warranties, expressed or implied are made herein, notwithstanding that the goal remains to identify a suite of appropriate measures calculated, to the extent feasible under the circumstances, which would mitigate the potential for such injury or damage.

Although the SCFD may determine to recommend, or mandate, particular ameliorative measures in advance, such as the development and/or enforcement of vegetation management requirements, the responsibility to react to and implement suitable fire protection features required for the Specific Plan site lies with the property owners. To this end, practices such as ongoing resident education and maintenance of the common areas, would further support the common mission to maximize fire safety and awareness to the maximum extent feasible.

Limitation On Reliance or Dependence Upon Report

Any person or entity furnished with this report and/or who reviews it agrees that the advance written consent of Dudek be sought and furnished to such person or entity prior to the review, reliance or authorization as to any matters that are the subject of the reports by any person or entity (whether through act or omission as set forth in the report), other than Dudek's direct client. In such case, obtaining Dudek's consent shall not be subject to any fee or charge (other than reasonable copy costs, where applicable).

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11 List of Preparers

Project Manager/FPP Preparer

Austin Ott
Fire Protection Planner
Dudek

Fire Behavior Modeling/FPP Preparer

Matthew Crockett
Fire Protection Planner
Dudek

FPP Preparer

Rob Ball
Fire Protection Planner V
Dudek

Erin Figurelli
Fire Protection Planner I
Dudek

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Appendix A

Representative Site Photograph Log



Image taken at central northern boundary of the Project looking south towards the project site. Note flat topography and grasses.



Image taken at central northern boundary of the Project looking north away from the project site. Note flat topography and grazed grasses. Active grazing in background.



Image taken at northwestern boundary of the Project looking east toward the project site. Note flat topography and crops.



Image taken at northwestern boundary of the Project looking west away from the project site. Note flat topography and crops, railroad tracks in background.



Image taken at southern boundary of the Project looking north towards the project site. Note flat topography and grazing in background.



Image taken at southern boundary of the Project looking south away from the project site. Note flat topography and crops, grazing in background.



Image taken at eastern boundary of the Project looking west toward the project site. Note flat topography and crops.



Image taken at eastern boundary of the Project looking east away from the project site. Note flat topography and crops.

Appendix B

FlamMap Modeling Analysis

FlamMap Fire Behavior Modeling

The FlamMap software package (Finney et al. 2015) was used to evaluate fire hazard for the Project. The FlamMap software package is a publicly available resource available through the Fire, Fuel, and Smoke Science Program of the U.S. Forest Service. FlamMap uses the same fire spread equations built into the BehavePlus software package, but allows for a geographical presentation of fire behavior outputs as it applies the calculations to each pixel in an associated geographic information system (GIS) landscape (Finney 1998). FlamMap is a GIS-based software package that models potential fire behavior for constant weather conditions (wind and fuel moisture) and generates map files of potential fire behavior characteristics (e.g., flame length, crown fire activity). FlamMap outputs represent fire behavior calculated for each pixel within the analysis area independently and does not calculate fire spread across a landscape. The software requires a minimum of five input variables, including elevation, slope, aspect, fuel model, and canopy cover. To use the crown fire activity model for forested land cover types, additional input variables are necessary, including stand height, canopy base height, and canopy bulk density. Given the absence of forest vegetation, crown fire was not assessed. Wind and weather data are also critical components to FlamMap modeling efforts. The following sections present a background on fire behavior modeling and present the methods and data sources used in performing the FlamMap fire behavior modeling analysis for this CWPP.

Fire Behavior Modeling Background

Predicting wildland fire behavior is not an exact science due to the many variables that must be considered. As such, the movement of a fire will likely never be fully predictable, especially considering the variations in weather, the limits of weather forecasting, and the weather that is often created by firestorms. Nevertheless, practiced and experienced judgment, coupled with a validated fire behavior modeling system, results in useful and accurate fire information (Rothermel 1993). To be used effectively, the basic assumptions and limitations of fire behavior modeling applications must be understood.

- First, it must be realized that the fire model describes fire behavior only in the flaming front. The primary driving force in the predictive calculations is dead fuel less than 0.25 inches in diameter. These are the fine fuels that carry fire. Fuels greater than 1 inch in diameter have little effect, while fuels greater than 3 inches in diameter have no effect on fire behavior.
- Second, the model bases surface fire calculations and descriptions on a wildfire spreading through fuels that are within 6 feet of the ground and contiguous to the ground. Surface fuels are classified as grass, grass/shrub, shrub, timber litter, timber understory, or slash.
- Third, the software assumes that weather is uniform. However, because wildfires almost always burn under non-uniform conditions, creating their own weather, length of projection period and choice of fuel model must be carefully considered to obtain useful predictions.
- Fourth, fire behavior computer modeling systems are not intended for determining sufficient fuel modification zone/defensible space widths. However, results can provide the average length of the flames, which is a key element for determining defensible space distances for minimizing structure ignition.

FlamMap can provide valuable fire behavior predictions, which can be used as a tool in the decision-making process. In order to make reliable estimates of fire behavior, one must understand the relationship of fuels to the fire environment and be able to recognize the variations in these fuels. Fuels are made up of the various

components of vegetation, both live and dead, that occur in a particular landscape. The type and quantity will depend upon soil, climate, terrain, and management and disturbance (e.g., fire) history. The major fuel groups of grass, grass/shrub, shrub, trees, tree litter, and slash are defined by their constituent types and quantities of litter and duff layers, dead woody material, grasses and forbs, shrubs, regeneration, and trees. Fire behavior can be predicted largely by analyzing the characteristics of these fuels. Fire behavior is affected by seven principal fuel characteristics: fuel loading, size and shape, compactness, horizontal continuity, vertical arrangement, moisture content, and chemical properties.

The 7 principal fuel characteristics help define the 13 standard fire behavior fuel models (Anderson 1982). According to the model classifications, fuel models used for fire behavior modeling (BehavePlus, FlamMap, FARSITE) have been classified into four groups, based upon fuel loading (tons/acre), fuel height, and surface area-to-volume ratio. Observation of the fuels in the field determines which fuel models should be applied in modeling efforts. The following describes the distribution of fuel models among general vegetation types for the standard 13 fuel models:

- Grasses – fuel models 1 through 3
- Brush – fuel models 4 through 7
- Timber – fuel models 8 through 10
- Logging slash – fuel models 11 through 13

In addition, the aforementioned fuel characteristics were utilized in the development of 40 newer fire behavior fuel models (plus 5 non-burnable models) (Scott and Burgan 2005) developed for use in the BehavePlus, FlamMap, and FARSITE modeling systems. These newer models attempt to improve the accuracy of the 13 standard fuel models and to allow for the simulation of fuel treatment prescriptions. The following describes the distribution of fuel models among general vegetation types for the 40 newer fuel models:

- Non-burnable – models NB1, NB2, NB3, NB8, NB9
- Grass – models GR1 through GR9
- Grass shrub – models GS1 through GS4
- Shrub – models SH1 through SH9
- Timber understory – models TU1 through TU5
- Timber litter – models TL1 through TL9
- Slash blowdown – models SB1 through SB4.

FlamMap Analysis

Base Mapping Data

FlamMap (version 6.0) was used for the modeling analysis. The base data for the modeling analysis was obtained from the LANDFIRE (Landscape Fire and Resource Management Planning Tools) data distribution site (LANDFIRE 2024). LANDFIRE is shared program between the wildland fire management programs of the U.S. Forest Service and U.S. Department of the Interior and provides landscape-scale GIS data layers. LANDFIRE 2022 data file was obtained and used for the model base data set. The LF Remap represents circa 2022 ground conditions and has a

data resolution of 30 meters. The LANDFIRE data was obtained in a Landscape file format, which is a composite GIS file that includes the following layers:

- **Elevation:** Necessary for adiabatic adjustment of temperature and humidity and for conversion of fire spread between horizontal and slope distances.
- **Slope:** Necessary for computing slope effects on fire spread and solar radiance.
- **Aspect:** Important in determining the solar exposure of grid cells.
- **Fuel Model:** A numerical assignment of vegetation/fuels that represent distinct distributions of fuel loadings found among surface fuel components (live and dead), size classes, and fuel types. The fuel models are described by the most common fire carrying fuel type (grass, brush, timber (tree) litter or timber understory), loading and surface area-to-volume ratio by size class and component, fuelbed depth, and moisture of extinction. The fuel model set used for this analysis was the 40-fuel model set from Scott and Burgan (2005). The models included in the analysis are summarized in Table B-1. Natural fuels are made up of the various components of vegetation, both live and dead, that occur on a site. Vegetation is comprised of living and dead fuel. The type and quantity will depend upon the soil, climate, geographic features, disturbance regimes, and the fire history of the site. The major fuel groups of grass, shrub, trees, and slash are defined by their constituent types and quantities of litter and duff layers, dead woody material, grasses and forbs, shrubs, regeneration, and trees. Fire behavior can be predicted largely by analyzing the characteristics of these fuels and is affected by weather (wind, air temperature) and seven principal fuel characteristics: fuel loading, size and shape, compactness, horizontal continuity, vertical arrangement, moisture content and chemical properties.

The fuel model layer was edited to improve accuracy and reflect existing vegetation conditions post-development. Specifically, fuel models in the development areas were reclassified to a non-burnable model value (NB 91). Fuel models in the paved, built, and landscaped portions of the proposed site plan were also reclassified to a non-burnable model value (NB 91). Vegetation and corresponding fuel models outside of the Project boundary were classified to reflect the SHCP Vegetation Land Cover Vegetation GIS dataset (LSA, 2023). For Scenario 1, fuel models were further refined to reflect mature conditions of agricultural areas using the *Agriculture Parcels - Detailed Use (Updated, April 2024)* dataset as reference. For example, irrigated row crops were classified as non-burnable, while grazed areas and dryland crop fields were classified as moderate load grasslands to reflect grassland conditions prior to harvest/significant grazing. For Scenario 2, fuel models were assigned to reflect managed conditions.

Exhibit 1. Example of managed (left, Scenario 2), and mature (right, Scenario 1) grassland conditions.



Based on the post-Project vegetation conditions, five different fuel models were used in the fire behavior modeling effort presented herein. Modeled areas include unmanaged annual grasslands, grazed grasslands, dryland crop fields, irrigated row crops and orchards, and development areas.

Table B-1. Fuel Models in Modeling Area

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet) ¹
GR1	Short, Sparse Dry Climate Grass	Representative of grazed grasslands and post-harvest conditions of dryland crop fields. (Scenario 2)	0.4 ft.
GR2	Low Load, Dry Climate Grass	Representative of grasslands conditions prior to grazing, and mature dryland crop fields prior to harvest (Scenario 1)	1.0 ft.
GR 4	Moderate-load Dry Climate Grass	Representative of unmanaged annual grasslands (Scenario 1 and 2)	2.0 ft.
NB1	Non-burnable	Development areas, irrigated crop fields, roadways, and marshlands (Scenario 1 and 2).	0.0 ft

Note:

¹ Listed fuel bed depths reflect the fuel models that best depict the vegetation in and around the proposed Project site and not an exact measure of local vegetation (Anderson 1982; Scott & Burgan 2005).

- **Canopy Cover:** Necessary for computing shading and wind reduction factors for all fuel models. Canopy cover is measured as the horizontal fraction of the ground that is covered directly overhead by tree canopy.

The FlamMap analysis area encompassed the Project Site plus a buffer zone. LANDFIRE data layers were projected to the NAD 83, California State Plane, Zone 5 coordinate system. In addition to the Landscape file, wind and weather data were incorporated into the model inputs, as described below.

Wind and Fuel Moisture

In addition to the Landscape file, wind and weather data were incorporated into the model inputs to represent fire progression during offshore wind (97th percentile) conditions. Winds from the north and northeast bring warm and dry air to the region and increase the potential for wildfire ignition and spread. In extreme cases, extreme winds from the north and northeast are referred to as “Diablo Winds”

Fuel moisture inputs for 97th percentile conditions were obtained from Remote Automatic Weather Stations closest to the Project site (Brooks: 042202, Black Diamond: 043008, Altamont: 043047). Wind speed and direction values were obtained from the Travis Airforce Base Weather Station Records (2004-2024). Table B-2 summarizes the weather and wind input variables used in the FlamMap modeling process. Fuel moisture and will values were assessed from 2004-2023 from June-October which generally coincides with the regional fire season.

Table B-2. Weather Variables Used for Fire Behavior Modeling

Model Variable	Peak Weather (97 th Percentile)
1 h fuel moisture	2%
10 h fuel moisture	3%
100 h fuel moisture	7%
Live herbaceous moisture	30%
Live woody moisture	60%
20 ft. wind speed	19 mph
Wind Directions from north (degrees)	85 degrees

Source: Brooks: 042202, Black Diamond: 043008, Altamont: 043047 RAWS; Travis Airforce Base Weather Station Records (2004-2024)

Finally, wind vectors were modeled within the FlamMap runs using the WindNinja tool embedded in the FlamMap software. WindNinja models the effect of topography on wind speed and direction and generates wind vector files for use in the modeling runs. The grid resolution for the WindNinja analysis was set at 30 meters.

Model Outputs

Six output grid files output grid files were generated for the FlamMap run and represent flame length, rate of spread, and fireline intensity for Scenarios 1 and 2. Flame length, the length of the flame of a spreading surface fire within the flaming front, is measured from midway in the active flaming combustion zone to the average tip of the flames (Andrews et al. 2008). It is a somewhat subjective and non-scientific measure of fire behavior but is extremely important to fireline personnel in evaluating fireline intensity and is worth considering as an important fire variable (Rothermel 1993). Flame length values in the resulting grid file are in feet. Table B-3 presents an interpretation of flame length and its relationship to fireline intensity. Fireline intensity is a measure of heat output from the flaming front and also affects the potential for a surface fire to transition to a crown fire.

Table B-3. Fire Suppression Interpretation

Flame Length	Fireline Intensity	Interpretations
Under 4 feet	Under 100 BTU/ft/s	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.
4 feet to 8 feet	100–500 BTU/ft/s	Fires are too intense for direct attack on the head by persons using hand tools. Hand line cannot be relied on to hold the fire. Equipment such as dozers, pumpers, and retardant aircraft can be effective.
8 feet to 11 feet	500–1,000 BTU/ft/s	Fires may present serious control problems—torching out, crowning, and spotting. Control efforts at the fire head will probably be ineffective.
Over 11 feet	Over 1,000 BTU/ft/s	Crowning, spotting, and major fire runs are probable. Control efforts at head of fire are ineffective.

Source: Roussopoulos and Johnson 1975.

Note: BTU/ft/s = British thermal units per foot per second.

The FlamMap modeling results are based on the data inputs presented herein. FlamMap calculates fire behavior across the landscape assuming independence of fire behavior between neighboring cells in the landscape and holds the wind and fuel moisture inputs constant for the duration of the modeling run. Therefore, the FlamMap results presented provide a conservative estimate of fire as the model does not consider changes to wind speed, wind direction, or fuel moisture influenced by terrain, time of day, or changes in regional weather patterns. While the model allows for static analysis of fire behavior, the inclusion of constant wind speed and direction data in the model were used to represent specific weather scenarios, and do not account for real-world changes in wind speed or direction that may be realized during an actual fire event. Further, current research indicates that Flammap tends to over-predict wildfire spread rates (Finney 1998). Changes in wind, weather, or pockets of different fuel types are not accounted for in this analysis. Model results should be used as a basis for planning only, as actual fire behavior for a given location will be affected by many factors, including variable weather patterns over time, small-scale topographic variations, or changing vegetation patterns.

Appendix C

Fire Prevention and Grazing Plan for California Forever Land Holdings in East Solano County

Fire Prevention and Grazing Plan for California Forever Land Holdings in East Solano County

Spring 2025

Land Stewardship Team

Ranch Manager: Matthew Bidou | Director of Land Stewardship: Anders Engnell

Introduction

Grass fires in the agricultural lands of East Solano County are mitigatable phenomena that tend to occur in the warm summer months, often because of human activity. The weather cycles of Northern California result in stands of dry grasslands in the summer, which can be ignited by sparks caused by mechanical tractor operations or chains dragging from vehicles passing on public roads. Weather events such as lightning strikes can also spark grass fires in the dryer months.

California Forever works to prevent the start and spread of grass fires on all of its agricultural and conservation land holdings through leasing of land to ranching tenants, annual collaboration with fire districts, fire breaks, refuse and brush clearing, and elimination of dilapidated, flammable structures. California Forever's Ranch Manager Matt Bidou directly engages with applicable fire districts on emergency response when a grass fire does occur.

Essential Annual Grazing for Fire Prevention

As a property-wide practice, the Land Stewardship team of California Forever leases all grassland parcels to qualified and experienced ranching tenants who actively graze the land to mitigate fire risk, particularly during the high-growth months of January to June.

Ranching tenants graze the grasslands with cattle, sheep, and/or goats to a grass height of approximately 10cm or less and return grazing livestock to the property upon request if regrowth crosses 20cm.

All applicable grassland parcels are actively grazed up to development boundaries and fire breaks, whether at the Delta Conservation Camp, the Lambie Industrial Park, or the Suisun Expansion Plan.

Active Collaboration with Local Fire Districts

California Forever annually collaborates with Solano Fire Chiefs from the following districts and departments to prevent grass fires and engage in emergency response to limit the spread and eliminate grass fires when they do occur:

- Montezuma Fire Protection District
- Suisun Fire Protection District
- Vacaville Fire Protection District
- Rio Vista Fire Department
- Suisun City Fire Department

Note that the Fire Protection Districts of Solano County are in the process of merging into one Solano Fire Protection District entity.

Ranch Manager Matt Bidou and Land Stewardship Director Anders Engnell hold annual meetings with the relevant Fire Protection Districts and Fire Departments in the spring to plan for the summer season, inspect all fire breaks, and ensure emergency response plans are in place.

Other Important Annual Practices

1. Fire breaks on all parcels
 - a. Annual tenant notifications to pull fire breaks around all property edges at least 30' in width
 - i. Priority tenants for fire breaks due to size of leaseholds: Emigh Livestock, Anderson Ranch, Hearn Ranch, D3 Enterprises, Esperson Ranch, Pacific Livestock, Hamilton Bros, and Detar Ranch
 - b. Monthly inspections of fire breaks are conducted from May to September by Ranch Manager Matt Bidou
 - c. Collaboration with Solano County on their property or right of way fire breaks

- d. Where necessary, Flannery Associates directly pulls fire breaks where tenants are unable or lands are not leased to tenants who can pull fire breaks
- 2. Annual brush and refuse clearing
 - a. Ranch Manager Matt Bidou actively surveys the property to identify brush and refuse to be cleared prior to fire season
 - b. The survey list is then implemented with tenants or directly addressed by the Flannery Associates Team
 - c. For example, in May 2025 Flannery Associates conducted two weeks of weed and grass cutting at 3600 Canright around the red barn to protect from grass fires
 - d. Annually, the vacant Lambie Industrial 5-acre parcel is grazed or mowed for fire prevention
- 3. Demolitions of uninhabitable, flammable structures
 - a. Condemned, uninhabitable, or vacant and dilapidated structures at high risk of wildfire are demolished, relocated, or deconstructed so the land can be properly maintained
 - b. For instance, demolition of degraded and uninhabitable structures at the Tran, Denverton, Nagra (Petersen), and Canright properties was conducted from February to June of 2025 ahead of the Summer 2025 fire season

