APPENDIX N

Wildfire and Evacuation Route Assessment

Wildfire and Evacuation Route Assessment for the Cypress Point Affordable Housing Community Project, Moss Beach, San Mateo County, California

JULY 2023

PREPARED FOR

MidPen Housing Corporation

PREPARED BY

SWCA Environmental Consultants

WILDFIRE AND EVACUATION ROUTE ASSESSMENT FOR THE CYPRESS POINT AFFORDABLE HOUSING COMMUNITY PROJECT, MOSS BEACH, SAN MATEO COUNTY, CALIFORNIA

Prepared for

County of San Mateo
455 County Center
Redwood City, California 94063
Attn: Michael Schaller

Prepared by

SWCA Environmental Consultants
60 Stone Pine Road, Suite 100
Half Moon Bay, California 94019
(650) 440-4160
www.swca.com

SWCA Project No. 73999

July 2023

CONTENTS

Appendices

Figures

Tables

1 INTRODUCTION

This Wildfire and Evacuation Route Assessment has been prepared for the Cypress Point Affordable Housing Community Project (project). The purpose of the study is to identify wildfire hazards and associated risks with the project and additional hazards and areas of concern in the event of an emergency. The assessment addresses the project location, topography, combustible vegetation (fuel types), fire history, fire behavior, and emergency response capacity, as well as the water supply, emergency access (ingress/egress), structural ignitability and fire-resistant building features, defensible space, and impacts to existing emergency services evacuation.

1.1 Project Location, Description, and Environmental Setting

1.1.1 Project Location

The project site encompasses a total of approximately 11.02 acres within the unincorporated community of Moss Beach in San Mateo County (County), California (Figure 1). The project site is bounded by vacant land to the southwest (toward State Route 1 [SR-1]), residential properties along 16th Street to the northwest (in the community of Montara), and residential properties along Carlos, Sierra, and Lincoln Streets on the other two sides. Individual houses along Stetson Street and Buena Vista Street also border the property. The project site is approximately 750 feet east of the Pacific Ocean and is within 250 feet of Montara Creek at its closest point.

1.1.2 Project Description

The project is an affordable housing development sponsored by MidPen Housing Corporation (MidPen) and designed to provide affordable housing in the San Mateo Midcoast region. The intention of the project sponsors and San Mateo County is to improve the jobs/housing balance and jobs/housing fit by providing preference for those who live or work on the San Mateo Coast.

The project proposes the development of 71 affordable housing units, contained in 16 two-story buildings, and a community building for a total of 66,738 square feet. The project includes six different building layouts and unit configurations, ranging in height from 23 to 28 feet.

The project would cluster the residential units toward the northwestern corner of the site, retaining the forested open space on the northernmost portion of the site. This area primarily contains Monterey cypress (*Hesperocyparis macrocarpa*) and Monterey pine (*Pinus radiata*). To the south and east, the project would consist of landscaping and public trails. The project does not include changes to the two existing potable water tanks on-site.

Unpaved internal roadways extend from the northwest to southeast across the northern and central portions of the project site. In the southeast corner of the site, the existing dirt road is the continuation of Buena Vista Street between Lincoln Street and Carlos Street. The project site can be accessed from the southeast via Buena Vista and Lincoln Streets, and from the west via Carlos Street. The Montara Water and Sanitary District (MWSD) water tanks on the southeastern portion of the site are accessed by this unpaved portion of Buena Vista Street.

Figure 1. Project vicinity map.

1.1.3 Environmental Setting

1.1.3.1. TOPOGRAPHY, ELEVATION, AND CLIMATE

The project site is situated between the Pacific Ocean to the west and Rancho Corral de Tierra, managed by the National Park Service, in the Santa Cruz Mountains to the east. Project site slopes range from 10% to 50%. Elevations range from the high point of 205 feet above mean sea level (amsl) on the east side of the project adjacent to Lincoln Street to the low point of 90 feet amsl at the northwestern boundary along 16th Street. Montara Creek, a perennial stream, is approximately 250 feet to the northeast of the project site and runs in parallel to the northern border of the site (prior to emptying into the Pacific Ocean). Residential communities occur to the east and south of the project site. These communities span approximately 250 and 200 acres, respectively. San Mateo County has a Mediterranean climate characterized by cool wet winters, with an average of 29.6 inches of rain per year, and relatively warmer dry summers with coastal fog. The temperature typically varies from 44 degrees Fahrenheit (°F) to 66°F and is rarely below 38°F or above 75°F (Dwellics 2023; Weatherspark.com 2023).

1.1.3.2. VEGETATION COMMUNITIES

The project site consists of developed uses, including water tanks and an associated maintenance structure operated by the MWSD, concrete remnants of military facilities that are scattered throughout the project area, and dirt access roads that travel around the perimeter of the project area, and undeveloped land dominated by a mix of native and non-native vegetation. Four vegetation communities were mapped and were classified using the naming conventions of *A Manual of California Vegetation*, Second Edition (Sawyer et al. 2009). Vegetation communities present in the biological study area (BSA) include Monterey cypress–Monterey pine woodland stands (*Hesperocyparis macrocarpa–Pinus radiata* Forest and Woodland Semi-Natural Alliance), coyote brush scrub (*Baccharis pilularis* Shrubland Alliance), perennial rye grass fields, and developed/disturbed areas. Thick vegetation also covers the majority of the project site outside the areas of the building foundations.

1.1.3.3. WATER SUPPLY

The project site is served by the MWSD. The project would extend water lines to new project facilities for potable water and fire water supply, as well as for irrigation of landscaping. The proposed water line would extend from the existing MWSD tanks along the existing 10-foot right-of-way (ROW) along the eastern and northern parts of the project. New domestic water and fire water lines would be located in the driveway loop and parking areas, with individual connections to each building.

1.1.3.4. FIRE PROTECTION

Within the project site, fuel loadings vary from low to moderate depending on the species present, past activities on-site, and recent weather patterns. The project site is not located within a California Department of Forestry and Fire Protection (CAL FIRE)–designated very high, high, or moderate fire hazard severity zone (FHSZ) (CAL FIRE 2022).

The Coastside Fire Protection District (Coastside FPD) would provide fire protection services and emergency response on the project site. The Coastside FPD serves the City of Half Moon Bay; the communities of Montara, Moss Beach, Princeton, El Granada, and Miramar; and the surrounding unincorporated areas. Its service area covers approximately 50 square miles and serves a population of approximately 30,000 residents.

In addition to traditional fire service, the Coastside FPD provides advance life support, cliff rescue, water rescue, confined space rescue, and vehicle and residential lock-out services, responding to approximately 2,600 calls each year. These incidents include medical aid, fires and fire alarms, water rescue, cliff rescue, traffic accidents, odor investigations, hazardous materials, and public service assists.

Three fire stations operate within the Coastside FPD: Fire Station 44, located on Stetson Street in Moss Beach 1 block (approximately 300 feet) from the project site; Fire Station 40, located within the downtown area of the City of Half Moon Bay; and Fire Station 41, located within the unincorporated area of El Granada. Fire Station 40 serves as the Coastside FPD headquarters. Fire Station 44 (Moss Beach) would provide initial fire and emergency medical service response to the project site, and Fire Stations 41 (El Granada) and 40 (Half Moon Bay) would support the initial response, if needed.

Coastside FPD's response time goal is within 6 minutes 59 seconds of receiving a call. In an email to SWCA on May 11, 2023, the Coastside FPD Chief confirmed that response times are currently met throughout the service area. The proximity of Fire Station 44 to the project site indicates that response times would meet the established goal.

The Coastside FPD has 32 paid positions, along with 11 volunteer firefighter positions. Paid positions include one assistant fire chief, one fire marshal, one deputy fire marshal, four battalion chiefs, and two administrative support positions. All stations are staffed with one fire captain and two fire apparatus engineers, one of which is a paramedic to provide advance life support service. Shift personnel work a scheduled 3-day/72-hour workweek.

The Half Moon Bay Volunteer Fire Department (Volunteer Fire Department) is a volunteer division of the Coastside FPD. The Volunteer Fire Department comprises approximately 15 members and is under the direction of the fire chief. The number of volunteers reflects the current needs of the Volunteer Fire Department and is determined by the chief of the volunteer division. The objectives of the Volunteer Fire Department are to operate within the boundaries of the Coastside FPD as a supplemental force to the regular paid department, and to operate as a trained unit for both fire suppression and non-suppression situations.

There is an extensive network of roads, both well-maintained dirt and major paved roads, surrounding the project site including SR-1. These roads can support weight loads of fire apparatus and allow for access from all directions. There are main arteries from the nearest communities and fire stations that provide direct emergency response services. Main roads in this network include SR-1, Carlos Street, Sierra Street, Stetson Street, Etheldore Street, California Avenue, and Airport Street.

1.1.4 Regulatory Setting

SPRINKLER SYSTEMS: CALIFORNIA RESIDENTIAL CODE, CHAPTER 3, SECTION R313

All new dwellings, dwelling units, and one- and two-family townhomes must be equipped with an automatic fire-sprinkler system that can protect the entirety of the dwelling. Dwellings and homes constructed prior to January 1, 2011, that do not have a sprinkler system may be retrofitted, but it is not required.

FIRE SAFETY STANDARDS: CALIFORNIA PUBLIC RESOURCES CODE 4290 AND 14 CALIFORNIA CODE OF REGULATIONS (CCR) 1270

These regulations govern roads, driveway width, clearance, turnarounds, signing, and water related to fire safety throughout California. Public Resources Code 4290 is typically enacted through regulation at the county level.

WILDLAND-URBAN INTERFACE BUILDING STANDARDS: CALIFORNIA GOVERNMENT CODE 51189

The Office of the State Fire Marshal is required to create building standards for wildfire resistance. Construction of buildings in the wildland-urban interface must use fire-resistant materials to save life and property. As of 2011, the standards relevant to fire-safe construction for all new structures in the State Responsibility Area (SRA) are the California Building Code, Chapter 7A (for commercial construction) and the California Residential Code, Chapter 3, Section R327 (for residential construction).

STATE RESPONSIBILITY AREA: PUBLIC RESOURCES CODE 4102, 4125–4229 AND 14 CCR 1220

These statutes and regulations establish the locations where CAL FIRE has the financial responsibility for preventing and suppressing fires. These designations define financial arrangements for fire protection services and establish the locations where fire safe and defensible space laws or regulations apply.

HAZARDOUS FIRE AREAS: PUBLIC RESOURCES CODE 4251–4255 AND 14 CCR 1200

These laws and regulations allow petitioners to the Board of Forestry and Fire Protection or CAL FIRE to establish hazardous fire areas, providing for area closures and other restrictions for fire prevention.

DEFENSIBLE VEGETATION CLEARING AROUND STRUCTURES: PUBLIC RESOURCES CODE 4291 AND 14 CCR 1299

Public Resources Code 4291 regulates fuel management around a property. It states that a person who owns or controls a building or structure in or adjoining to forest, brush, or grass covered lands shall follow certain guidelines outlined in the code. At least 100 feet of defensible space is required. The owner of the property is liable for making these changes to protect habitable structures. The 100 feet is separated into two zones, with the closer zone, 30 feet out from the structure, being managed more intensively.

SAN MATEO COUNTY LOCAL COASTAL PROGRAM

The Local Coastal Program provides policies regarding development and project design standards in the coastal zone of San Mateo County (County of San Mateo 2013). This includes hazards such as high-risk fire areas and vegetation management. The Local Coastal Program policies are adopted by reference in the County's Zoning Regulations under Chapter 20B, Section 6328.19 through 6328.30.

SAN MATEO COUNTY GENERAL PLAN, CHAPTER 15

Chapter 15 (Natural Hazards) of the General Plan defines fire hazards as wildland or structural fires that occur in areas that are remote, have difficult access for fire vehicles, and/or contain potentially flammable vegetative communities (County of San Mateo 2021). The General Plan adopts CAL FIRE–designated FHSZs and other fire protection district hazardous area relating to wildfire.

SAN MATEO COUNTY LOCAL HAZARD MITIGATION PLAN

The San Mateo County Department of Emergency Management issued the 2021 Multijurisdictional Local Hazard Mitigation Plan, a large regional and cross-jurisdictional effort to plan for the reduction of risk from natural and human-made disasters (Tetra Tech 2021). The plan addresses natural and human-caused hazards, including wildfire, landslides, and severe weather. The hazard mitigation plan defines measures to reduce risks from natural disasters in the San Mateo County planning area, which consists of the entire county, including unincorporated areas, incorporated cities, and special purpose districts.

CONNECT THE COASTSIDE

Connect the Coastside serves as the San Mateo County Midcoast Comprehensive Transportation Management Plan (CTMP) (County of San Mateo 2022). Connect the Coastside aims to improve the safety and mobility for Midcoast residents, businesses, and visitors by recommending a suite of projects, policies, and programs to address current and future transportation conditions in the Midcoast CTMP. The Midcoast area faces challenges in realizing community goals and vision for transportation. Climate change has accelerated sea level rise, coastal erosion, and the number and severity of emergencies like wildfires.

The following is an overview of different County departments and special projects related to emergency response and hazard mitigation planning:

- In the event of a disaster, the Department of Emergency Management coordinates countywide response and protection services. One of the missions of the Department of Emergency Management is to maintain and improve the Countywide Emergency Operations Plan. This plan establishes policies and procedures and assigns responsibilities to keep residents safe during an emergency situation.

- During an emergency or disaster, law enforcement is responsible for evacuation and the movement of the public away from a hazard area. Representatives from law enforcement and public safety agencies were part of the Connect the Coastside Technical Advisory Committee that reviewed and helped refine the plan proposals.

- In the event of an emergency, public safety agencies such as police and fire will be able to provide emergency information directly to people who have registered for the SMC Alert service. These alerts may include life safety, fire, weather, accidents involving utilities or roadways or disaster notifications. For example, the SMC Alert service would be used to notify Coastside employees and citizens of available evacuation routes during an emergency.

- In March of 2019, Supervisor Don Horsley allocated $75,000 of discretionary Measure K funds to launch the development of a countywide standardized emergency evacuation zone project (Zonehaven). The goals of the project are to reduce the amount of time it takes to notify the public, create a common operating evacuation platform for all jurisdictions, share information, and help people safely and efficiently evacuate in case of an emergency. Since the project began, the CAL FIRE San Mateo Division has worked with every fire and law enforcement agency in San Mateo County to identify over 300 evacuation zones. The project includes a public webpage that shows a map of each evacuation zone and a software application that helps first responders call for evacuations using the standard zones. This will greatly reduce the time from when an evacuation is called to when the public is notified. Additionally, the application integrates with Waze and Google Maps, so as soon as a zone is closed people will be directed accordingly. Zonehaven was used to create an Evacuation

Zone Map for the CZU Lightning Complex Fire in August 2020. The platform is available at https://community.zonehaven.com/

- The County of San Mateo updated its Local Hazard Mitigation Plan (Tetra Tech 2021) and will update the Safety Element of the General Plan. The County will be working with emergency service providers such as CAL FIRE, the Department of Emergency Management, and the new Flood and Sea Level Rise Resiliency District. These efforts will further evaluate hazard risks and identify safety measures on the Midcoast.

2 ANTICIPATED FIRE BEHAVIOR

2.1 Fuels

Fuels within the project site and the surrounding 1-mile area (project area) were classified using fire behavior fuel models (Scott and Burgan 2005). The general classification of fuels is by fire-carrying fuel type. Fuels are then further classified into specific fuel models within a fuel type. Major fuel models for both the project site and project area are listed in Table 1.

The project site is predominantly a low to moderate grass and shrub fuel load with a litter component. Nonburnable substrate is also a major component (Figure 2). The project area is predominantly a low to moderate grass and shrub fuel load with a litter component intermixed with nonburnable substrate (Figure 3). Both the project site and the project area have nonburnable substrate intermixed with flammable vegetation, making fuels discontinuous spatially across the landscape. Smaller-percentage (≤3%) fuel models present in the project area but not present in the project site are not listed in Table 1.

Table 1. Common Fuel Models in the Project Site and 1-mile Buffer Project Area

Fuel Model	Fuel Model Description	Project Site Acres (%)	Project Area Acres (%)
SH2	Moderate shrub fuel load	3.7 (34%)	187.2 (15%)
TU1	Low grass and/or shrub with litter load	3.2 (29%)	93.7 (7%)
TL3	Moderate conifer litter load	1.1 (10%)	100.0 (8%)
NB9 and NB1	Nonburnable bare ground and urban development	0.9 (8%)	334.3 (27%)
GR2	Moderate continuous grass fuel load	0.6 (5%)	178.4 (14%)
TU5	High conifer litter and shrub fuel load	0.6 (5%)	85.4 (6%)
SH5	Heavy shrub fuel load	0.3 (3%)	35.8 (3%)
GS2	Moderate shrub and grass fuel load	0.3 (3%)	13.9 (1%)
SH7	Very heavy shrub fuel load	0.12 (1%)	14.9 (1%)
GR1	Patchy low grass fuel load	0.06 (0.5%)	103 (8%)
GR4	Moderate continuous tall grass fuel load	0.01 (0.1%)	15.5 (1%)

Note: Totals may not add to 100%.

Source: LANDFIRE (2020)

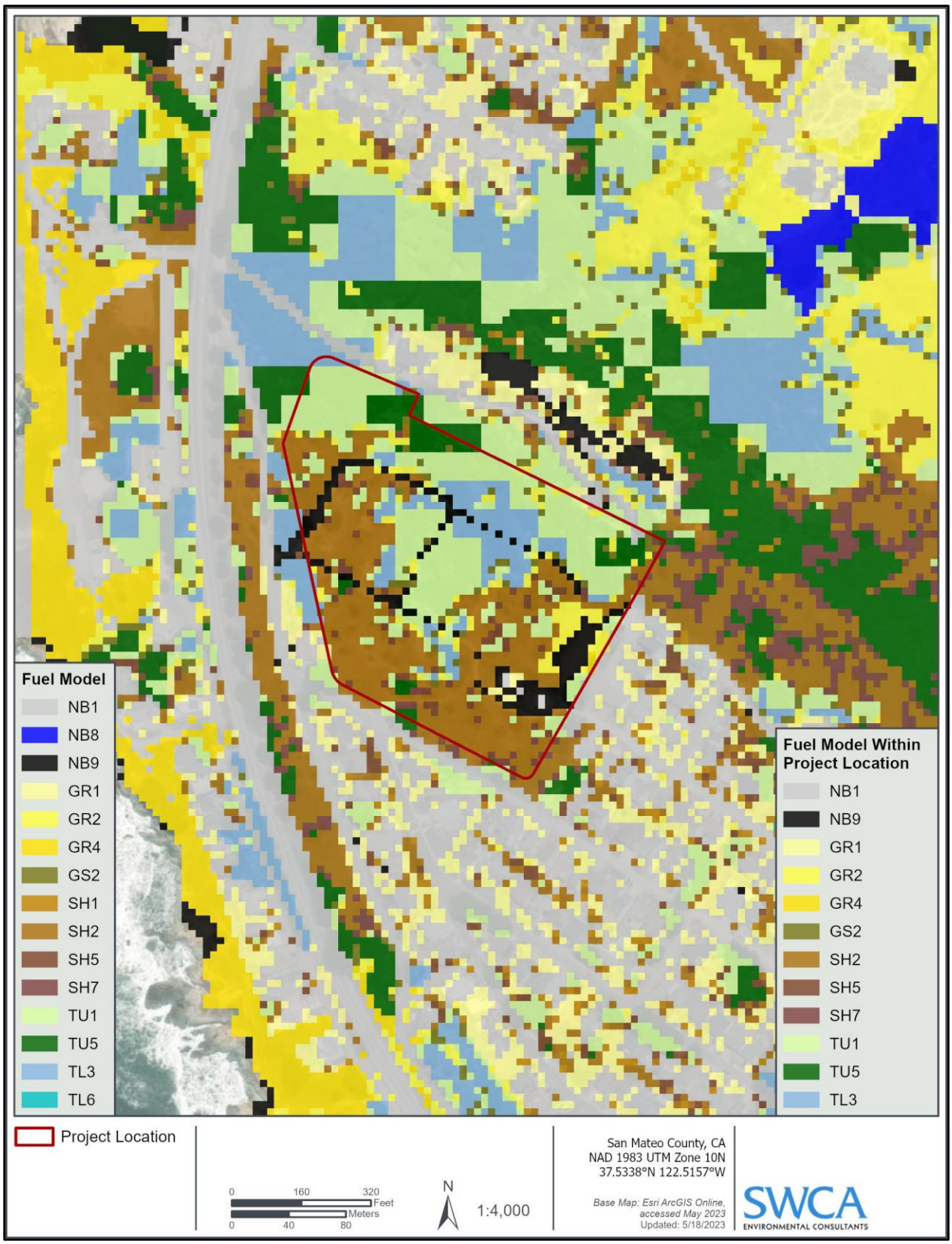


Figure 2. Fire behavior fuel models in the project site.

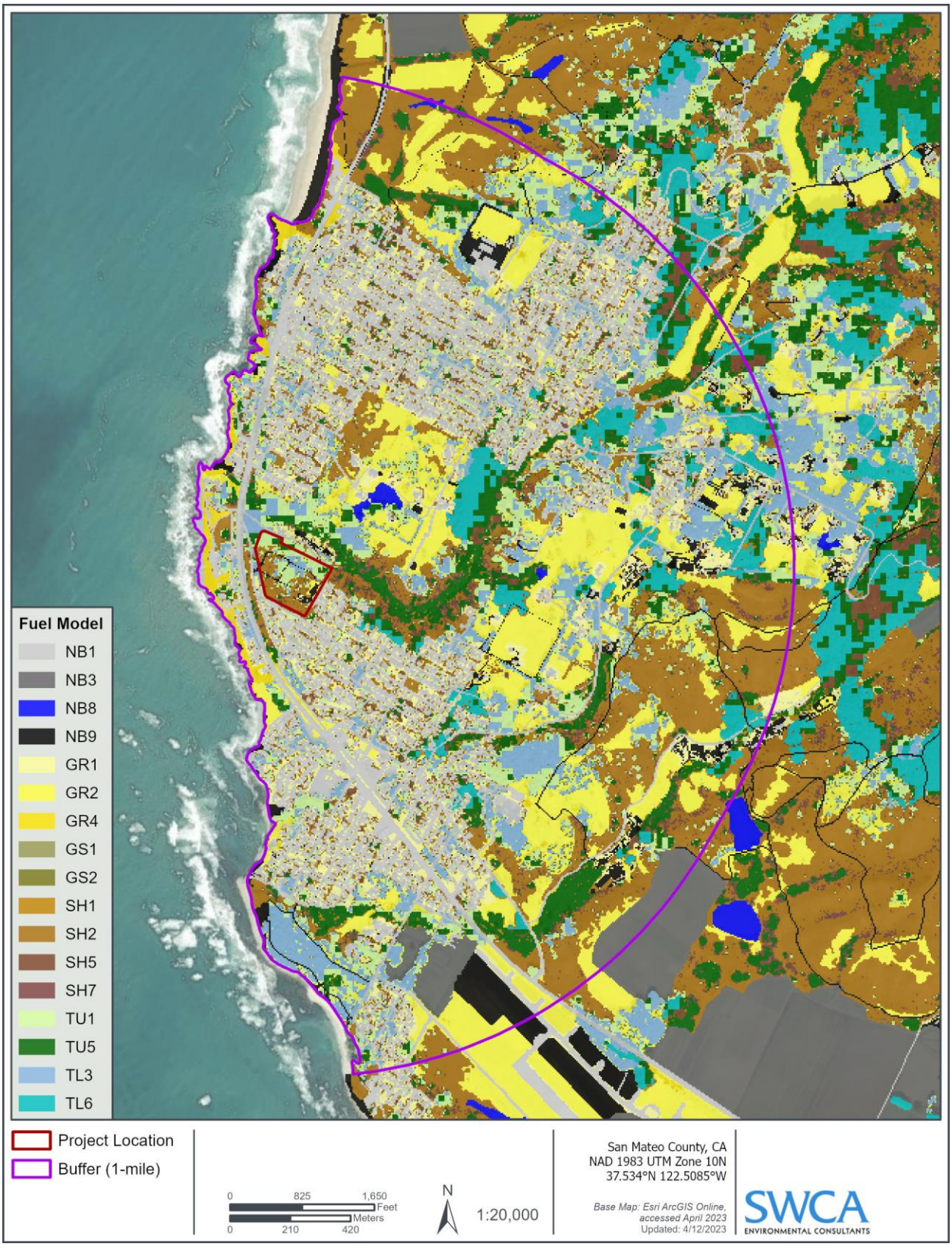


Figure 3. Fire behavior fuel models in the project site and project area.

2.2 Fire Behavior Modeling

The project site is outside of a CAL FIRE–designated very high or high FHSZ. There are SRA very high and high FHSZ–designated areas approximately 0.75 mile north and 0.5 mile east of the project site. There are also Local Responsibility Area (LRA) very high FHSZ–designated areas approximately 1.0 mile east and south of the project site (Figure 4).

The 2022 updated FHSZ data are not yet publicly available for use while updates are open for public commenting through April 2023 (CAL FIRE 2022). CAL FIRE has announced a 2023 release date; an update viewer is currently available to the public. The FHSZ updates are not anticipated to directly impact the project as there would be no change to designation of the project site (CAL FIRE 2022).

Fire behavior metrics were run with parameters set at the 97th percentile from local remote automatic weather stations (RAWS) to represent extreme conditions or the worst-case scenario. Live and dead fuel moistures were modified for the metrics, as available RAWS data used were from 1999 to 2016 and do not account for the continuing long-term drought in the region. Additional details of fire behavior modeling methodology can be found in Appendix A.

Analysis was conducted for the project site and the 1-mile buffer area using the Interagency Fuel Treatment Decision Support System (IFTDSS) (U.S. Department of Interior–Wildland Fire Management RD&A 2021) and FlamMap (U.S. Forest Service 2023) (Table 2). Burn probability, integrated burn hazard, rate of spread, and crown fire activity are the main metrics of predicted fire behavior. Burn probability is the likelihood of an area burning given an ignition source; it is related to historic fire size in the area, which is directly correlated with fire spread and duration. Integrated burn hazard couples burn probability with conditional flame length to show the fire potential at specific locations on the landscape. Rate of spread measures how fast a fire moves in chains per hour (ch/hr), where one chain is approximately 66 feet. Crown fire activity describes the ability for the fire to transition from a more benign surface fire to a more extreme crown fire in the canopy of shrubs and trees. Suppression difficulty index (SDI), a rating of relative difficulty in performing wildfire suppression work in an area, was also considered along with the other fire behavior metrics (Risk Management Assistance 2022). SDI factors in topography, fuels, expected fire behavior under severe fire weather conditions, firefighter line production rates in different fuel types, and accessibility (distance from roads).

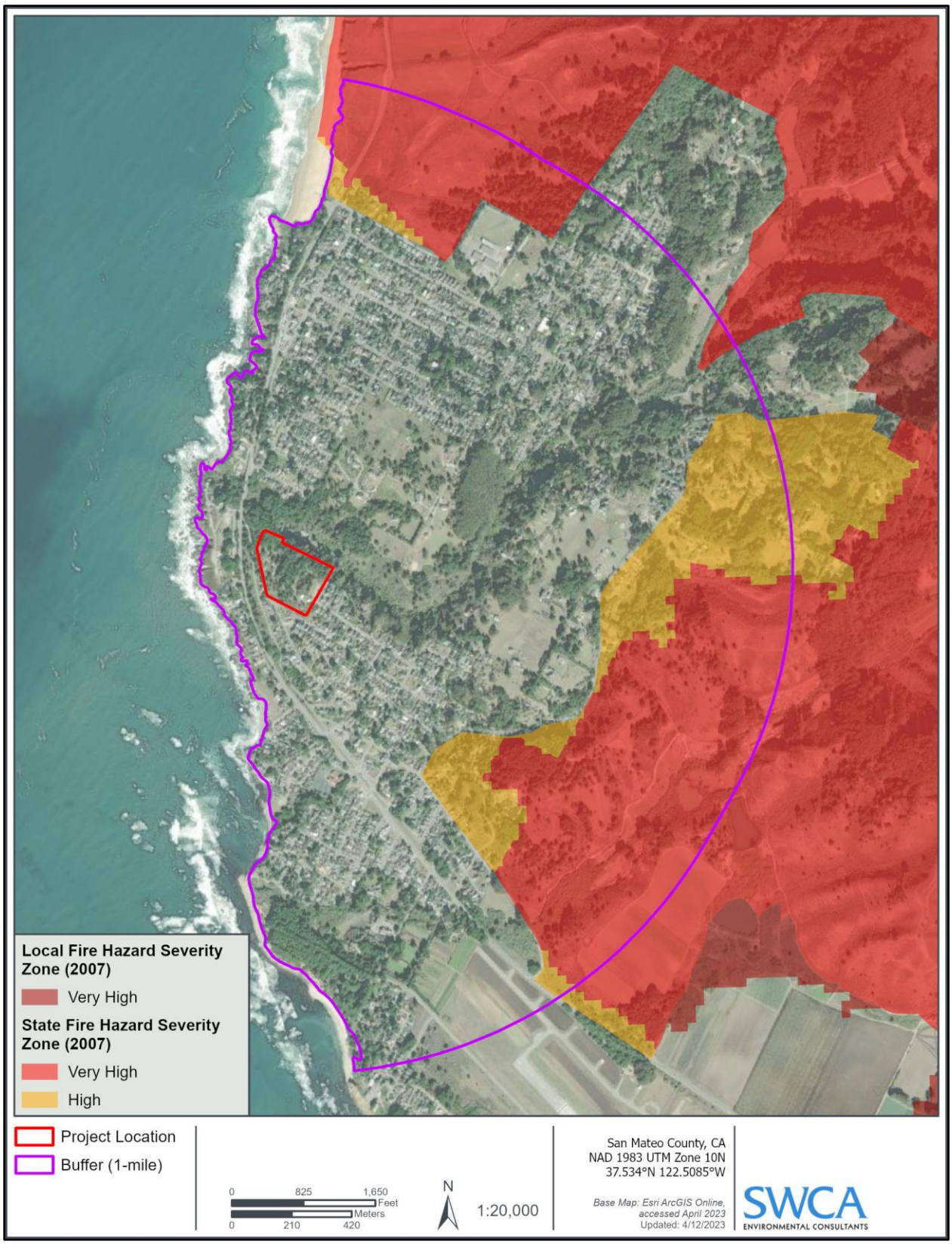


Figure 4. CAL FIRE FHSZ classifications.

Table 2. Fire Behavior Metrics in the Project Site and 1-mile Buffer Area

Burn Probability	Project Site Acres (%)	Project Area Acres (%)	Integrated Burn Hazard	Project Site Acres (%)	Project Area Acres (%)	Rate of Spread (ch/hr)	Project Site Acres (%)	Project Area Acres (%)	Crown Fire Activity	Project Site Acres (%)	Project Area Acres (%)
Non-burnable	3.1 (28%)	586.1 (47%)	**Non-burnable**	3.1 (28%)	586.1 (47%)	**0–5**	4.8 (44%)	731.2 (58%)	**No Fire**	1.0 (9%)	360.2 (29%)
Burnable, not burned	5.6 (50%)	49.3 (4%)	**Burnable, not burned**	5.6 (50%)	49.3 (4%)	**6–20**	2.7 (24%)	336.5 (27%)	**Surface Fire**	6.6 (59%)	616.2 (49%)
Lowest–Lower	2.4 (22%)	616.0 (49%)	**Lowest–Lower**	2.4 (22%)	614.6 (49%)	**21–50**	3.1 (28%)	139.0 (11%)	**Passive Crown Fire**	2.3 (21%)	259.1 (21%)
Middle	0	0	**Middle**	0	0.6 (<1%)	**>50**	0.5 (4%)	44.7 (4%)	**Active Crown Fire**	1.2 (11%)	15.8 (1%)
Higher–Highest	0	0	**Higher–Highest**	0	0.6 (<1%)						

Source: IFTDSS

Fire behavior within the project site was slightly more intense than the surrounding project area for certain metrics (rate of spread and crown fire activity). Fire intensity describes the energy released from the fire or characteristics of the fire behavior. In general, the project site predicts a higher percent capable of sustaining a faster rate of spread, likely due to the dominance of grass and shrub fuel types that exhibit faster rates of spread than other fuel types. There is also a higher percentage of the project site predicted to support crown fire (passive and active) compared to the project area, likely due to the higher percentage of shrub and timber fuel types (Figures 5 and 6).

Burn probability and integrated burn hazard were slightly more moderate in the project site than the buffer area. This is likely due to the larger percent of burnable, not burned acres during modeling, indicating that a fire is unlikely to reach a specific area or spread beyond that specific area due to a slow rate of spread. That is, although flammable vegetation is present, based on fire history it is unlikely a fire would occur or spread on the project site. Additionally, fuels are discontinuous across the landscape because of developed areas and roads; this can contribute to less fire spread. Modifying fuels to reduce fuel load or continuity helps mitigate potential fire behavior by creating fuel conditions and characteristics that naturally exhibit lower fire behavior (Figures 7 and 8).

The SDI for the project site is predominantly of low to lowest difficulty, with a minor percentage as moderate difficulty (Figure 9). The project area is also predominantly of low to lowest difficulty, with a small percentage as moderate difficulty.

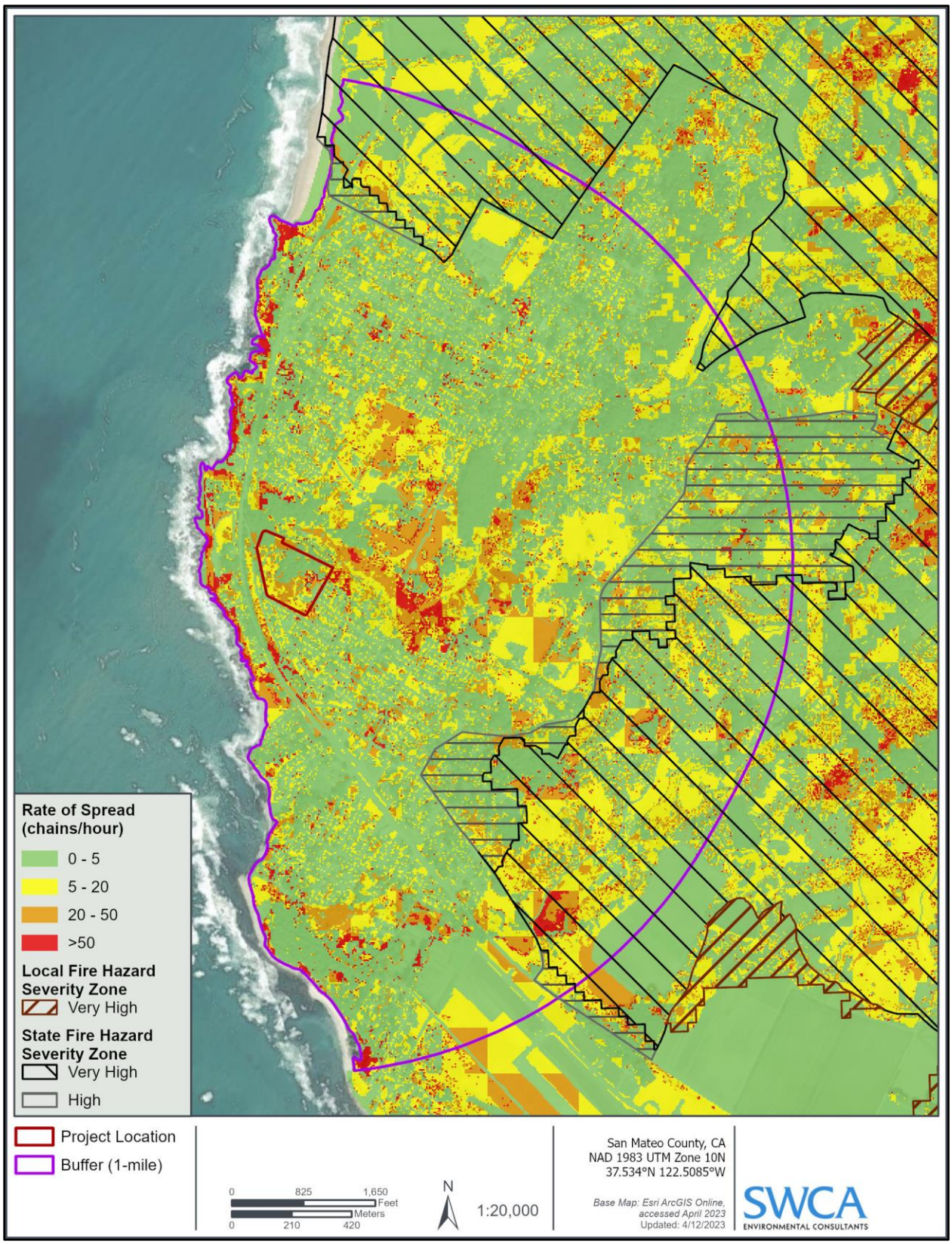


Figure 5. Rate of spread.

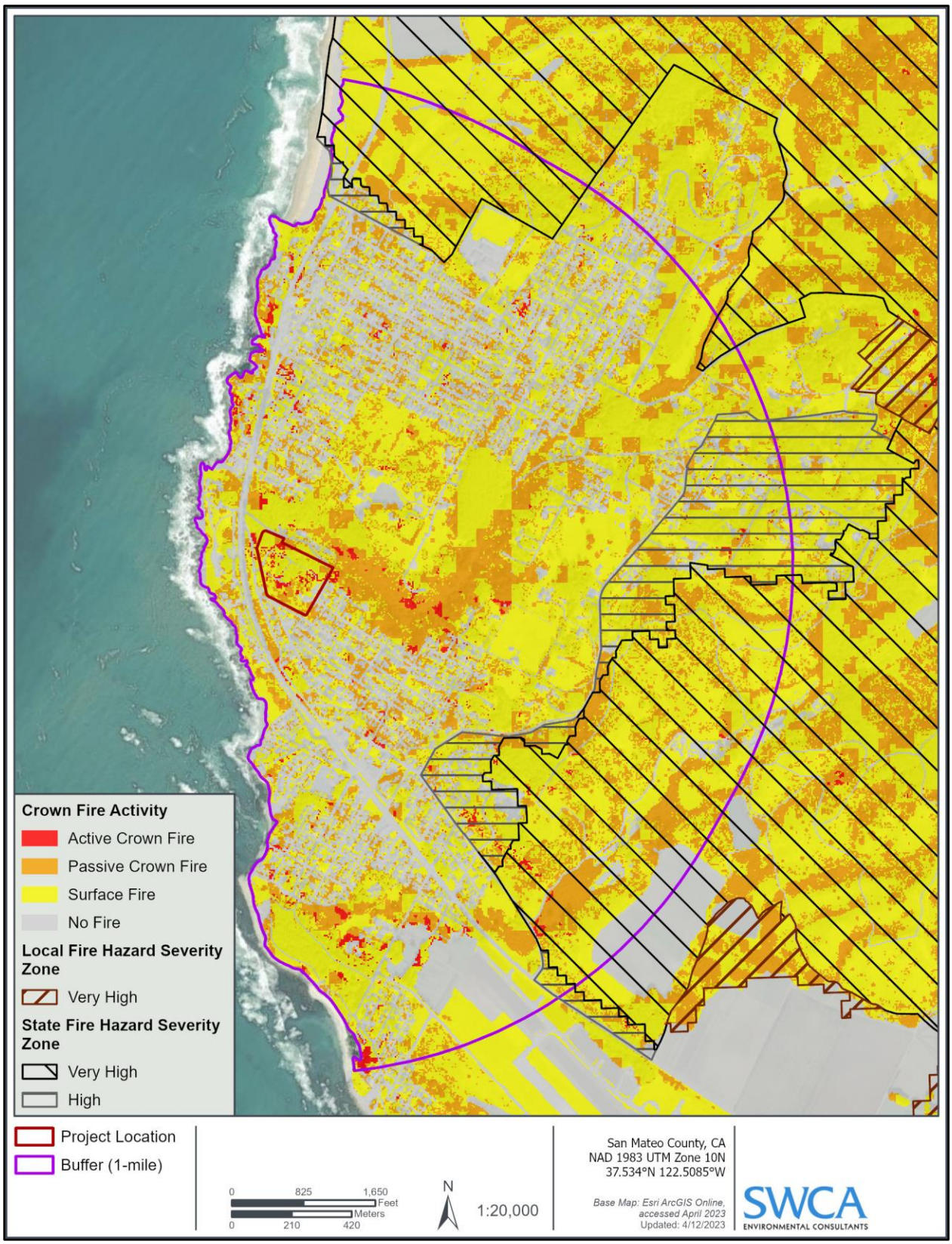


Figure 6. Crown fire activity.

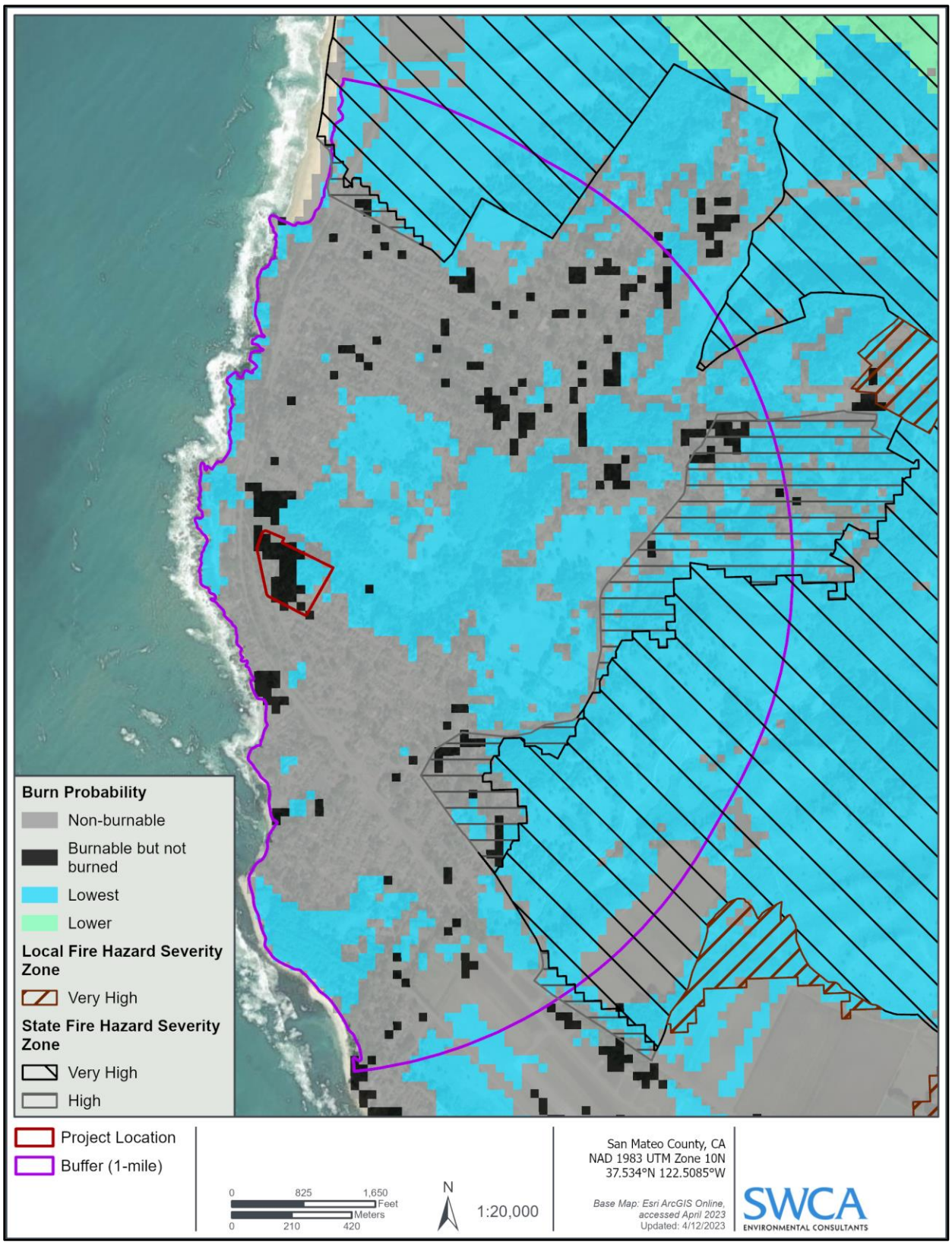


Figure 7. Burn probability.

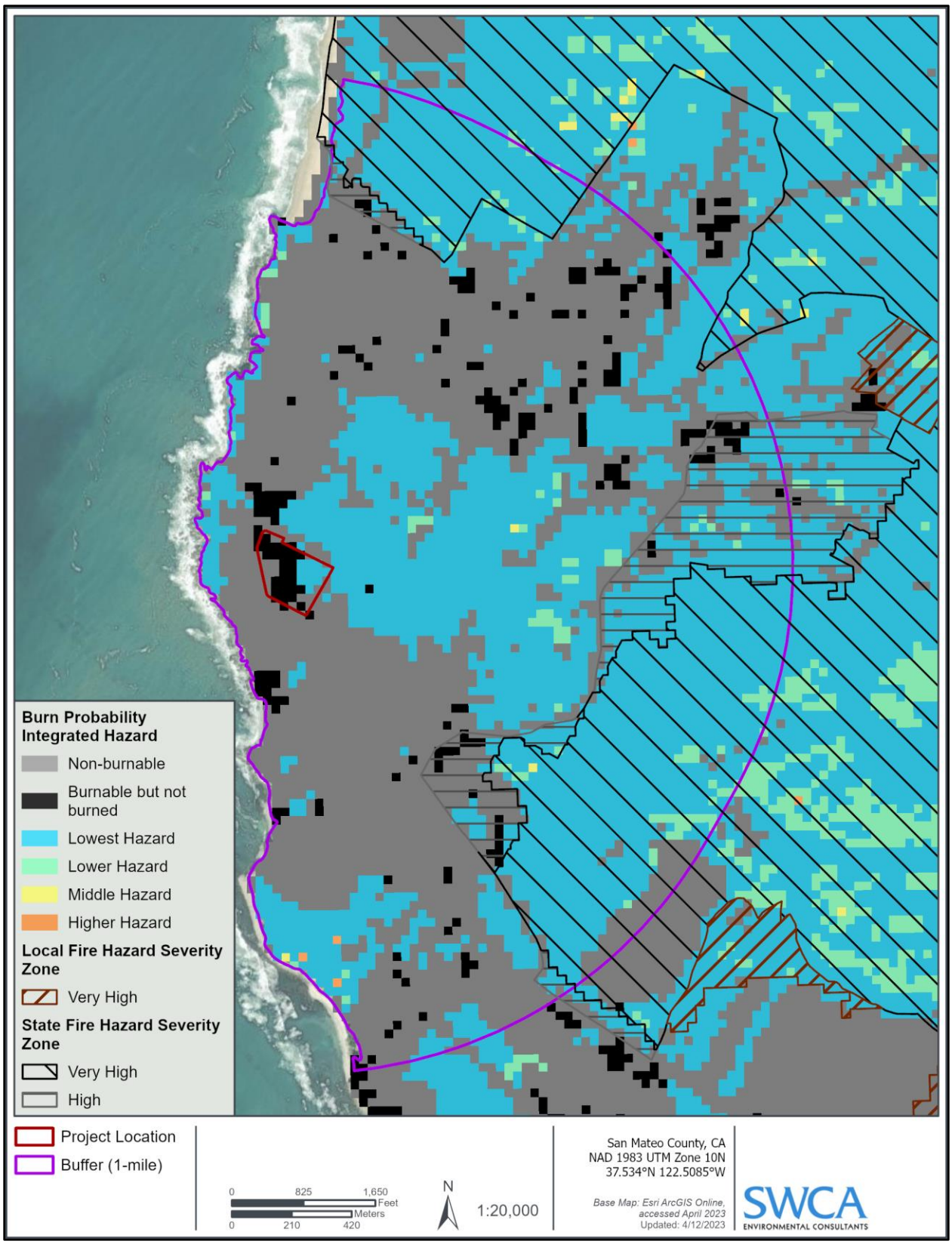


Figure 8. Integrated hazard burn probability.

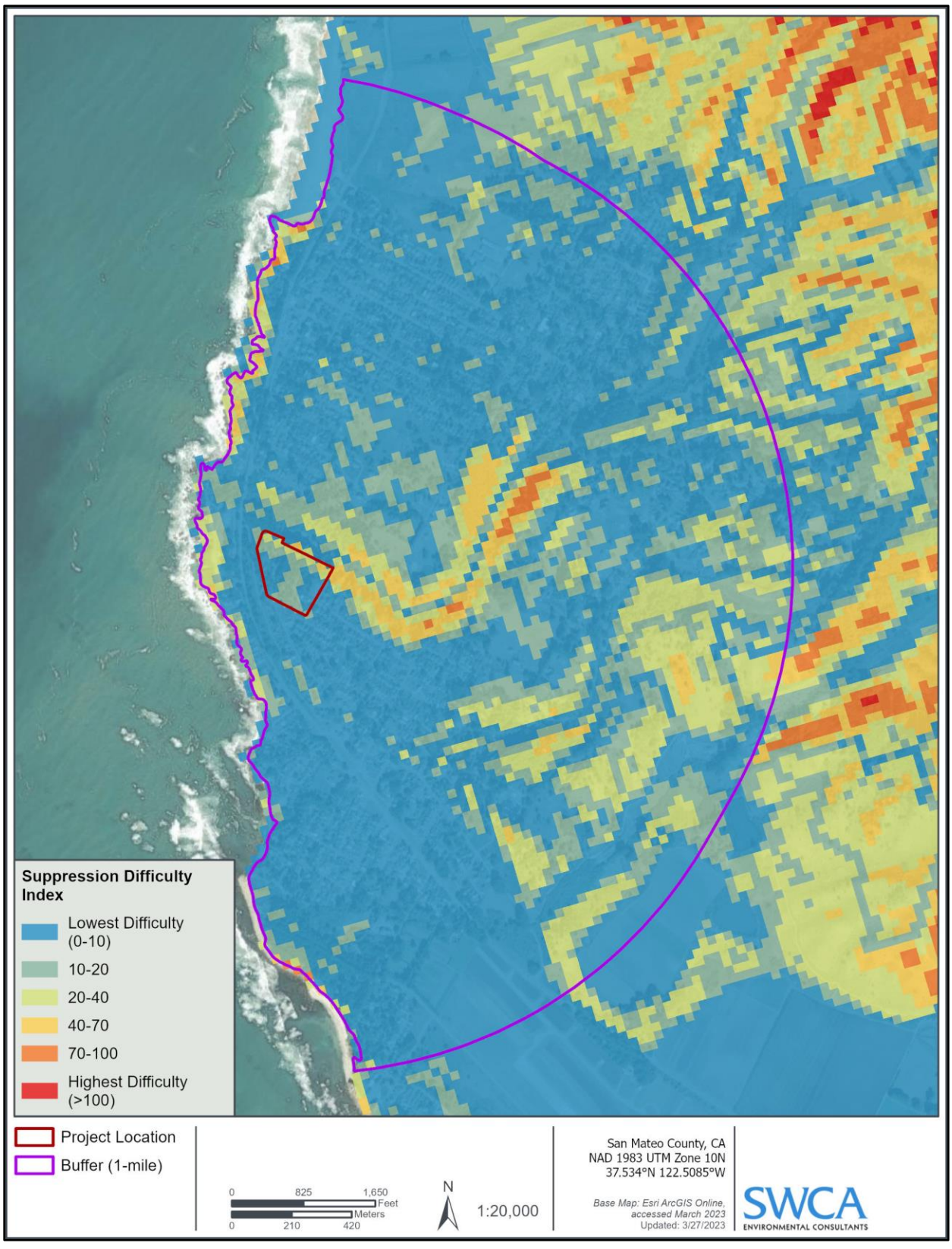


Figure 9. Fire suppression difficulty.

Overall, predicted fire behavior in the project site and 1-mile buffer area is low to moderate. A large percentage of the acres of non-burnable land or burnable, not burned land provides discontinuity in fuels and thus potential fire spread. The rate of spread is low to moderate (less than 50 ch/hr) for most of the project site and project area. Sustained and continuous active crown fire, versus the less extreme passive crown fire, is predicted over a minor percentage of the project site (11%) and project area (1%). Passive crown fire is predicted over less than one-quarter of the project site and project area (21% for each). The low SDI throughout the project site and project area supports the predicted low to moderate fire behavior, low to moderate fuel load, fuel discontinuity, and accessible terrain for emergency responders.

2.3 Fire History

From 2003 to 2022, three fires occurred within a 2-mile radius of the project site (Figure 10). All fires were less than 1 acre and have an "undetermined" cause (Table 3). Historically, in the range of data sourced, the most common causes of wildfires in the County have been "undetermined," equipment use, miscellaneous, and power line/electric power (National Interagency Fire Center 2018).

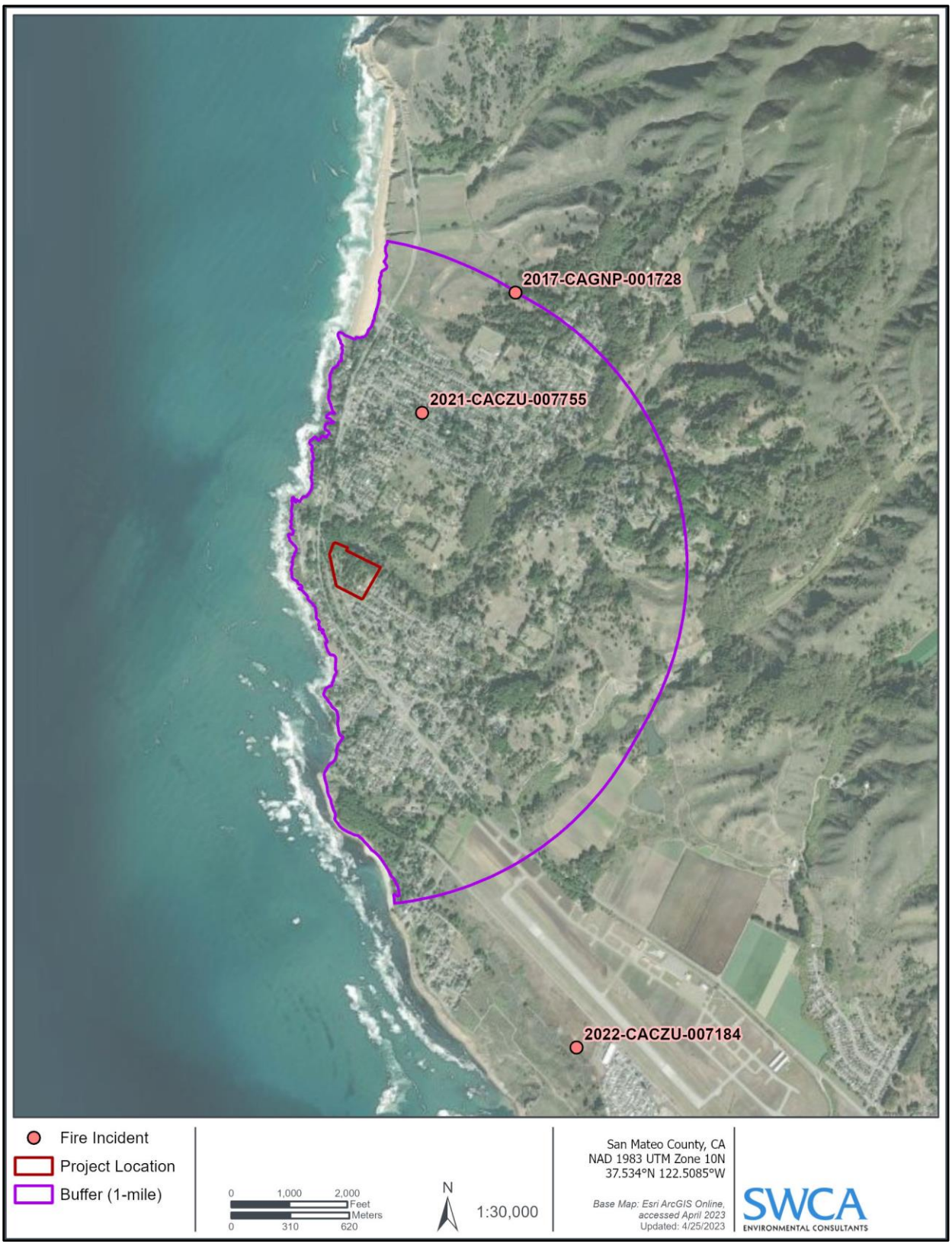


Figure 10. Fire history.

Table 3. Fire History

Date	Incident Name	Size (acres)	Cause
10/20/2022	Airport St Half Moon Bay UNINC (2022-CACZU-007184)	<1	Undetermined
11/19/2021	6th St/East Ave (2021-CACZU-007755)	<1	Undetermined
10/22/2017	Rancho (2017-CAGNP-001728)	<1	Undetermined

Source: National Interagency Fire Center (NIFC) 2018

3 ANALYSIS OF PROJECT EFFECTS ON WILDFIRE AND EMERGENCY SERVICES

3.1 Emergency Services

The project site is located within a 5-minute drive time from Coastside FPD's Fire Station 44 at Stetson and Kelmore Streets south of Sierra Street, which exceeds the Coastside FPD goal of 6-minute and 59-second response time (Figure 11). There are two additional fire stations within a 10-minute drive time and two additional fire stations within a 15-minute drive time from the project site (Table 4). Drive times were calculated using the ArcGIS Pro Generate Service Areas tool in the Network Analysis toolbox (ESRI 2022). This tool determines a network service area around a facility (the project) to measure accessibility. Travel times were set at 5-minute intervals.

Coastside FPD stations are staffed with one fire captain and two fire apparatus engineers. Additional details on Coastside FPD can be found in Section 1.1.3.4 (Fire Protection). Note that North County Fire Authority Station 72 has a shorter drive time to the project site than Coast Side FPD Station 40. Station 72's primary response area is the Linda Mar area and the southern end of Pacifica.

There are major arteries providing direct access for emergency services to the project site (see Section 3.2 [Emergency Access Routes]). Vehicular ingress/egress to the project site would be provided by a new 28-foot-wide single driveway on Carlos Street on the western boundary of the site, which exceeds the 20-foot road width requirement in the California Fire Code, Section 503 (International Code Council, Inc. [ICC] 2022a). In addition to the main entrance, there would be a 20-foot-wide emergency access route from Lincoln Street to the northeast corner of the project.

Table 4. Fire Stations within a 15-minute Drive Time of the Project Site.

Fire Station	Address	Project Drive Time Interval (minutes)	Distance to Project (miles)
Station 44 Coast Side Fire Protection District	501 Stetson Street, Moss Beach, California	5	0.02
Station 41 Coast Side Fire Protection District	531 Obispo Road, Half Moon Bay, California	10	3.2
Station 72 North County Fire Authority	1100 Linda Mar Boulevard, Pacifica, California	10	3.7
Station 40 Coast Side Fire Protection District	1191 Main Street, Half Moon Bay, California	15	7.3
Station 71 North County Fire Authority	616 Edgemar Avenue, Pacifica, California	15	7.8

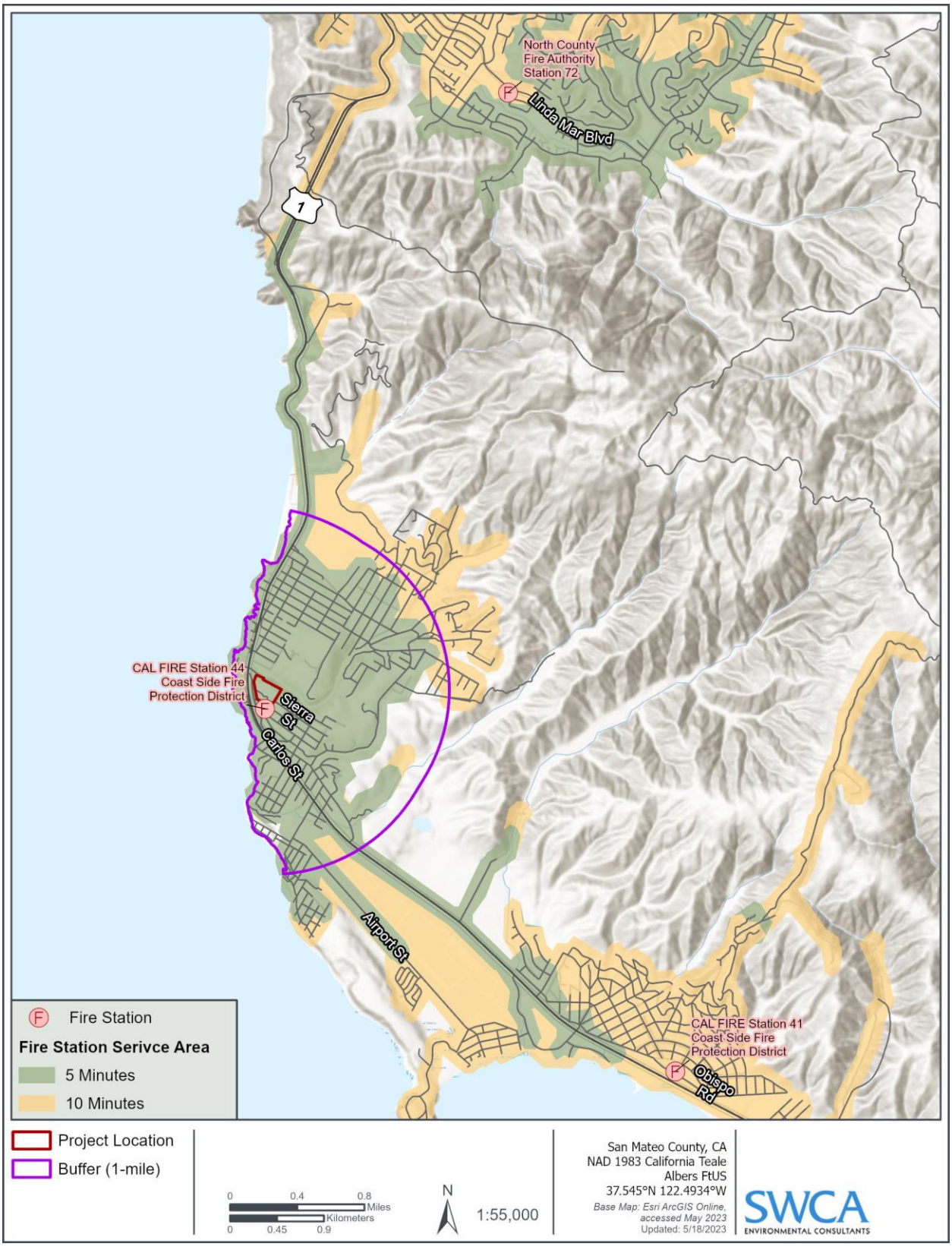


Figure 11. Fire stations within a 10-minute drive time of the project site.

3.2 Emergency Access Routes

There is one existing dirt road on the project site, which is the continuation of Buena Vista Street between Lincoln Street and Carlos Street. The project site can be accessed from Buena Vista Street, Lincoln Street, and Carlos Street. Installation of security gates is not a proposed feature of the project and, therefore, approval from the fire department is not necessary (according to the 2022 California Fire Code, Section 503.6) (ICC 2022a). Addresses would be plainly marked and visible from the street. Numbers would be 4 inches high on a contrasting background, as required by the California Fire Code, Section 505. All access to the project site and identification of site structures have been designed per the 2022 California Fire Code (ICC 2022a).

Vehicular ingress/egress to the project site would be provided by a new 28-foot-wide single driveway on Carlos Street on the western boundary of the site. This road width exceeds the 20-foot road width requirement in the California Fire Code, Section 503 (ICC 2022a). The entrance driveway would split into an access loop that circles the residential and community building areas. In addition to the main entrance, there would be a 20-foot-wide emergency access route from Lincoln Street to the northeast corner of the project.

The applicant has proposed closing Carlos Street between the project driveway and SR-1 to daily traffic from the proposed development; however, it would be available for emergency vehicle ingress/egress and for the public during emergency situations.

All internal driveway and parking areas would be composed of asphalt, concrete, or other approved driving surface capable of supporting the imposed load of fire apparatus weighing up to 75,000 pounds in accordance with California Fire Code, Section D102, which regulates required access and loading for new construction (ICC 2022a).

There is an extensive network of roads, both well-maintained dirt and major paved roads, surrounding the project site, including SR-1. These roads can support weight loads of fire apparatus and allow for access from all directions. There are main arteries from the nearest communities and fire stations that provide direct emergency response services. Descriptions of each roadway facility are presented below.

- SR-1 is a major north-south state highway that facilitates regional travel along California's Pacific coastline and provides the only access to Moss Beach. It connects Moss Beach to destinations in the north such as San Francisco and to the south such as Half Moon Bay. This portion of SR-1 is also known as the Cabrillo Highway. In the vicinity of the project site, it is a two-lane highway with one lane each for both the northbound and southbound directions and median left-turn lanes at the intersections of 16th, Carlos, and Etheldore/Vallemar Streets and California Avenue/Wienke Way. SR-1 has a posted speed limit of 45 miles per hour (mph).
- Carlos Street is a narrow two-way local street that runs north-south through Moss Beach parallel to SR-1. Primary access to the project site is provided via a proposed driveway off Carlos Street north of Sierra Street. North of the project site Carlos Street can be directly accessed from SR-1. From the south access to Carlos Street is from SR-1 via Etheldore Street or California Avenue. The posted speed limit is 25 mph.
- Sierra Street is a two-lane, two-way local street that extends east from Carlos Street to Vermont Street and provides residential access across Moss Beach. The posted speed limit is 15 mph.
- Stetson Street is a two-lane, two-way local street that extends south from Sierra Street near the project site to Sunshine Valley Road and provides access across Moss Beach. The posted speed limit is 15 mph.

- Etheldore Street is a two-lane, two-way local street that connects Moss Beach to SR-1. It extends in a southeasterly direction from the intersection with SR-1 through Moss Beach and intersects with SR-1 further south. The posted speed limit is 15 mph. Vallemar Street is on the west side of SR-1 and is a continuation of Etheldore Street.
- California Avenue is an east-west, two-lane, two-way local street that crosses SR-1 south of the project site, providing SR-1 access to much of the residential area of Moss Beach. The posted speed limit is 15 mph. Wienke Way spurs off California Avenue on the west side of SR-1.
- Airport Street is a north-south, two-lane, two-way local street that runs parallel to SR-1 south of the project site. It provides access from Moss Beach to Half Moon Bay, connecting to local streets in both communities, respectively.

3.3 Fire Water Supply

The project site contains easements for facilities operated by MWSD, including two water storage tanks with a height of 35 feet in the southeastern portion of the site, a booster pump system, and distribution facilities within a fenced parcel of land adjacent to and west of the intersection of Lincoln Street and Buena Vista Street near the eastern boundary of the project site. The project would have water tanks capable of supplying a flow of 100 gallons of water per minute (gpm) for the duration of 2 hours, as required by the California Fire Code, Section 507 (ICC 2019) and in compliance with the San Mateo County General Plan, Chapter 15, Section 15.30 (County of San Mateo 2021). The project would extend water lines to new project facilities for potable water and fire water supply, as well as for irrigation of landscaping. The proposed water line would extend from the existing MWSD tanks along the existing 10-foot right-of-way along the eastern and northern parts of the project site. New domestic water and fire water lines would be located in the driveway loop and parking areas, with individual connections to each building. The fire water would connect to a flow meter in the northeast corner of the driveway loop. The project is considered a R-2 Residential Group occupancy and would have automatic fire sprinkler systems in compliance with California Fire Code, Chapter 9, Section 903.3.1.2 (ICC 2022a). Fire flows for the 63,374 square feet of residential buildings would be at least 1,500 gpm at 20 pounds per square inch residual pressure for a minimum of 2 hours as required by Coastside FPD standards (personal communication via email on October 18, 2022). The fire supply systems meet the requirements listed in California Fire Code, Chapter 5, Section 507.5.1 through 507.5.6 and Appendix C (ICC 2022a). There are 31 fire hydrants located within a 1-mile buffer of the project site (Figure 12). These fire hydrants could be used as additional water sources in the event of wildfire.

Figure 12. Hydrant locations.

3.4 Ignition-Resistant Construction and Fire Protection Systems

Design and construction of new structures within the project site would meet standards in the 2022 California Building Code, Title 24, Part 2, Chapters 7 and 7a for exterior walls and roofing materials, as well as Chapter 9, Section 903 for automatic fire sprinkler systems and fire alarm and detection systems (ICC 2022b). This includes using fire-resistant and ignition-resistant materials of a certain rating for exterior walls and roofing materials.

3.5 Defensible Space and Vegetation Management

The project includes a 30-foot fire break area and a 100-foot reduced fuel zone surrounding the development as required in the Public Resources Code 4291; California Code of Regulations, Title 24, Part 9, Section 4907; and as referenced in the Local Hazard Mitigation Plan (Tetra Tech 2021). The 30-foot fire break would be cleared of all flammable vegetation (except irrigated grass mowed to 4 inches vertical height or less), and the 100-foot reduced fuel zone would maintain vegetation (grass and shrubs) reduced to a maximum of 4 inches vertical height. The reduced fuel zone would ensure adequate spacing between any existing trees, which is a minimum of 10-foot spacing between widest points of the crown of adjacent trees. Tree crowns would be limbed or trimmed to reach this spacing; some trees may also need be removed. The 100-foot reduced fuel zone extends 70 feet beyond the 30-foot fire break area.

The project would retain approximately 193 of the existing trees on-site and remove approximately 295 trees within the project site. Tree Protection Zones would be defined and marked prior to construction to protect each tree to be preserved during construction. Approximately 190 trees would be planted throughout the project site. These trees would be caged for the first year to protect them from herbivores and irrigated until established as evidenced by vigorous top growth in the spring. The project would replant disturbed slopes with native or low-water ground cover and shrubs, and/or seeded with red fescue (*Festuca rubra*) and California poppy (*Eschscholzia californica*), for erosion control.

4 EVACUATION ROUTE ASSESSMENT

Evacuation of residents during an emergency incident is a dynamic situation requiring coordination among different agencies and local residents. Evacuation is recommended by authorities to reduce the risk of residents being impacted by hazards from natural and human-made disasters, such as fire, as well as secondary effects like road congestion. Evacuation recommendations by authorities are done in a manner to help reduce traffic blocks and aid emergency responders during incident operations. A change in population may impact evacuation processes. Ladris Technologies' evacuation platform was used to model potential changes in evacuation times with the increase in residents from the project.

All evacuation simulations were considered with a 1-hour maximum departure timeframe for residents, meaning all vehicles are entering roadways over a 1-hour window. Regional occupancy coverage was set to 100% for each simulation, indicating the maximum number of residents (vehicles) was modeled. All residents within Zone Haven designated zone SMC-E029 (the zone where the project is located) were evacuated to the Coast Side Clinic located at 225 South Cabrillo Highway, Half Moon Bay, California.

Additional details of evacuation modeling methodology can be found in Appendix B.

4.1 Travel Times under Existing and Proposed Development Models

The development proposes an additional 71 residences with approximately 213 occupants. The evacuation modeling platform only considers vehicle counts and not occupancy. Publicly available data indicates recent trends in cars per capita range from 0.8 to 0.9 in the country, depending on specific year. This model assumes 0.85 car per resident. It does not account for possible differences in cars per capita in situations such as affordable or senior housing.

Simulations were run with and without the proposed development to model the impact on travel time from increased vehicles (residents) in the evacuation zone. Table 5 shows the increase in evacuation time by approximately 18% for median travel time and 1% for maximum travel time with the proposed development compared with no proposed development. The development modeled in Table 5 does not include the project mitigation of the temporary closure of Carlos Street between the project driveway and SR-1 as it would be open during an emergency situation.

The model shows all residents within Zone Haven SMC-E029 evacuating within 1-hour to the Coast Side Clinic in Half Moon Bay, California, to the south of Moss Beach. Evacuation times model probable flows of traffic using all available roads and routes to the designated evacuation point; SR-1 and Airport Street are two main arteries. Additional details of the simulation can be found in Appendix B.

Table 5. Travel Times with and without Proposed Development

Project Status	Median Time (H, M)[1]	Percent Increase	Maximum Time (H, M) [1]	Percent Increase
No development	1H, 27M	--	2H, 22M	--
Development	1H, 43M	18.3%	2H, 23M	1%

1. Hours, Minutes

Source: Ladris Technologies

5 CUMULATIVE IMPACTS

The proposed Etheldore Apartments Project is located nearby the project (approximately 2,100 feet southeast). Ethledore Apartments is a project that includes the construction of an eight-unit, multiple-family housing development (San Mateo County 2023). The Etheldore Apartments Project is currently in early planning and development stage of environmental review. The pre-application workshop was held in February 2020. The Etheldore Apartments Project also has the potential to increase human-caused ignitions in the surrounding area, though smaller in scope (fewer housing units). No additional projects are currently planned to occur within 1 mile of the project site.

6 CONCLUSION

The minimal fire history, discontinuity of fuels across the landscape, and the low to moderate predicted fire behavior (burn probability, rate of spread, and crown fire) in the project site and 1-mile buffer area indicate a low fire hazard. While the proposed development of residential buildings where there currently are none potentially increases human-caused ignitions, both during and post-construction, modeled fire behavior does not lend itself to large fire growth. The addition of paved roads and other nonburnable

surfaces associated with project development further fragment flammable fuels, preventing fire spread by acting as fuel breaks. Additionally, the SDI shows a low difficulty in suppression efforts for the project site, indicating the likelihood of stopping forward progression of a fire, minimizing fire size and adverse impacts to the environmental setting.

Given the relatively flat terrain and absence of significant topographic features in the vicinity, it is not likely the topography would exacerbate wildfire risks, and it is not likely a fire would result in landslides, post-fire slope instability, or drainage and debris flow issues. Fire is an intrinsic part of the landscape, and during seasonal prevailing winds when fire season peaks, risks would be reduced by designing an area of defensible space around the building, using ignition-resistant equipment, and adding domestic fire water lines to the buildings.

The project site is located within 300 feet from Fire Station 44, ensuring sufficient emergency response if necessary (less than a 6-minute and 59-second response time). Resident evacuation simulations indicate that the project would increase evacuation time by approximately 1% for median travel time and 18% for maximum travel time. There is, however, a network of roads surrounding the project site. There are main arteries from the nearest communities and fire stations that provide direct emergency response services beyond Station 44.

As the area experiences further growth and development, the County anticipates that exposure to wildfire hazards will remain the same or decrease over time due to codes and regulations enforcement for new construction (Tetra Tech 2021). The project would follow all applicable local, state, and federal regulations designed to reduce wildfire risk for new developments, including defensible space measures (PRC 4291), fire-resistant building materials and features (California Building Code and California Residential Code), and emergency vehicle ingress/egress routes (California Code of Regulations Title 14 and California Fire Code Title 24). Local plans, such as the 2021 Multijurisdictional Local Hazard Mitigation Plan and the Connect the Coastside Plan further describe coordinated actions to reduce wildfire risk and enhance emergency response, including evacuation of the public during emergency situations. The project would not impair the evacuation procedures and warning time protocols as described in the Local Hazard Mitigation Plan (Tetra Tech 2021).

7 LITERATURE CITED

California Department of Forestry and Fire Protection (CAL FIRE). 2022. Fire Hazard Severity Zones Map. Available at: https://osfm.fire.ca.gov/divisions/community-wildfire-preparedness-and-mitigation/wildfire-preparedness/fire-hazard-severity-zones/fire-hazard-severity-zones-map/. Accessed March 2023.

County of San Mateo. 2013. Local Coastal Program Policies. Available at: https://www.smcgov.org/planning/local-coastal-program#. Accessed May 2023.

———. 2021. County of San Mateo General Plan: Updated January 2013. Chapter revisions 2021. Available at: https://www.smcgov.org/planning/general-plan-policies. Accessed March 2023.

———. 2022. *Connect the Coastside San Mateo County Midcoast Comprehensive Transportation Management Plan*. Available at: https://www.smcgov.org/media/136501/download?inline. Accessed May 2023.

———. 2023. Etheldore Apartments. Available at: https://www.smcgov.org/planning/etheldore-apartments. Accessed May 12, 2023.

Dwellics. 2023. Climate in Moss Beach, California. Available at: https://dwellics.com/california/climate-in-moss-beach. Accessed March 20, 2023.ESRI. 2022. ArcGIS Pro Resources: Tool reference. Available at: https://pro.arcgis.com/en/pro-app/latest/tool-reference/main/arcgis-pro-tool-reference.htm. Accessed April 2023.

International Code Council, Inc. (ICC). 2019. 2019 California Referenced Standards Code: California code of regulations, Title 24, Part 12. Available at: https://codes.iccsafe.org/content/CARSC2019/title-page. Accessed April 2023.

———. 2022a. 2022 California Fire Code. Available at: https://codes.iccsafe.org/content/CAFC2022P1. Accessed April 2023.

———. 2022b. 2022 California Building Code. Available at: https://codes.iccsafe.org/content/CABC2022P1. Accessed April 2023.

National Interagency Fire Center (NIFC). 2018. WFIGS – Wildland Fire Incident Locations. Available at: https://data-nifc.opendata.arcgis.com/pages/new_firehistory_services. Accessed. April 2023.

Risk Management Assistance (RMA). 2022. The Wildland Fire Management Research, Development, and Application. Available at: https://wfmrda.nwcg.gov/. Accessed March 2023.

Sawyer, J.O., T. Keeler-Wolf, and J.M. Evens. 2009. *A Manual of California Vegetation, Second Edition*. Sacramento, California: California Native Plant Society. 1,300 pp.

Scott, J.H. and R.E Burgan. 2005. *Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model*. General Technical Report RMRS-GTR-153. Missoula, Montana: United States Department of Agriculture–Forest Service, Rocky Mountain Research Station.

Tetra Tech. 2021. *2021 Multijurisdictional Local Hazard Mitigation Plan*. Prepared for County of San Mateo Department of Emergency Management. Available at: https://www.smcgov.org/media/53471/download?inline=. Accessed May 2023.

U.S. Department of Interior–Wildland Fire Management RD&A. 2021. Welcome to IFTDSS: The Interagency Fuel Treatment Decision Support System. Available at: https://iftdss.firenet.gov/landing_page/index.html. Accessed April 2023.

U.S. Forest Service. 2023. FlamMap. Available at: https://www.firelab.org/project/flammap. Accessed April 2023.

Weatherspark.com. 2023. Average Weather Year Round in Moss Beach. Available at: https://weatherspark.com/y/536/Average-Weather-in-Moss-Beach-California-United-States-Year-Round. Accessed March 20, 2023.

APPENDIX A

Fire Behavior Modeling

Fire behavior modeling was conducted using the Interagency Fuels Treatment Decision Support System (IFTDSS) (U.S. Department of Interior–Wildland Fire Management RD&A 2021) and FlamMap (U.S. Forest Service 2023). IFTDSS is a web-based application that models fire behavior under a variety of weather conditions and possible fuels treatments for an area of interest or a landscape. FlamMap is a fire behavior mapping and analysis program that computes discrete potential fire behavior characteristics, or metrics. IFTDSS and FlamMap use the following data parameters: 1-hour, 10-hour, and 100-hour dead fuel moistures; herbaceous and woody live fuel moistures; and wind speed and direction. Fuel size classes (1, 10, and 100 hour) used for dead fuel moisture are based on the fuel size diameter and how long it takes for approximately 67% of the moisture content of the woody fuel to reach equilibrium with the environment. Live fuel moistures range from approximately 50% to 300% depending on the stage of vegetative development.

Fire behavior metrics were run with parameters at the 97th percentile to represent extreme conditions or a worst-case scenario. Fire weather and fuels conditions are from the closest remote automated weather station (RAWS) to the project, Spring Valley RAWS. RAWS data available was from July 1999 to October 2016; to account for ongoing drought in the region, some 97th percentile parameters were modified. The 100-hour fuel moisture, live herbaceous fuel moisture, and live woody fuel moisture values were reduced to reflect consistent trends throughout the state and coastal region because of drought. Analysis was conducted for the project site and the 1-mile buffer area.

IFTDSS and FlamMap use fire behavior fuel models to classify the vegetation on the landscape. LANDFIRE was used for certain modeling when the San Mateo Countywide Fine Scale Vegetation Map and Landscape Database Project data were incompatible. LANDFIRE data are at a 30-meter resolution, while the Fine Scale Project data are at a 5-meter resolution.

The 30-foot fuel break maintains irrigated grass mowed to 4 inches or less vertical height. This is best represented by a nonburnable substrate as it would not be flammable with constant irrigation.
The 100-foot reduced fuel zone (70 feet beyond the fuel break) would maintain all grass and shrubs to a vertical height of 4 inches or less, making both grass and shrubs behave like grass fuel model GR1 with a low fuel load and thus low predicted fire behavior. This modified 100-foot zone would reduce fuels in critical areas where new fire starts are likely to occur from human activities and also create defensible space from off-site fuels to prevent fire spread to the structure.

APPENDIX B

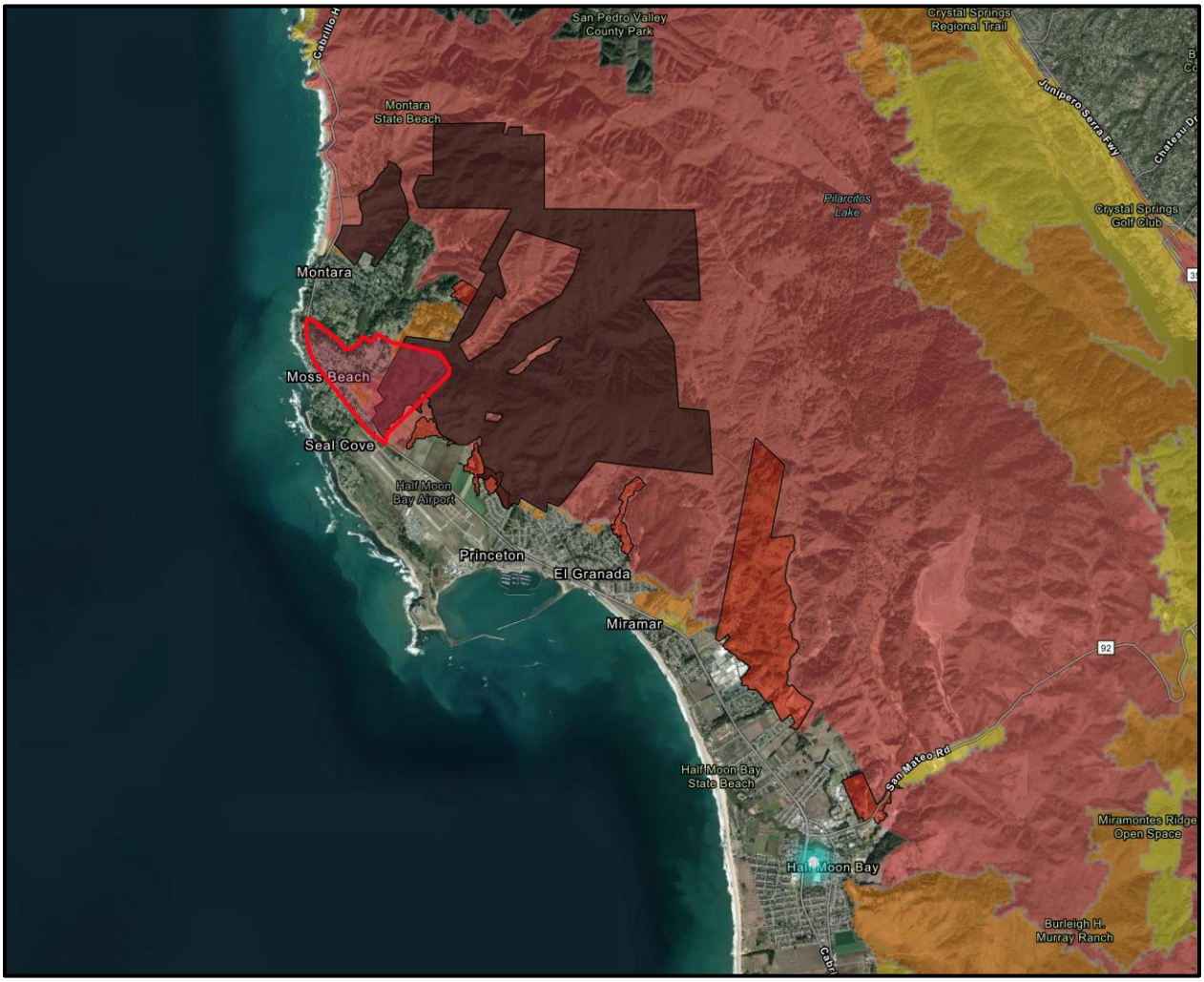
Evacuation Route Simulations

The Ladris Technologies' evacuation modeling platform considers only vehicle counts and not occupancy. Publicly available data indicates recent trends in cars per capita range from 0.8 to 0.9 in the country, depending on specific year. This model assumes 0.85 car per resident and does not distinguish between local differences in the country average.

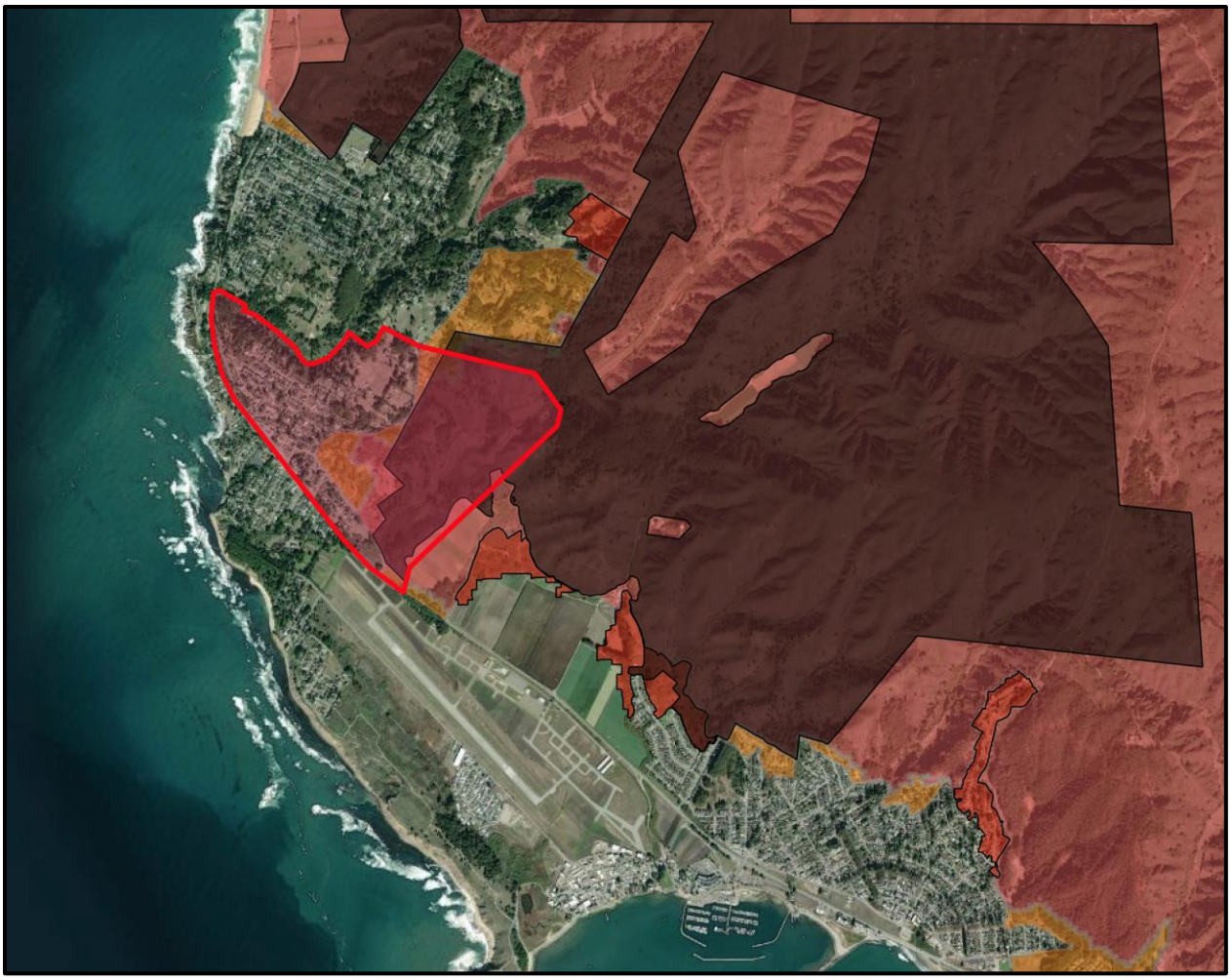
All evacuation simulations were considered with a 1-hour maximum departure timeframe for residents, meaning all vehicles are entering roadways over a 1-hour window. A 1-hour departure timeframe represents an extremely urgent evacuation scenario representing a worst-case-scenario. Regional occupancy coverage was set to 100% for each simulation, indicating the maximum number of residents (vehicles) was modeled.

All residents within Zone Haven designated zone SMC-E029 (the zone where the project is located) were evacuated in all simulations. All residents were evacuated to the Coast Side Clinic located at 225 South Cabrillo Highway, Half Moon Bay, California, to represent a potential temporary shelter for evacuating residents during an emergency incident.

Evacuation zone with CAL FIRE FHSZs and evacuation point.



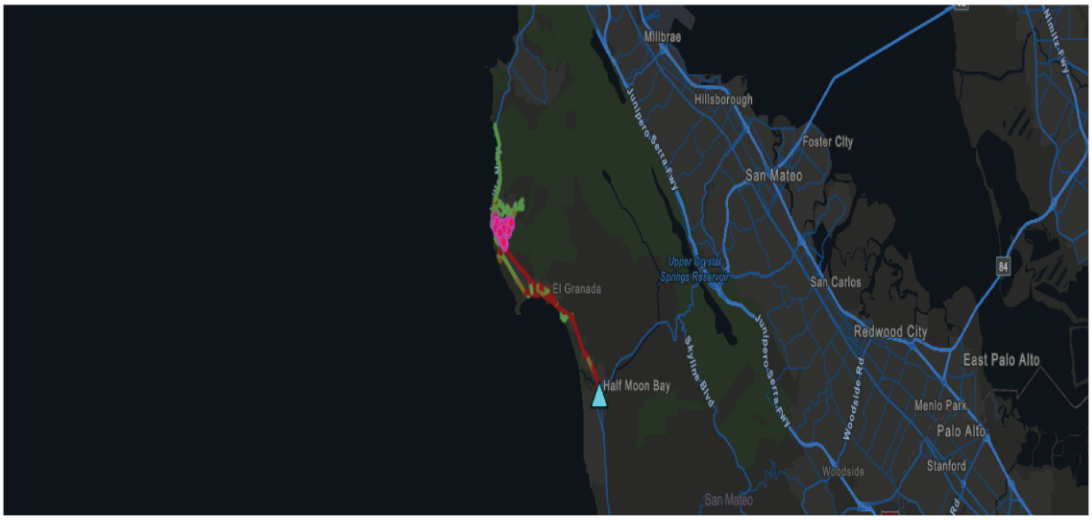
Evacuation zone with CAL FIRE FHSZs.



Evacuation Simulation | San Mateo County - Cypress Point

2023-05-08 12:21:07.07038

Operator: Support Ladris



Map powered by Esri.

Projections

Metric	Projection
Median	1H 27M
Mean	1H 28M
Standard Deviation	0H 29M
Maximum	2H 22M
Minimum	0H 8M
Addresses Evacuated	446 addresses
Passenger Cars Evacuated	892 passenger cars
Heavy Vehicles Evacuated	892 heavy vehicles
Simulation Type	Polygon
Simulation Type	Zoned

Notice: This report is generated by a modeling algorithm that identifies patterns in disaster response. It is dependent upon the assumptions used by the operator in generating the report and the accuracy of third-party data. It is unlikely to fully reflect all of the complexity inherent in chaotic environments. Any assessment of future outcomes carries inherent risk, and Ladris does not assume responsibility for decisions made as a result of projections. End users should possess expertise in understanding the real-world implications of forecasts, and should always exercise sound judgement and expert discretion when interpreting results.

Evacuation Simulation | San Mateo County - Cypress Point

2023-05-08 12:21:07.07038

Operator: Support Ladris

Assumptions

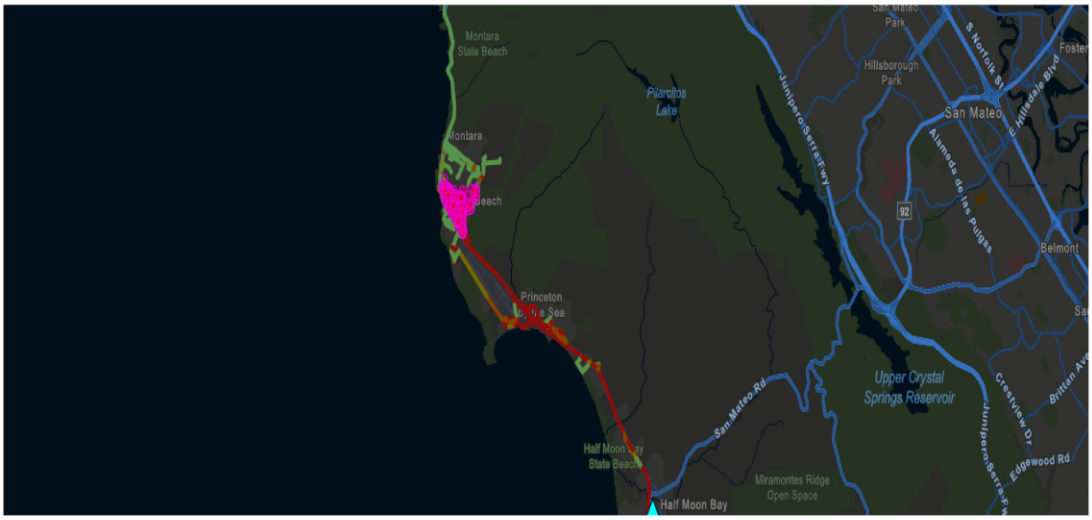
The following assumptions were configured by the operator prior to running the simulation:

Variable	Assumption
Passenger Cars per Address	2 per address
Heavy Vehicles per Address	2 per address
Freeway Free-Flow Speeds	65 miles per hour
Highway Free-Flow Speeds	50 miles per hour
Arterial Free-Flow Speeds	40 miles per hour
Residential Free-Flow Speeds	28 miles per hour
Service Free-Flow Speeds	15 miles per hour

Evacuation Simulation | San Mateo County - Cypress Point

2023-05-08 12:19:01.779237

Operator: Support Ladris



Map powered by Esri.

Projections

Metric	Projection
Median	1H 43M
Mean	1H 38M
Standard Deviation	0H 31M
Maximum	2H 23M
Minimum	0H 8M
Addresses Evacuated	459 addresses
Passenger Cars Evacuated	1058 passenger cars
Heavy Vehicles Evacuated	891.4 heavy vehicles
Simulation Type	Polygon
Simulation Type	Zoned

Notice: This report is generated by a modeling algorithm that identifies patterns in disaster response. It is dependent upon the assumptions used by the operator in generating the report and the accuracy of third-party data. It is unlikely to fully reflect all of the complexity inherent in chaotic environments. Any assessment of future outcomes carries inherent risk, and Ladris does not assume responsibility for decisions made as a result of projections. End users should possess expertise in understanding the real-world implications of forecasts, and should always exercise sound judgement and expert discretion when interpreting results.

Evacuation Simulation | San Mateo County - Cypress Point

2023-05-08 12:19:01.779237

Operator: Support Ladris

Assumptions

The following assumptions were configured by the operator prior to running the simulation:

Variable	Assumption
Passenger Cars per Address	2 per address
Heavy Vehicles per Address	2 per address
Freeway Free-Flow Speeds	65 miles per hour
Highway Free-Flow Speeds	50 miles per hour
Arterial Free-Flow Speeds	40 miles per hour
Residential Free-Flow Speeds	28 miles per hour
Service Free-Flow Speeds	15 miles per hour