



City of San Rafael Fire Department San Rafael Hill and Deer Valley Fuel Reduction Project

**Draft Final Initial Study/Mitigated Negative
Declaration**

State Clearinghouse: 2025060794

June-August 2025



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Project**
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~~June~~ August 2025

Prepared for:

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1 Project Description

1.1 Introduction

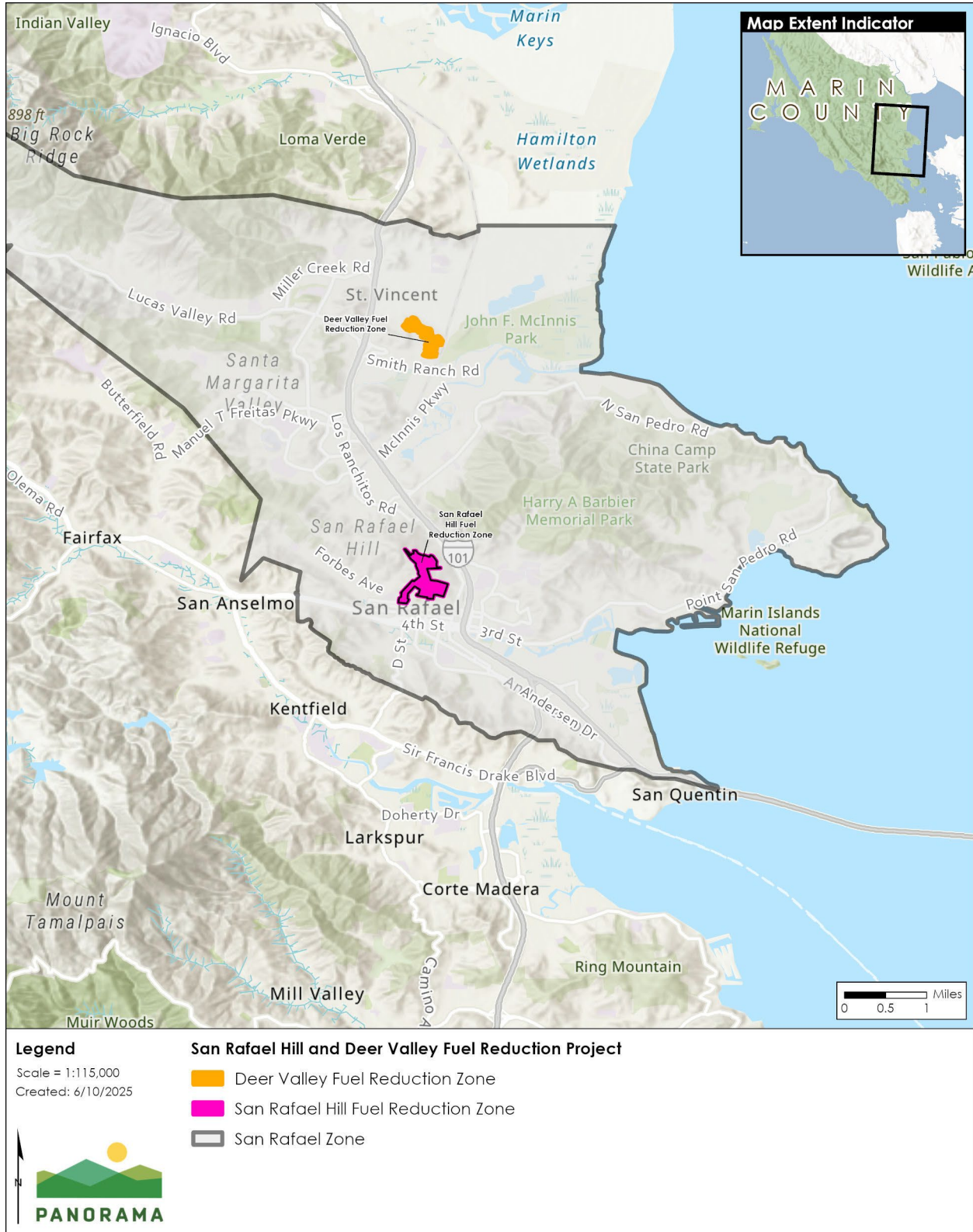
The San Rafael Fire Department (SRFD), a department of the City of San Rafael, is proposing a Marin Wildfire Prevention Authority (Marin Wildfire) funded Core Project, referred to as the San Rafael Hill and Deer Valley Fuel Reduction Project (proposed project; formerly referred to as the San Rafael Open Space Fuel Reduction Project). The proposed project would involve conducting vegetation management activities within Boyd Memorial Park, also known colloquially as San Rafael Hill, and within the Deer Valley open space area in the city of San Rafael, as shown in Figure 1-1. Of the 122 acres of total treatment area, 79.1 acres would be treated within the San Rafael Hill open space area and 42.9 acres would be treated within the Deer Valley open space area.

1.2 Purpose

The purpose of the proposed project is to expand existing fuel reduction zones within City of San Rafael open space parcels adjacent to communities. The San Rafael Hill and Deer Valley project sites are at high risk for wildfires due to the spread of exotic, invasive fire-hazardous vegetation (i.e., French and scotch broom, gorse, eucalyptus, and acacia, and conifers encroaching into native oak woodlands), decades of dead vegetation accumulation, as well as increased risk of anthropogenic ignition due to the interface with urban development and frequent activity onsite. The San Rafael Hill area has a history of ignitions, as recently as winter 2023, due to a history of interspersed homeless encampments (Cameron Macdonald 2023). The Deer Valley area is adjacent to a skilled nursing facility and high-density residential buildings which would be vulnerable in the event of an ignition. By expanding the fuel reduction zones at these two open spaces, the proposed project would slow wildfire spread, reduce wildfire intensity, extend the time residents would have to evacuate, and provide firefighters with better access to the fire's perimeter should a wildfire occur. Removal of fire-hazardous, invasive species and dead vegetation in the fuel reduction zones would be intended to reduce fire hazards to the adjacent community as well as provide an opportunity for native, less hazardous plant species to recolonize and restore these areas to more natural and fire-resilient habitat.

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Figure 1-1 Project Location



1.3 Project Location and Existing Habitat

The proposed project is within two City of San Rafael-owned and managed open spaces. The San Rafael Hill fuel reduction zone is located north of the city's downtown commercial district and approximately 0.2 mile west of U.S. 101. The San Rafael Hill fuel reduction zone contains the Boyd Memorial Park and the Falkirk Cultural Center (formerly the Robert Dollar Estate) as shown in Figure 1-2. The San Rafael Hill site is primarily characterized by scrub habitat, mixed oak woodland, California bay woodland, and invasive, non-native vegetation (i.e., French and Scotch broom, eucalyptus, acacia, gorse, and conifers encroaching into native oak woodlands), but also includes landscaped species such as palms, and historic estate structures. Parcels surrounding the San Rafael Hill site primarily consist of residential properties and the Elks Lodge.

The Deer Valley fuel reduction zone is located along the north boundary of the city of San Rafael and south of the St. Vincent community. The Deer Valley fuel reduction zone is bounded by residences to the north, west, and south of the project site as shown in Figure 1-3. The Las Gallinas Golf Club is approximately 230 feet east of the project site. The Deer Valley site is primarily characterized by scrub habitat, mixed oak woodland, oak savannah/grassland, and invasive, non-native vegetation (i.e., French broom).

1.4 Proposed Treatments

1.4.1 Treatment Types

Treatments would occur within grasslands, woodland and shrub communities. Treatment within grassland would be conducted with manual and mechanical cutting of grasses and forbs, removal of dead woody vegetation, and with removal or cutting of low-lying shrubs and brush to achieve horizontal spacing and reduce overall fuel loading. Larger trees encroaching on or distributed throughout grasslands may have lower limbs removed to reduce vertical fuel continuity. Small trees and brush would be cut in part to retain the native grassland habitat.

Treatment within woodland and shrub communities would include manual and mechanical thinning using a hand crew, ground-based mechanical equipment, and broadcast burning in the San Rafael Hill fuel reduction area.

Non-native, invasive trees and shrubs, including those that are not native locally, would be prioritized for removal (project design and implementation feature [PDIF] IP-4). Fuel reduction work within woodland treatment areas would involve pruning tree branches 8 to 10 feet above ground (not to exceed 1/3 of the tree's height), removal of large dead/downed vegetation and branches, and the removal of small diameter (less than 12 inches diameter at breast height [DBH]) live trees where appropriate to achieve appropriate horizontal spacing. Understory ladder fuels including non-native, invasive Scotch broom, French broom, and gorse as well as shrub-like understory tree saplings would be removed or thinned.

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Figure 1-2 San Rafael Hill



1 PROJECT DESCRIPTION

Figure 1-3 Deer Valley



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Invasive shrubs would either be pulled (when soils are moist) or cut, with herbicides applied. Herbicide would be applied in a targeted manner such as via basal bark application prior to cutting or applied to cut stumps. Native shrubs¹ would be thinned to create the appropriate horizontal spacing (e.g., spaced up to 5 to 10 feet apart), depending on the site conditions.

A hazard tree (e.g., dead or dying tree) generally poses a risk of failure or fracture with the potential to cause injury to people or damage to property. Hazardous trees, dead standing trees, and non-native trees (e.g., acacia, eucalyptus, encroaching conifers in native oak woodlands) would be removed where deemed appropriate in coordination with an arborist or qualified fire professional. In general, one snag (i.e., standing dead tree) would be retained per acre for habitat if the retained snag would not be a hazard.

Broadcast burning would be implemented across portions of the San Rafael Hill fuel reduction zone to reduce fuels over a larger area and with consideration of site-specific conditions including weather, fuel type, sensitive resources, and other factors. Broadcast burning may be conducted in the understory of woodlands, grasslands, or other selected communities.

No non-hazardous-Non-hazardous healthy, mature, native trees would not be removed targeted for removal under this proposed project but trees up to 12 inches DBH may be removed as appropriate. Fuel reduction treatments would avoid wetted streams and wetlands within the area.

1.4.2 Treatment Methods

Manual Treatment

Manual treatments include use of hand tools, such as pole pruners and loppers, and hand-operated power tools, such as chainsaws and string trimmers, to cut, clear, girdle², or prune herbaceous woody species and remove dead woody vegetation and low-lying shrubs and brush as well as trees. These treatments are typically used where access by larger equipment is not feasible or not appropriate. Invasive species removal can be performed by hand (or mechanically).

¹ The California Vegetation Treatment Program (CalVTP) Programmatic Environmental Impact report (PEIR) is currently subject to pending CEQA litigation filed in San Diego Superior Court in early 2020 by two environmental organizations (Board of Forestry and Fire Protection n.d.). The court's decision only applies to projects being carried out under the CalVTP and relying on the CalVTP PEIR, which is not applicable to this project. The ruling does not prohibit or limit all fire fuel reduction projects that may be carried out in sage scrub or chaparral.

² Girdling, also called ring-barking, is the circumferential removal or injury of the bark of a branch or trunk of a woody plant. Girdling prevents the tree from sending nutrients from its foliage to its roots, resulting in the death of the plant over time.

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Ground-Based Mechanical Treatment

Motorized equipment would be used in locations with particularly dense vegetation to cut, uproot crush/compact, masticate, or chop existing vegetation. Equipment would also be used to remove larger-diameter materials from the work areas for transport to staging areas. No tilling or disking would occur. The equipment and tools that could be used include the BurnBot³, excavators, skid steers with mounted masticators, and light duty tractors. BurnBot or other appropriate equipment could be used to do masticating and brush cutting. BurnBots can operate on slopes up to 30 degrees, dependent upon soil conditions and under windy conditions up to 20 miles per hour.

Herbicide Application

Herbicide treatments applied as part of initial or follow-up treatment would be implemented according to all applicable regulations, including the City of San Rafael Integrated Pest Management Plan (IPMP). The proposed project would use Garlon 4 Ultra and Turflon Ester (i.e., herbicide with the active ingredient triclopyr), and Cheetah Pro (i.e., herbicide with active ingredient glufosinate) as allowed in the IPMP.

Herbicides would be applied in a targeted manner. No broadcast or aerial spraying would occur. Application methods would include painting onto stumps and cut vegetation immediately after cutting and as follow up treatment, as needed, to kill or prevent regrowth of invasive and non-native species, particularly broom and eucalyptus, but potentially also acacia and gorse. Native plant species would not be targeted. Herbicide treatments could also include application of foliar treatments or basal-bark treatments. Equipment associated with herbicide application includes backpack sprayers, wand applicators, and low-pressure pumps operated in a targeted manner from vehicles.

Applicators would possess a Qualified Applicator Certificate or Qualified Applicator License, issued by the California Department of Pesticide Regulation. In accordance with the City of San Rafael IPMP, all contractors hired to perform project activities would receive appropriate education and training regarding the application, storage, or handling of herbicides (City of San Rafael 2017). Herbicides would not be applied within 24 hours of a known rain event and signs would be posted at the project site within or adjacent to public recreation areas, residential areas, schools, or any other public areas at least 1 day prior to application and would remain posted on-site at least 1 day following application (PDIF HAZ-4).

Broadcast Burning

Broadcast burning would occur within an up to 58.5-acre area at the San Rafael Hill site, as shown in Figure 1-4. Broadcast burning would typically include site preparation, ignition, mop-up, and post-burn monitoring and rehabilitation activities.

³ BurnBot equipment includes remote controlled machines that provide forestry mastication services such as brush removal and clearing, up to 8-inch tree stand clearing, and defensible space.

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Prior to burning, the burn unit would be identified within the overall potential broadcast burn area. The burn units would be designed such that active broadcast burning ignition and mop-up for a single burn unit would typically last for 1 day, but could extend up to 2 days for patrolling, mop-up, and spot checks following the burn.

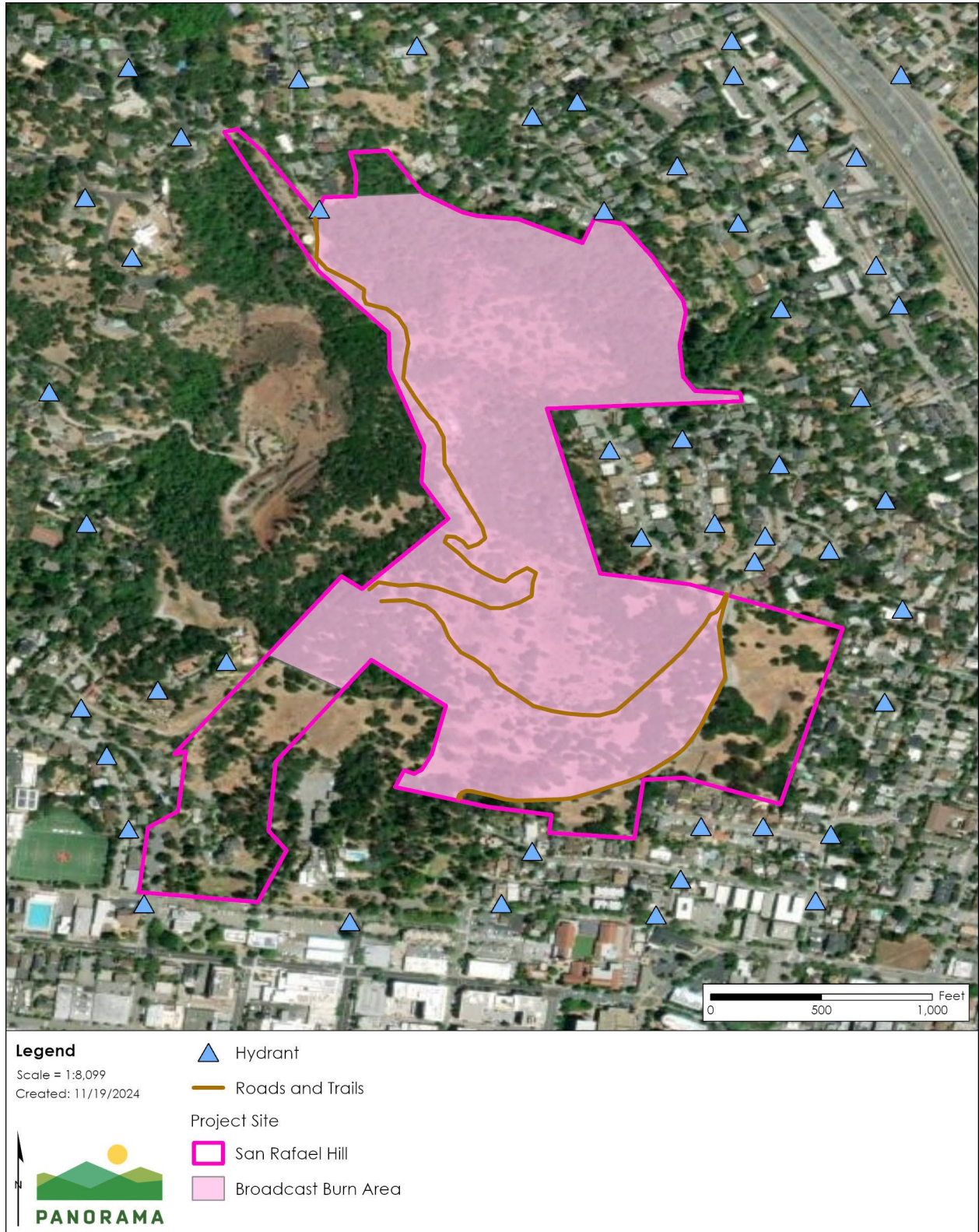
Burn units are typically bounded by existing infrastructure, such as roads and trails shown in Figure 1-4, that act as control lines. Control line installation and vegetation management using hand tools would occur prior to burning as part of site preparation. Existing roads and trails would be used as control lines to the extent feasible. New control lines may need to be installed prior to a burn event if sufficient existing infrastructure is not present to bound the burn unit. A new control line would be up to 4 feet wide and may be installed through mowing, mastication, blacklining, or wetting. Additionally, if hard control lines are needed, then scraping may be used to establish a control line. Blacklining for control lines could be performed using a BurnBot. Additional pre-treatment of fuels in a burn unit may be needed for operational safety, including understory fuel reduction, tree limbing, and ladder fuel reduction using the treatment methods described above. A prescribed burn would be ignited using standard approved ignition devices, which may include a drip torch, hand-held flares (“fusee”), or similar methods.

Control during the burn would be accomplished by or with firing equipment, hoses, backpack pumps, fire engines, saws, and hand tools. Other equipment needed on site could include equipment for making a fuel containment perimeter (masticators and/or track chippers). Fire engines and nearby hydrants would be used for fire suppression. The potential broadcast burn area is close enough to the hydrant system that water tenders and pumps may not be needed. A Smoke Management Plan would be submitted to the Bay Area Air Quality Management District (BAAQMD) at least 30 days in advance of the broadcast burn in accordance with BAAQMD Regulation 5 for open burning. The draft burn plan has been written by a qualified burn plan preparer, who is a qualified prescribed fire burn boss. The burn plan includes burn unit level information including the burn prescriptions, resource needs, weather parameters for burning, pre-burn prep, burn team communication protocols, and post-burn monitoring. The burn plan describes the general ignition pattern, such as a strip head fire, dot ignition, or other, with discretion given to the burn boss to use the pattern they deem most appropriate given local vegetation and weather conditions.

Following the burn, mop-up would occur, which is the process to ensure that the prescribed fire is safely extinguished. Mop-up activities typically include checking the burn unit for smoldering fuel and hot spots and actively extinguishing any sources of re-ignition. Activities might include trimming or felling any branches, snags, or trees that pose a threat and ensuring that surface fuels, such as woody debris, logs or stumps are no longer burning. Logs may need to be trenched to prevent rolling after an area has burned. Putting out any flames or stirring up a hot spot that is smoking may also occur. Mop-up would begin as soon as the burn area is safe and cool enough to enter. Mop-up efforts would take place throughout the burn unit due to its proximity to developed areas and particular attention would be focused on the perimeter of the burn unit.

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Figure 1-4 Limits of the Potential Broadcast Burn Area



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Mop-up activities would include hand crews using hand tools and be supported with hoses, fire engines and hydrants. Mop-up activities would be supported with hoses, saws, fire engines, and hand tools. Control lines, particularly scraped and blacklined control lines, would be repaired after mop-up is completed. Rehabilitation consists of the decommissioning of control lines as well as follow-up weed control, where necessary, after a prescribed fire. Control line decommissioning is generally limited to the manual re-distribution of duff and brush back into the previously cleared lines. This spreads native seeds back into the lines to facilitate natural revegetation.

Following burning activities, the burn units or control lines may be replanted with native vegetation, if needed. Native seeds or plugs could be used to reestablish vegetation.

1.4.3 Biomass Disposal Methods

Chipping

Project debris and cut material may be disposed of through chipping and hauling, or chipping and broadcasting. An *all-terrain vehicle* (ATV) and tracked towable chipper, trailer-mounted chipper, or chipper truck may be used to process cut vegetative materials. The vegetative material would be fed through the chipper and broadcast at treatment areas or hauled away for processing. Chipped material spread on site would be chipped to under 3 inches in size and would be applied no more than 2 to 4 inches in depth to minimize wildfire risk. Vegetative material, if removed, would be hauled to West Marin Compost, Redwood Landfill, Marin Resource Recovery Center, or another appropriate biomass-processing facility or used as appropriate in other areas of Marin County.

Pile Burning

Cut material may be pile burned, depending upon access and the conditions of the treatment area. Suitable pile burning treatment areas are typically flat or gentle slopes and have open areas away from tree canopies and power lines. Pile burn areas would be located away from waterways. Piles would generally be 4 feet in diameter and 4 feet in height. Multiple piles may be burned on a single day. Pile burning would be conducted in compliance with the California Department of Forestry and Fire Protection (CAL FIRE) and BAAQMD Regulation 5 for open burning and burn day restrictions. Following pile burning, the burn areas may be replanted with native seeds or plugs.

Air Curtain Burning

An air curtain burner is a piece of equipment that can be brought on site to burn woody material in a way that has fewer particulate emissions than pile burning. Air curtain burning may be used as an alternative to pile burning for sites with higher fuel loading and more woody material. An air curtain burner places a high velocity curtain of air over a defined burn chamber, which would be located in a typically metal aboveground structure with refractory walls. During air curtain burning, the rising particulates or smoke particles (also referred to as *black carbon*) from burning the wood waste hit the curtain of air, are bounced back down, and reburn to the area just below, which is usually the hottest area in the burn box and referred to as

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the *secondary burn chamber*. The particles remaining that are light enough to penetrate the air curtain and rise outside of it are limited to gaseous emissions consisting mostly of water vapor and (biogenic) carbon dioxide. The result is a cleaner, nearly smokeless burn as well as a much faster burn as some of the air curtain's volume is directed in the burn chamber, over-oxygenating the fire and thereby accelerating it. The burner would typically be staged on parking lots or roads. The air curtain burner would typically be run when a backstock of at least 2 days' worth of debris is available to burn.

Carbonator and Kiln Burning

Carbonators burn vegetative biomass and trap *greenhouse gases* (GHGs) and particulates in the form of biochar. Carbonators can be standard air curtain burners or specialized equipment. The biochar is produced through a couple of additional steps beyond the standard air curtain burner process. The coals and wood chunks are separated from the burner either by hand with an ash rake or using a mechanical conveyor belt and hydraulic system at the bottom of the equipment and quenched with water either from a hand-held hose or an integrated quenching bin in the equipment. This material is the biochar, which can be redistributed as a soil amendment. Biochar mimics the soil properties of wildfire-generated charcoal, which can assist in returning the land to a fire-adapted ecosystem (DeLuca, T. H.; Aplet, G. H. 2008; Harvey, A. E.; Larsen, M. J.; Jurgensen, M. F. 1979; Matovic, D. 2011). If biochar is produced on site, the majority of biochar would likely be distributed off site but some may be used on site or at other City of San Rafael open space parcels as a soil amendment. Biochar would not be used for biomass energy production. The carbonator would be staged in flat areas such as parking lots, trails, or roads. The carbonator would typically be run when a backstock of at least 2 days' worth of debris would be available to burn.

Kilns are simple systems that burn biomass and produce biochar. Kilns typically consist of open-top metal containers in the shape of cylinders, inverted pyramids, or cones. Biomass is placed into the kiln and combusted using a pyrolysis process known as flame carbonization. The process of flame carbonization uses a flame curtain or cap at the top of the kiln to exclude oxygen from the biomass (Ascent Environmental 2022). Biochar is collected at the bottom of the kiln once combustion is complete. The kiln would be typically staged on roads or parking lots.

Kiln burner and carbonization are forms of *pyrolysis*, or carbonization. Pyrolysis can be performed in a variety of ways, from simple oxygen-depriving designs (e.g., an Oregon kiln, or kiln burner) to more complex large-scale pyrolysis chamber systems in a fixed location that can process up to hundreds of tons of biomass per day. Pyrolysis involves the conversion of biomass into hydrocarbon liquids, gases, or solids (or all three) in the absence of oxygen at temperatures ranging from 400 to 900 degrees Celsius. A kiln burner typically consists of open top metal cylinders, where biomass is placed into the kiln and combusted, which uses a flame curtain or cap at the top of the kiln to exclude oxygen from the biomass. Carbonators and kiln burners are similar to air curtain burners in that they trap greenhouse gas emissions and particulates but they also form biochar as a byproduct (Ascent Environmental. 2022).

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1.4.4 Workers

A single contractor crew would consist of 3 to 20 workers at a single location. Multiple crews may work at the same time across the fuel reduction zones. Broadcast burning is anticipated to require at least 25 crew members for a single burn day, but up to 50 personnel. Vegetation management crews may be different than crews conducting broadcast burning.

1.4.5 Site Access

Treatment areas would be accessed via existing roads, fire roads, and trails to the maximum extent feasible with some offroad access potentially required. Lane or road closures may be required along Robert Dollar Drive for the San Rafael Hill site during certain treatment activities such as hazard tree felling or broadcast burning. Lane closures are not anticipated for Deer Valley. Private residences may be used as access points with the landowner's permission. Vehicles and equipment would be staged at the contractor's yard daily or may be staged along adjacent roadways.

1.4.6 Schedule and Duration of Initial Treatment

All work would be performed on weekdays between 8:00 am and 5:00 pm. Initial treatments would begin in 2025 and would last approximately 3 months. Treatment would occur at each site for approximately 6 weeks, which may be consecutive or segmented into different treatment periods. As discussed above, broadcast burning ignition and mop-up for a single burn unit would last for approximately 1 day, but may last up to 2 days for patrolling and mop-up activities. Depending on crew availability and weather conditions, broadcast burning may be completed over multiple years.

1.4.7 Monitoring and Maintenance Treatments

Following initial project implementation, the condition of the fuel reduction zones would be monitored and reassessed by SRFD staff every year to evaluate if maintenance is needed that year. Maintenance treatments are anticipated to be similar to the proposed activities but are subject to change depending on the condition of the fuel break and response to initial treatment. Maintenance activities of some types of non-native vegetation would occur annually. Maintenance of shrubs in the project areas would occur every 2 to 5 years. Broadcast burning maintenance would occur every 10 years in oak woodland communities, and every 3 years in areas with substantial non-native, invasive species.

1.5 Project Design and Implementation Features

Marin Wildfire has developed specific design and implementation features adapted from several source documents that are incorporated, as applicable, into the project design and implementation for each of its projects. The ~~project design and implementation features~~ (PDIFs) appropriate to the proposed project are listed in Appendix A and referenced in the analysis, where applicable. PDIFs are not needed to address any significant impacts but are a standard part of Marin Wildfire Core Projects.

2 Environmental Checklist

2.1 Approach to Environmental Analysis

This IS checklist evaluates the potential environmental impacts of the project. The level of significance for each resource topic is determined by considering the predicted magnitude of the impact. Four levels of impact significance are evaluated in this IS checklist:

No Impact. The project would not have the impact described. The project may have a beneficial effect, but there is no potential for the project to create or compound the impact described.

Less Than Significant Impact. The project would have the impact described, but the impact would not be significant. Mitigation is not required; however, the project applicant may choose to modify the project to avoid the impacts.

Less Than Significant with Mitigation. The project would have the impact described, and the impact could be significant. One or more mitigation measures have been identified that will reduce the impact to a less-than-significant level.

Potentially Significant Impact. The project would have the impact described, and the impact could be significant. The impact cannot be reduced to a less-than-significant level by incorporating mitigation measures. An environmental impact report must be prepared for this project.

2.2 Environmental Analysis

2.2.1 Aesthetics

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
1. AESTHETICS. Except as provided in Public Resources Code Section 21099, would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?	☐	☐	☒	☐
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage points). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

Environmental Setting

Scenic Vista

The Silveira Corridor, located north of the Deer Valley project site on Silveira Ranch within Marin County, is a designated scenic vista in the Marin Countywide Plan (Marin County Community Development Agency 2007). The Silveira Ranch contains scenic grasslands, valley oaks, tideland habitats associated with the Miller Creek Estuary, as well as cultural and agricultural legacies (Connolly and Dickenson 2016). The Deer Valley project site is designated as a ridge and upland greenbelt by Marin County (Marin County, n.d.-a). Ridge and upland greenbelts are identified in the Marin Countywide Plan as the uppermost portion of ridges and hills and associated wooded hillsides (Marin County Community Development Agency 2007). The San Rafael Hill project site is visible from surrounding ridges and upland greenbelts (Marin County, n.d.-b) but is not within or near a designated scenic vista.

State Scenic Highway

There are no designated scenic highways in Marin County (California Department of Transportation, n.d.). Eligible scenic highways in Marin County include State Route 1, U.S. 101, and State Route 37 (California Department of Transportation, n.d.).

2 ENVIRONMENTAL CHECKLIST

Visual Character

The existing visual character of the project sites are primarily vegetated and forested areas within the open spaces surrounded by residential uses. The primary vegetation types within the project sites are grasslands, oak woodlands, and non-native invasive species.

Discussion

a) **Would the proposed project have a substantial adverse effect on a scenic vista?**

There are no officially designated scenic vistas within or that provide views of the fuel reduction zones. The Silveira Corridor is an area with scenic vistas north of the Deer Valley fuel reduction zone. The proposed project would not encroach on the Silveira Corridor or permanently alter views of the natural landscape from the scenic vistas of this property. No substantial adverse effect as seen from State or locally designated scenic roads or vistas would occur.

The proposed project would impact views from ridges and greenbelts. Visual effects could occur from the short-term presence of equipment to perform the work. Equipment and vehicles would be temporarily visible throughout the proposed project activities and may be staged in or near the fuel reduction zones. The presence of equipment would last approximately up to 6 weeks per fuel reduction zone each year. Visual change related to the presence of equipment and workers is generally considered low because viewers perceive it as temporary and can quickly and easily move away.

Vegetation management would cause some long-term changes to the vegetation within the fuel reduction zone due to removal and thinning of trees and shrubs, chipping and broadcasting, and herbicide application. While vegetation would regrow and fill in over time, removal of dense non-native broom and gorse from the understory would be perceived as a visual change even though the project would be returning the area to more natural conditions. Retreatment would occur intermittently. Chipped material, if spread on site, would be visible during decomposition.

Pile burning, if conducted, would result in temporary visual impacts from the staging of debris to allow the vegetation to dry, burning the debris, smoke plumes from the burn, and the appearance of scorched vegetation that remains after the treatment. Piles would be located in open areas away from any dense vegetation or forests. Pile burns may result in smoke plumes which may be visible from a distance and would typically last a day. Visual exposure to the public from smoke plumes would be short term.

Similar to pile burning, broadcast burning at the San Rafael Hill fuel reduction zone would result in short-term visual impacts from equipment staging before and after the burn, smoke plumes from the burn, the changes in vegetation from green and brown colors to black, and the changes in vegetation patterns after the burn. Longer-term visual impacts from a broadcast burn would consist of burnt vegetation and would change the density of vegetation and color of the landscape to dark gray/black. The visual impacts would depend upon the vegetation community type, but in all cases visual effects are temporary, as part of former natural

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processes, and major changes to composition of the landscape would not occur. The effects of broadcast burning would diminish over time, and the visual character would return to more natural conditions as successional vegetation is reestablished. Broadcast burning equipment, such as fire engines and masticators, and smoke plumes would be temporarily visible from ridges, greenbelts, and public vantages in the surrounding area. Visibility from ridgelines, greenbelts, or public vantages would vary based on weather conditions and visibility. Smoke would be visible during the burn and could limit the ability to view scenic areas. A Smoke Management Plan would be prepared prior to broadcast burn activities in accordance with BAAQMD Regulation 5, which would contain information for managing smoke, smoke travel projections, smoke minimization techniques, which would minimize smoke that could disrupt views from nearby scenic vistas (e.g., Silveira Corridor). Burning for a single burn unit would last for approximately 1 day, but may extend to up to 2 days for patrolling and mop-up activities, and would not result in permanent effects on views of the natural landscape from scenic vistas. Smoke from broadcast burning would not result in a substantial degradation of a scenic vista.

Targeted herbicide application may result in localized areas of dead foliage while the non-native species are dying and before they are cut and removed. Views of and from the ridges and upland greenbelts would not be significantly altered as result of the proposed activities within the Deer Valley or San Rafael Hill fuel reduction zones. Implementation of the proposed project would not alter the conditions such that the natural character of the sites would be lost. The impact would be less than significant.

b) Would the proposed project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?

There are no eligible or designated scenic highways in the vicinity of the fuel reduction zones (California Department of Transportation, n.d.). Work would be contained within the fuel reduction zones and designated scenic highways would not be affected by the proposed activities. U.S. 101, an eligible scenic highway, is approximately 0.30 mile east from the San Rafael Hill fuel reduction zone and approximately 0.30 mile west of the Deer Valley fuel reduction zone. The proposed activities would temporarily alter the vegetative landscape. However, the natural vegetation and characteristics of the two fuel reduction zones would remain. Additionally, vegetation would regrow within both fuel reduction zones. Smoke plumes from broadcast and pile burning may be visible from U.S. 101 during burning. Smoke generated from burning activities would be temporary, and burning for a single burn unit would be approximately 1 day, but could last approximately 2 days for patrolling and mop-up. As discussed above, a Smoke Management Plan would be prepared prior to broadcast burn activities, which would minimize smoke from impacting scenic resources as viewed from U.S. 101. Views from U.S. 101 would not be significantly affected by the proposed project. Implementation of the proposed project would have a less than significant impact to scenic resources within a state scenic highway.

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- c) In non-urbanized areas, would the proposed project substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage points). If the proposed project is in an urbanized area, would the proposed project conflict with applicable zoning and other regulations governing scenic quality?**

The proposed project is located within City of San Rafael-managed open space lands, which is accessed by the public for outdoor recreation. The fuel reduction zones would be surrounded by urbanized areas⁴. The publicly accessible vantage points would be from the existing trails and fire roads. Open space is defined as an area which is essentially unimproved natural landscape acquired by the city for open space purposes (City of San Rafael, n.d.-d). The proposed project would be consistent with the City of San Rafael's open space zoning regulations pertaining to the closing and prohibition of certain areas, archaeological features, fires, wildlife, and the California Vehicle (City of San Rafael, n.d.-c).

Manual and mechanical removal of vegetation, such as hazard trees, non-native trees, and shrubs, would occur and would alter the existing visual landscape. As noted in impact a) above, the natural vegetation and characteristics of the areas would remain. Treated vegetation would regrow, and the changes to the landscape would be within natural patterns. The project would not substantially degrade the existing visual character or quality of public views of the site and surroundings.

Broadcast burning would change the visual character of the San Rafael Hill fuel reduction zone from scorching the vegetation and altering vegetation patterns. While broadcast burning would result in longer-term changes from burnt vegetation and burn scars, the visual character would return to more natural conditions as vegetation is reestablished. A burn plan and Smoke Management Plan would be implemented for broadcast burning activities, which, as discussed under impacts a) and b), would minimize smoke and would not degrade the existing visual character or quality of public views from the site and its surroundings. Broadcast burning would not substantially degrade the existing visual character or quality of public view of the site and surroundings.

The vegetation treatments would be compatible with the existing visual setting and would be limited to the two open space areas. Implementation of the proposed project would have a less than significant impact on visual character and quality of public views.

⁴ Defined as a central city or a group of contiguous cities with a population of 50,000 or more, together with adjacent densely populated areas having a population density of at least 1,000 persons per square mile (California Code of Regulations, n.d.).

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d) Would the proposed project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Glare is an objectionable brightness usually created by the reflection of sunlight or artificial light from highly polished surfaces. Small amounts of glare may occur when light reflects off proposed project equipment. The proposed project would not include any new sources of light. No nighttime work requiring lighting is proposed. Therefore, the proposed project would not create a new source of substantial light or glare which would adversely affect views in the area. For these reasons, no impact would occur.

Mitigation Measures

No mitigation measures would be required.

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2.2.2 Agriculture and Forestry

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
2. AGRICULTURE AND FORESTRY RESOURCES. In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project, and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220[g]), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104[g])?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

Environmental Setting

The project sites are located within City of San Rafael owned and managed open space areas and surrounded by residential and commercial uses. The two project sites are classified as Other Land, which is defined as land not included in any other California Important Farmland Finder mapping category (California Department of Conservation, n.d.-a). The San Rafael Hill and Deer Valley project sites are not on lands enrolled within a California Williamson Act Contract (California Department of Conservation, n.d.-b). There are no agricultural uses that occur or are designated within the project sites. The land directly north of the Deer Valley project site, separated from the site by North Avenue, is categorized as Farmland of Local Importance, which describes land of importance to the local agricultural economy (California Department of Conservation, n.d.-a). A settlement between the Silveira family and Marin

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County put the Silveira Ranch, which is located directly north of the Deer Valley project site, into Williamson Act Land designation (Connolly and Dickenson 2016). Refer to Section 2.2.11, Land Use and Planning for information on the parcel land use designations for the project sites.

Discussion

- a) **Would the proposed project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?**
- b) **Would the proposed project conflict with existing zoning for agricultural use, or a Williamson Act contract?**

The fuel reduction zones are located within the San Rafael Hill and Deer Valley open spaces areas in the city of San Rafael do not include lands designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. The San Rafael Hill and Deer Valley fuel reduction zones are not on lands enrolled within a California Williamson Act Contract. The proposed vegetation treatment activities would not convert or conflict with any nearby agricultural activities. No impact to lands designated as farmland, zoned for agriculture, or under a Williamson Act contract would occur.

- c) **Would the proposed project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220[g]), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104[g])?**
- d) **Would the proposed project result in the loss of forest land or conversion of forest land to non-forest use?**
- e) **Would the proposed project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?**

No lands within the proposed fuel reduction zones are zoned as forest land, Timberland, or a Timberland Production Zone. Thus, the proposed project would not conflict with zoning of lands that have a Timberland Production designation.

Some hazardous trees, dead standing trees, non-native trees, and other targeted trees would be removed during vegetation treatment activities. Fuel reduction work within woodland treatment areas would involve the removal of small diameter live trees (less than 12 inches DBH) for horizontal spacing purposes. Healthy, mature, native trees would not be removed to the extent that type conversion of forests would occur and would not result in the loss of forest land, nor would it convert forestry land to non-forestry use. Broadcast burning would target surface fuels and would not significantly harm mature trees. No trees considered to be forest resources or forest land under state definitions would be removed. The sites and surrounding areas are not managed for the production of forest products or forest uses but consist of open space and recreational uses. Therefore, the proposed project would not impact forest land zoning or convert forest land to non-forest uses. No impact to forest resources would occur.

Mitigation Measures

No mitigation measures would be required.

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2.2.3 Air Quality

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
3. AIR QUALITY. Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	☐	☒	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

Environmental Setting

Air Basin

The proposed project is located within the San Francisco Bay Area Air Basin (SFBAAB). SFBAAB covers roughly 5,340 square miles and consists of Napa, Marin, San Francisco, Contra Costa, Alameda, San Mateo, and Santa Clara Counties, the southern portion of Sonoma County, and the western portion of Solano County. The BAAQMD is the state regulatory body responsible for air quality-related activities in SFBAAB.

Air Quality

The USEPA has set National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: ozone (O₃), carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), lead (Pb), and particulate matter. Particulate matter criteria pollutants are classified as either respirable particulate matter less than 10 micrometers in diameter (PM₁₀) or fine particulate matter less than 2.5 micrometers in diameter (PM_{2.5}). Ozone forms when ozone precursors (e.g., reactive organic gases [ROGs], CO, or nitrogen oxides [NO_x]) react with sunlight in the atmosphere. Sources of these precursors include fuel combustion in vehicles and industrial processes, gasoline vapors, and chemical solvents. The California Air Resource Board (CARB) has set California Ambient Air Quality Standards (CAAQS) for four pollutants in addition to the six NAAQS criteria pollutants: sulfates, hydrogen sulfide (H₂S), vinyl chloride (C₂H₃Cl), and visibility reducing particles.

The USEPA and CARB designate areas based on the attainment status for air quality standards (NAAQS or CAAQS). Attainment areas meet or exceed ambient air quality standards and nonattainment areas do not. Nonattainment areas are sometimes classified by degree of underperformance (i.e., marginal, moderate, serious, severe, and extreme). If there is

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insufficient air quality monitoring data to support a classification, the area is unclassified. It is generally assumed that unclassified areas are meeting the ambient air quality standard. Table 2.2-1 lists USEPA and CARB attainment designations by pollutant for SFBAAB.

Table 2.2-1 SFBAAB Attainment Status

Pollutant	USEPA Designation	CARB Designation
O ₃	Marginal Nonattainment	Nonattainment
CO	Attainment	Attainment
NO ₂	Attainment	Attainment
SO ₂	Attainment	Attainment
Pb	Attainment	Attainment
PM ₁₀	Unclassified	Nonattainment
PM _{2.5} ¹	Moderate Nonattainment	Nonattainment
Sulfates	N/A	Attainment
H ₂ S	N/A	Unclassified
Visibility Reducing Particles	N/A	Unclassified

Notes:

1. SFBAAB has met the national ambient air quality standard, but the basin will remain designated as non-attainment until BAAQMD submits and USEPA approves a redesignation request.

Source (California Air Resources Board 2022b)

Toxic Air Contaminants

Health Effects

Toxic air contaminants (TACs; also referred to as hazardous air pollutants or air toxics) are a broad class of compounds known to have the potential to cause morbidity or mortality (e.g., have carcinogenic qualities). TACs are substances that are identified by the California Environmental Protection Agency (CalEPA), listed in Title 17, CCR, § 93000 as air pollutants that may pose a present or potential hazard to human health. TACs can cause long-term health effects, including but not limited to cancer, asthma, and neurological damage as well as short-term health effects, including but not limited to eye watering and headaches. Diesel exhaust is the predominant TAC in urban air and is estimated to contribute more than 85 percent of the total inventoried cancer risk in SFBAAB (BAAQMD 2014). Diesel exhaust is a complex mixture of gases, vapors, and fine particles. Some of the gaseous components of diesel exhaust, such as benzene, formaldehyde, and 1,3 butadiene, are suspected or known to cause cancer in humans. Exposure to diesel exhaust can lead to serious health conditions such as asthma and respiratory illnesses, additionally inhalation of diesel exhaust can worsen existing heart and lung disease, especially in children and the elderly (U.S. Environmental Protection Agency 2024a). Pile burning and broadcast burning can emit TACs including particulate matter and black carbon, and other pollutants including CO, polycyclic aromatic hydrocarbons (PAHs), polychlorinated

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dibenzodioxins/dibenzofurans (PCDD/PCDF), volatile organic compounds (VOCs), carbon dioxide, and methane (Aurell et al. 2016; Jaffe et al. 2020). The concentrations of TACs emitted by pile burning and broadcast burning may differ due to fire conditions, fuel types, and burning techniques.

Sensitive Receptors

BAAQMD defines sensitive receptors as land uses and facilities where sensitive populations are likely to be located (BAAQMD 2022a). Sensitive receptors can be categorized as follows:

- Residences (e.g., houses, apartments, retirement homes)
- Active recreational land uses (e.g., sports fields)
- Medical facilities (e.g., hospitals, long-term health care facilities)
- Eldercare facilities (e.g., convalescent homes)
- Schools and playgrounds
- Childcare centers

BAAQMD recommends identifying sensitive receptors generally within 1,000 feet of a project site (BAAQMD 2022a). Active recreationalists are not considered sensitive receptors because of their mobility, which limits their exposure duration.

Bay Area Air Quality Management District

2017 Clean Air Plan

BAAQMD adopted the 2017 Clean Air Plan (CAP) to address state nonattainment in SFBAAB for both the one- and eight-hour ozone standards. The 2017 CAP details a control strategy to address ozone precursors (typically ROGs and NO_x), particulate matter, and TACs. The 85 control measures are categorized into nine economic sectors, including transportation, energy, agriculture, and natural and working lands (BAAQMD 2017). The 2017 CAP would apply to the proposed project.

Air Quality Emission Thresholds

BAAQMD published the 2022 California Environmental Quality Act Air Quality Guidelines (2022 CEQA Guidelines) to assist in evaluating air quality impacts of projects and plans proposed in the Bay Area Air Basin and provide BAAQMD-recommended procedures for evaluating potential air quality impacts during the environmental review process consistent with CEQA requirements (BAAQMD 2022b). BAAQMD adopted thresholds of significance and their latest 2022 CEQA Guidelines, to assist lead agencies in determining when potential air quality impacts would be considered significant under CEQA and to advise lead agencies on how to evaluate potential air quality impacts with the adopted new thresholds of significance. Based on the substantial technical research that went into the preparation of the thresholds by BAAQMD, Marin Wildfire has elected to use the BAAQMD operational-related thresholds of significance for vegetation treatment activities as shown in Table 2.2-2. The proposed vegetation treatment activities implemented as part of the proposed project would be implemented initially in 2025, but maintenance activities would continue likely annually in perpetuity.

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Table 2.2-2 BAAQMD Criteria Pollutant Thresholds of Significance

Pollutant/Precursor	Construction Related Average Daily Emissions (lb/day)	Operational Average Daily Emissions (lb/day)	Operational Maximum Annual Emissions (tons per year)
ROG	54	54	10
NO _x	54	54	10
PM ₁₀	82 (exhaust)	82	15
PM _{2.5}	54 (exhaust)	54	10
PM ₁₀ /PM _{2.5} (fugitive dust)	Best management practices	None	None
CO	None	9.0 ppm (8-hour average), 20.0 ppm (1-hour average)	9.0 ppm (8-hour average), 20.0 ppm (1-hour average)

Sources: (BAAQMD 2022c)

Health Risk Threshold

The significance of impacts to sensitive receptors is dependent on the chance of contracting cancer from exposure to TACs or of having adverse health effects from exposure to non-carcinogenic TACs. A project is considered to be significant if the incremental cancer risk at a receptor exceeds 10 in a million. The Office of Environmental Health Hazard Assessment (OEHHA) does not recommend assessing cancer risk for projects lasting 2 months or less (California Office of Environmental Health Hazard Assessment 2015). Health risk is evaluated for sensitive receptors within a 1,000-foot radius of a project's impact area.

Methodology

Initial vegetation treatment emissions associated with the proposed project were calculated using the California Emissions Estimator Model (CalEEMod, version 2022.1.1.22) (CAPCOA 2022). Equipment use assumed that up to three tractors (or similar types of off-road equipment) could be used for up to 8 hours each day over the 60-day initial implementation period at both sites. This represents a conservative assumption, as most treatment activities would likely be conducted by hand crews with manual or mechanized tools. This assumption accounts for the likelihood that a chipper may be used for vegetation disposal, as a chipper could have a similar horsepower and produce similar levels of pollutants as a tractor operating off-road. A chipper would likely operate if off-road equipment were not used to masticate or mulch vegetative material. The emission calculations also conservatively assumed that a maximum of 20 workers would commute to and from the project sites daily and up to two round-trip haul trips to dispose of chipped or cut vegetation daily.

The Consume Model was developed by the U.S. Forest Service (USFS), Fire and Environmental Research Applications Team, in 2014 and was used to estimate emissions from pile burning (Fire and Environmental Research Applications Team 2014). The Consume model does not calculate NO_x or SO_x emissions, but applicable NO_x and SO_x emission factors were used to

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estimate emissions from pile burning (Urbanski 2014). For the purposes of the analysis, up to 100 piles (4 feet wide by 4 feet tall half spheres) were assumed to be burned in the first year of treatment activities. While pile burning may occur, it is likely that much of the vegetative material would be chipped. As such, calculating pile burn emissions from a maximum quantity assumed in a single year represents a conservative scenario, since the material may be chipped or burned via an air curtain burner or carbonator instead, which would result in lower emissions.

The analysis of smoke emissions from broadcast burning was conducted using the First Order Fire Effects Model (FOFEM) for the 58.5-acre burn area. FOFEM was developed to predict the consequences of fire, including tree mortality, fuel consumption, smoke production, and soil heating (U.S. Forest Service 2020). FOFEM 6.7 is the most recent version of the model available at the time of preparation of this document. The model can be used to estimate emissions of PM_{2.5}, PM₁₀, CO, CO₂, NO_x, and CH₄ based on fuel volume of the vegetation burned and the moisture of the fuels when burned. FOFEM does not include a method for calculating ROG emissions. Applicable ROG emissions factors were used to estimate emissions from broadcast burning in various vegetation types (CARB 2000). The FOFEM vegetation communities and acreages used in the model are shown below in Table 2.2-3.

Table 2.2-3 FOFEM Vegetation Assumptions

San Rafael Hill Vegetation Communities	FOFEM Vegetation Communities	Acres
Baccharis pilularis Alliance	FCCS 316 Coyotebush - ceanothus shrubland	1.2
Californian Annual & Perennial Grassland	SRM 215 Valley Grassland (Annual Grassland)	8.0
Eucalyptus (globulus, camaldulensis) Provisional Semi-Natural Association	FCCS 077 Eucalyptus Plantation Forest	1.6
Quercus agrifolia Alliance	FCCS 035 California Live Oak - Blue Oak Woodland	37.7
Sequoia sempervirens Alliance	SAF 232 - Redwood	0.1
Umbellularia californica Alliance	SRM 906 - Broadleaf Forest	9.8
Total		58.5

Source: (U.S. Forest Service 2020)

Discussion

a) Would the proposed project conflict with or obstruct implementation of the applicable air quality plan?

In determining consistency with the applicable air-quality plan, this analysis considers whether the proposed project would (1) support the primary goals of the plan, (2) include applicable control measures, if any, during the work, and (3) avoid disrupting or hindering implementation of control measures. The most recently adopted air-quality plan for the SFBAAB is the 2017 CAP. The primary goals of the 2017 CAP are to (1) protect public health by

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decreasing exposure to particulate matter and TACs as well as regional ROG, NO_x, and PM_{2.5} and (2) protect the climate by reducing GHG emissions. To meet the primary goals, the 2017 CAP recommends specific control measures and actions to reduce ozone, fine particulate matter, and TACs. These control measures are grouped into various categories that include stationary and area source measures, mobile source measures, transportation control measures, land use measures, and energy and climate measures. To this end, the 2017 CAP includes 85 control measures aimed at reducing air pollution in the SFBAAB. The proposed project would not result in new long-term emission sources and any emissions generated by the proposed project would be short term, thus the proposed project would not conflict with the primary goals of the 2017 CAP. The proposed project would not include new stationary sources or new permanent mobile sources, nor would it introduce a new land use or use a substantial amount of energy. The proposed project's impact with respect to GHGs is discussed in Section 2.2.8, Greenhouse Gas Emissions.

Vehicles for worker and haul trips, and equipment used to implement the proposed project activities would emit diesel particulate matter and criteria air pollutants. Pile burning and broadcast burning, which are not activities specifically covered by the 2017 CAP, would contribute emissions if implemented as part of the proposed project. As further discussed under Impact b) below, estimated emissions during implementation of the proposed project would not exceed the numerical significance thresholds for particulate matter (PM₁₀ and PM_{2.5}) and ozone precursors (NO_x and ROG). Maximum emissions under the proposed project are well below BAAQMD 2022 Criteria Pollutant Thresholds of Significance. Therefore, implementation of the proposed project would not conflict with or obstruct implementation of the applicable air quality plan, and therefore the impact would be less than significant.

b) Would the proposed project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

The SFBAAB is currently designated as a non-attainment area for federal and state ozone standards, the State PM₁₀ standard, and the Federal and State PM_{2.5} standards. This is primarily due to the region's development history. Past, present, and future development projects contribute to the SFBAAB's adverse air quality impacts on a cumulative basis and no individual project is sufficient in size, by itself, to result in nonattainment of ambient air quality standards. Instead, an individual project's emissions contribute to existing cumulatively significant adverse air quality impacts. If an individual project's contribution to the existing cumulative impact is considerable, then the project's impact on air quality would be considered significant.

The proposed project would involve vegetation treatment to treat and maintain fuel reduction zones within up to 122 acres in between communities on vegetated, open space lands in the city of San Rafael. Initial manual and mechanical treatments would occur for approximately 6 weeks at each fuel reduction zone. Broadcast burning would also be conducted on up to 58.5 acres of land within the San Rafael Hill fuel reduction zone. All the burn units would not be burned in a single year. Broadcast burning of a single burn unit would last for approximately 1 to 2 days, and burning may be completed over multiple years. Maximum potential emissions associated

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with the treatment activities proposed are found in Table 2.2-4, below. Emissions are likely to be lower in any given year as it is unlikely that all burn units would be burned annually, the maximum number of workers would be on site every day, and it is likely that other biomass disposal techniques, such as chipping and broadcasting or use of an air curtain burner may occur instead of or in tandem with pile burning rather than burning all cut vegetation. While broadcast burning is unlikely to occur every year, maintenance activities for broadcast burning would be less intense and would emit less emissions than initial treatments.

Table 2.2-4 Estimated Emissions by Pollutant (tons/year) for Initial Treatment Activities

Pollutant/Precursor	Broadcast Burning Emissions	Pile Burn Emissions	Equipment and Vehicle Emissions	Total Emissions	Operational Maximum Annual Emissions	Threshold Exceedance?
PM ₁₀	6.9	0.01	0.02	6.9	15	No
PM _{2.5}	5.9	0.01	0.01	5.9	10	No
CO	71.2	0.07	0.3	71.6	-	No
ROG	0.6	0.004	0.04	0.6	10	No
NO _x	0.8	0.004	0.22	1.0	10	No
SO _x	0.5	0.002	0.005	0.5	-	No

Sources (BAAQMD 2022c; U.S. Forest Service 2020; CARB 2000)

Emissions from fuel management treatments would not exceed the operational maximum annual thresholds. Broadcast burning would generate the most emissions compared to pile burning, vehicle use, and equipment operation. As discussed above, initial broadcast burning would likely occur over several years with only one or two units burned annually, and annual emissions would therefore be less than those estimated in Table 2.2-4. A Smoke Management Plan would be prepared and implemented for the broadcast burn area in accordance with and including all the restrictions required by BAAQMD's Regulation 5 and CCR Title 17, Subchapter 2, which would reduce some burn emissions due to adhering to seasonal, climatic, and daily timing stipulations.

If an air curtain burner, carbonator, or kiln burner were used, the impacts would be similar to, but less than, those resulting from the comparative use of pile burning for biomass processing. Air curtain burners operate by trapping particles of smoke under an air curtain, which are then reburned, resulting in very high combustion efficiency (up to 99 to 100 percent reported) (Zahn 2005) and avoiding the release of smoke particles into the atmosphere (up to 99 to 100 percent reported) (Zahn 2005; Page-Dumroese et al. 2024). Use of the air curtain burner would result in comparatively reduced emissions of carbon monoxide, methane-based gases such as butane (refer to Section 2.2.8, Greenhouse Gas Emissions for more information), and nonmethane gases such as benzene and significantly reduced particulate matter emissions.

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With respect to the generation of criteria air pollutants, the biomass technologies substantially reduce ROG and PM emissions when compared to pile burning, ranging between a 91-percent and 100-percent reduction. For NO_x reductions, air curtain burners and carbonators are estimated to reduce NO_x emissions by at least 73 percent and 39 percent, respectively. For the purposes of the comparative analysis, emissions from burning trees and woody biomass were evaluated because this is the most common type of vegetation treatment byproduct anticipated from the proposed project. The comparison of emissions from an air curtain burner (direct combustion), carbonator (pyrolysis on-site), and kiln burners (pyrolysis on-site, also known as an Oregon kiln) as compared with pile burning as a form of biomass processing are shown in Table 2.2-5 (Ascent Environmental. 2022). To further illustrate this, similar or significantly lower emissions generated by an air curtain burner, refer to Table 2.2-6, which demonstrates the average emissions factors for an air curtain burner as compared with pile burning of ponderosa pine, as an example. Since the air curtain burner burns with a 10 percent higher combustion efficiency than pile burning, other pollutants such as PM₁₀ would also be expected to be much lower than pile burning. Smoke and particulate matter emissions are low and, due to the high combustion efficiency, the risk to personnel conducting the burn or any other personnel in the area is relatively low. Use of an air curtain, carbonator, and kiln burner would therefore result in fewer emissions than the pile burning estimate provided in Table 2.2-4.

Table 2.2-5 Comparison of Criteria Air Pollutants by Biomass Processing Technology (Pounds of Emissions per Acre)

Type of biomass process	Emissions per acre treated (lb./acre) ROG	Emissions per acre treated (lb./acre) NO _x	Emissions per acre treated (lb./acre) PM ₁₀	Emissions per acre treated (lb./acre) PM _{2.5}
Pile burning (prescribed burning) ¹	2,187	166	1,421	1,421
Direct combustion (on-site) (air curtain) ²	81	45	54	54
Difference	(2,106)	(121)	(1,367)	(1,367)
Percent reduction	96%	39%	71%	71%
Pyrolysis (on-site) (Oregon kiln) ²	44	101	417	417
Difference	(2,143)	(65)	(1,004)	(1,004)
Percent Reduction	98%	39%	71%	71%
Pyrolysis (on-site) (carbonator) ³	52	10	6	6
Difference	(2,135)	(156)	(1,415)	(1,415)
Percent reduction	98%	94%	100%	100%

Notes:

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1. The emissions estimates for prescribed burning, which may consist of pile burning or broadcast burning, consist of the emissions that would be generated by the combustion of vegetative fuels. They do not include emissions generated by trucks hauling equipment to and from treatment sites.
2. Calculated based on results from Puettman et.al. 2020 as provided in Ascent Environmental 2022.
3. Calculated based on results from Sormo et. al. 2020 as provided in Ascent Environmental 2022.

Source: (Ascent Environmental. 2022)

Table 2.2-6 Average Criteria Pollutant Emission Factors for Pile Burning versus Air Curtain Burning (Pounds of Emissions per Ton of Vegetation)

Type	CO	NMHC	PM _{2.5}
Pile burning – ponderosa pine	178.5	9.9	25.5
LLC air curtain burner	26.3	1.1	1.1
McPherson air curtain burner	30	0.6	1.4

Note:

Reactive organic gas (ROG) emission factor is likely less than nonmethane hydrocarbons (NMHC) so it is conservative to assume it is equal.

Source: (Zahn 2005)

Following the burning of vegetative biomass in curtain burners, some research indicates that the resulting biochar can contain elevated levels of toxic chemicals or increase soil dust emissions, if disturbance such as mechanical tilling or a wind event occurs after application of biochar as a soil amendment (Gelardi et al. 2019; S. Ravi et al. 2016). Toxic air pollutants are not expected to occur in biochar produced from the proposed project because biomass feedstock, consisting of woody vegetative material from the fuel reduction zones, contains very low levels of these pollutants (Springsteen et al. 2021). Soil dust emissions following any potential biochar soil amendment in the fuel reduction zones would be expected to be minimal because vehicular and personnel activity would be substantially reduced after treatment. The remaining vegetative cover in the vicinity would also reduce dust release compared to the Ravi et al. (2016) study that was performed in a wind tunnel on bare, dry soils. It is expected that project site soils would retain much of the existing vegetative cover present and, if treated during the wet season, would retain some degree of moisture and therefore substantially reduce any risk of dust erosion (Gelardi et al. 2019). Furthermore, the quantity of biochar produced at any one time and potentially used on site as a soil amendment would cover a relatively small area. Additional research indicates that low application rates (such as below 1 percent biochar by soil weight) do not result in an increased risk of dust emissions. It is expected that biochar creation and application as part of the proposed project would be below this threshold and therefore would pose even less of a fugitive dust risk (Li et al. 2018).

Implementation of the proposed project would result in minor criteria pollutant emissions generated per year, as shown above. Equipment that would be used during project implementation and potential pile burning would emit criteria air pollutants far below the thresholds of significance identified. Implementation of the proposed project would result in a

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less than significant increase of ozone and particulate matter, the criteria pollutants for which the SFBAAB is in non-attainment under applicable federal and state ambient air quality standards. Due to the limited scope of project activities during initial treatment and planned ongoing maintenance, implementation of the proposed project would not result in a cumulatively considerable net increase of any criteria pollutant under an applicable federal or state ambient air quality standard. Broadcast burning could potentially reduce the intensity of a wildland fire in the San Rafael Hill fuel reduction zone, limit wildland fire spread, and slow the progress of a wildland fire to allow for more rapid containment, should one ignite. Wildland fires emit greater criteria air pollutant emissions annually than non-agricultural broadcast burning (U.S. Forest Service, n.d.-c, 101). Studies have found that particulate matter emission rates for wildland fires are more than two times higher than for broadcast burns in the western United States (Liu et al. 2017). It is not possible to accurately estimate emissions associated with a potential wildfire that could be reduced in intensity or avoided by these treatments due to the greater potential for firefighters to attack a fire when conditions have less fuel loads. However, the primary purpose of the proposed project is to reduce wildfire hazards for the adjacent community and increase wildfire resiliency. The impact would be less than significant.

c) Would the proposed project expose sensitive receptors to substantial pollutant concentrations?

Use of diesel-powered vehicles and equipment, such as tractors, would occur during many vegetation treatments in the fuel reduction zones, which would emit TACs in the form of diesel exhaust emissions and particulate matter. Diesel exhaust is a complex mixture of gases, vapors, and fine particles, some of which are suspected or known to cause cancer in humans. Fuel reduction activities would not occur continuously in any one location within 1,000 feet of an individual receptor for longer than 2 months, and the numbers of equipment and vehicles used annually would be minimal. Additionally, equipment would be maintained per manufacturer's specifications, reducing diesel exhaust (PDIF HAZ-1). As such, diesel exhaust from vehicle and equipment use would not concentrate in the vicinity of sensitive receptors.

Broadcast burning would be conducted within the San Rafael Hill fuel reduction zone. The duration of impacts from TAC emissions generated by burning and smoldering would be short, limited to one-day burn and mop-up. It is anticipated that not all broadcast burn units would be burned in a given year. Smoke from burns would generate TAC emissions, including fine particulate matter, acrolein, PAHs, and formaldehyde. Exposure to TAC emissions within smoke could lead to acute and instantaneous eye and respiratory irritation and shortness of breath. Symptoms may also include headaches, dizziness, and nausea lasting several hours. A 2-year study in California evaluated respiratory outcomes and immune function among school-aged children exposed to wildfire and broadcast burn smoke. The study found that children in the wildfire group had worsened wheezing and asthma compared to the broadcast burn group (Prunicki et al. 2019). Another study estimated the health impacts from broadcast burning-related PM_{2.5} exposure under three scenarios: no prescribed fire, 100 percent broadcast burning, and 30 percent broadcast burning which reduced prescribed fire by 70 percent and supplemented with manual biomass clearing (V. Ravi et al. 2019). Under the 30 percent broadcast burn scenario, which is similar to the proposed broadcast burning activities at the San

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Rafael Hill fuel reduction zone, deaths, respiratory symptom cases, bronchitis cases, and workday losses attributed to broadcast burning decreased by up to 30 percent compared to the 100 percent burn scenario. These findings suggest that broadcast burn activities combined with manual and mechanical treatments can reduce the impacts of broadcast burning on human health. Crews conducting the broadcast burn would experience the greatest exposure to smoke. Crews would wear personal protective clothing and equipment in accordance with CCR, Article 10.1. Broadcast burning would be conducted under appropriate weather, moisture, fuel, and fire behaviour conditions, as described in BAAQMD Regulation 5, to limit smoke from impacting neighbouring communities and sensitive receptors. Furthermore, as discussed above, a Smoke Management Plan and burn plan would be implemented that would reduce impacts from broadcast burning smoke impacts.

CO emitted from broadcast burns is rapidly diluted and is generally not a health concern to the general public due to the infrequency of burns and distance from active burn areas (Story and Dzomba 2005). Sensitive populations, including the elderly and children, would generally not be exposed to high CO concentrations as a result of broadcast burns due to rapid dilution. Broadcast burn crews would experience the highest exposure to CO concentrations. Attack activities⁵ have resulted in firefighters experiencing concentrations of CO that were on average 40 percent greater than the next-highest-measured concentrations, which occurred when firefighters were conducting a mix of attack and mop-up activities (Reinhardt et al. 2022). Studies have shown average carbon monoxide concentrations over the course of a fireline shift⁶ to be 6.9 ppm but can be as high as 58 ppm averaged over the fireline shift (Reinhardt et al. 2022). CO concentrations of greater than 200 ppm have been recorded among firefighters fighting wildland fires. While broadcast burning could emit highly localized CO that may exceed the operational concentration thresholds, crews would be required to wear personal protective clothing and equipment that would protect them from CO exposure.

Broadcast burning would likely occur over several years, and annual CO concentrations would be less than those estimated in Table 2.2-4. A Smoke Management Plan would be prepared and implemented for broadcast burns in accordance with BAAQMD's Regulation 5. Furthermore, exposure to CO would be minimized by ensuring smoke does not drift or blow towards areas with sensitive receptors, in accordance with the Smoke Management Plan and burn plan. The Smoke Management Plan would include specifications for disseminating project information to the public. Typical methods for disseminating information about broadcast burning to the public include, but are not limited to, social media campaigns, sign placement near the burn site, flyer notifications, and notification to the County and local jurisdictions prior to burning. Public notification of broadcast burn activities would ensure that sensitive receptors in the

⁵ Activities included containing larger spot fires and extinguishing flaming and smoldering combustion that had escaped the prescribed unit boundaries.

⁶ Defined as an average of seven hours.

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vicinity of the San Rafael Hill fuel reduction zone would be aware of project activities prior to burning and would be able to leave the area or close windows.

Pile burning may occur under the proposed project, depending upon access constraints that could limit hauling material out or chipping and the conditions of the treatment area. Pile burning produces smoke, which when inhaled may result in irritation to the eyes, nose and throat, respiratory irritation, and worsen existing health conditions. Pile burning produces far less smoke than a large wildfire and often smoke from pile burning does not impact the public due to its limited scale (U.S. Forest Service, n.d.-b). Pile burns are conducted after the vegetative material has dried out (as appropriate, piles may be covered to dry them out), which allows for more complete combustion and less smoke generation. Furthermore, pile burning is conducted during the wet season when surrounding vegetation is green, minimizing burning of non-target vegetation and excess smoke. Suitable areas for piles are typically flat or gentle slopes and have open areas away from tree canopies and power lines. In accordance with PDIF HAZ-3, pile burning would occur away from public areas and only on days where wind speeds permit.

Pile burning and broadcast burning would comply with the BAAQMD Regulation 5 including burn notification requirements and burn day restrictions. Burns are planned for and conducted under optimal weather conditions to limit air quality and smoke issues for neighboring communities and ensure fire fighters can maintain control. A Smoke Management Plan must be prepared and implemented for pile burns in accordance with and including all the information and restrictions required by BAAQMD's Regulation 5. For burn events, exposure to TAC emissions would be minimized by ensuring smoke does not drift or blow towards areas with sensitive receptors, in accordance with the Smoke Management Plan and burn authorization procedure.

Additionally, if an air curtain burner, carbonator, or kiln burner were used, the impacts would be similar to, but less than, those resulting from the use of pile burning for biomass processing. As stated above, the air curtain burner burns with a 10 percent higher combustion efficiency than pile burning, other pollutants such as PM₁₀ would also be expected to be much lower than pile burning. Smoke and particulate matter emissions are low, and due to the high combustion efficiency, the risk to personnel conducting the burn or any other personnel in the area is relatively low. Additionally, air curtain burners and carbonators are estimated to reduce NO_x emissions by at least 73 percent and 39 percent, respectively. For these reasons, implementation of the proposed project would result in a less than significant impact associated with exposure of sensitive receptors to substantial pollution.

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d) Would the proposed project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Odor impacts are subjective as odor sensitivity varies from person to person. Odor impacts are related, to some degree, to the distance from the origin of the odor to the receptor. Smoke from pile burning and broadcast burning would not be expected to affect many people due to the duration of the burns, wet weather conditions, limited size of the burn area, and conditions under which pile burning would be permitted pursuant to PDIF HAZ-3. BurnBots, if used for blacklining, emit little to no smoke emissions. Diesel exhaust from equipment and vehicles would generate some odors. Any odor emissions would be temporary and would dissipate rapidly in the air, decreasing with increasing distance from the source, thus minimizing potential exposure to persons utilizing open spaces or residences near the project sites. For these reasons, implementation of the proposed project would not result in odor emissions that would adversely affect a substantial number of people.

Mitigation Measures

No mitigation measures would be required.

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2.2.4 Biological Resources

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
4. BIOLOGICAL RESOURCES. Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	☐	☐	☒	☐
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☒	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

Environmental Setting

Biological Resources Desktop Review

Biological database searches for the vicinity of the project sites were conducted (California Native Plant Society 2024; California Department of Fish and Wildlife 2024). Species identified during the database search were determined to have the potential to occur within the project sites if the species is known to occur in the vicinity of the project sites and if the project sites or immediate vicinity contains suitable habitat to support these species. Special-status species with potential to occur in the project sites as shown in Table 2.2-7 through Table 2.2-10.

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A reconnaissance survey was conducted on March 8, 2024, at the project sites by qualified biologists. The project sites were surveyed on foot using controlled methodology, and the project sites were scanned for the presence of species of special concern, including both plants and wildlife, and heavy infestations of non-native vegetation. Areas that were inaccessible, due to heavy poison oak and steep slopes, were unable to be surveyed and were observed at the best vantage point using binoculars. In addition, the biologists searched for avian behaviors that might indicate nesting such as defensive or territorial behaviors, adult individuals with prey or nesting material in their beaks, or the sound of nestlings begging for food, as well as the physical presence of nests. The biologists did not observe any wildlife or plants of special concern or rarity except for the monarch butterfly. However, the survey occurred outside of the blooming period for many of the special-status plant species with potential to occur in the survey area. The biologists did not observe any nesting birds or woodrat middens in the project sites. Suitable bat habitat (i.e., snags, exfoliating bark) was observed throughout both project sites, but no signs of bat usage were observed. A small drainage fed by a seep was observed at the Deer Valley project site. Additionally, riparian habitat was observed outside of the Deer Valley project site that may serve as potential amphibian breeding habitat with the survey area serving as possible upland habitat.

Table 2.2-7 Special-Status Plant Species with Potential to Occur on the Deer Valley Project Site

Common Name	Scientific Name	Regulatory Status	Habitat	Potential to Occur
Point Reyes salty bird's-beak	<i>Chloropyron maritimum ssp. palustre</i>	CNPS 1B.2	Coastal salt marsh	Low; no suitable habitat within the project site.
Tiburon buckwheat	<i>Eriogonum luteolum var. caninum</i>	CNPS 1B.2	Chaparral, coastal prairie, valley grassland, serpentine endemic	Low; no suitable habitat within the project area. Occurrences not in proximity to the project site.
Congested-headed hayfield tarplant	<i>Hemizonia congesta ssp. congesta</i>	CNPS 1B.2	Northern coastal scrub, valley grassland	Moderate; potentially suitable habitat and soils present in project area. Occurrences within 2 miles of the project site in similar habitat.
Marin knotweed	<i>Polygonum marinense</i>	CNPS 3.1	Coastal salt, brackish marshes, swamps	Low; no suitable habitat within the project area. Occurrences not in proximity to the project site.

Notes:

Species with occurrences within 3 miles of project areas were examined. Species which are considered "extirpated" or those with occurrence data greater than 75 years old were removed from the analysis as they are not anticipated to occur in the vicinity of the work area. Species with occurrence data which was greater than 50 years old were examined for inclusion on a case-by-case basis.

FE Federally Endangered

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FT	Federally Threatened
FC	Federal Candidate
CE	California State Endangered
CT	California State Threatened
CR	California Rare
CC	California State Candidate
FP	Fully Protected
SSC	California State Species of Special Concern
CNPS	California Native Plant Society Ranks

Source: (California Department of Fish and Wildlife 2024; California Native Plant Society 2024; California Department of Fish and Game 2003; Hickman 1993; Stebbins 2003)

Table 2.2-8 Special-Status Plant Species with Potential to Occur on the San Rafael Hill Project Site

Common Name	Scientific Name	Regulatory Status	Habitat	Potential to Occur
Napa false indigo	<i>Amorpha californica</i> var. <i>napensis</i>	CNPS 1B.2	Wetland, riparian woodland	Low; riparian areas not included in the project site.
Mt. Tamalpais manzanita	<i>Arctostaphylos montana</i> ssp. <i>montana</i>	CNPS 1B.3	Chaparral, valley grassland	Low; no suitable habitat within the project site.
Marin manzanita	<i>Arctostaphylos virgata</i>	CNPS 1B.2	Chaparral, valley grassland	Low; known occurrence over 1.5 miles from the project site.
Point Reyes salty bird's-beak	<i>Chloropyron maritimum</i> ssp. <i>palustre</i>	CNPS 1B.2	Coastal salt marsh	Low; no suitable habitat within the project site.
Tiburon buckwheat	<i>Eriogonum luteolum</i> var. <i>caninum</i>	CNPS 1B.2	Chaparral, coastal prairie, valley grassland, serpentine endemic	Low; no suitable habitat within the project area. Occurrences not in proximity to the project site.
Small groundcone	<i>Kopsiopsis hookeri</i>	CNPS 2B.3	Open woodland, mixed conifer forest	Low; no suitable habitat within the project area. Occurrence not in proximity to the project site.
Tamalpais lessingia	<i>Lessingia micradenia</i> var. <i>micradenia</i>	CNPS 1B.2	Thin, gravelly soil of serpentine outcrops, roadcuts	Low; no suitable habitat within the project area. Occurrences not in proximity to the project site.
Marin knotweed	<i>Polygonum marinense</i>	CNPS 3.1	Coastal salt, brackish marshes, swamps	Low; no suitable habitat within the project area. Occurrences not in proximity to the project site.

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Common Name	Scientific Name	Regulatory Status	Habitat	Potential to Occur
Tamalpais oak	<i>Quercus parvula</i> var. <i>tamalpaisensis</i>	CNPS 1B.3	Coastal salt, brackish marshes, swamps	None; species known only to occur on slopes of Mt. Tamalpais over 2.8 miles from the project site.

Notes:

Species with occurrences within 3 miles of project areas were examined. Species which are considered “extirpated” or those with occurrence data greater than 75 years old were removed from the analysis as they are not anticipated to occur in the vicinity of the work area. Species with occurrence data which was greater than 50 years old were examined for inclusion on a case-by-case basis.

FE	Federally Endangered
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FC	Federal Candidate
CE	California State Endangered
CT	California State Threatened
CR	California Rare
CC	California State Candidate
FP	Fully Protected
SSC	California State Species of Special Concern
CNPS	California Native Plant Society Ranks

Source: (California Department of Fish and Wildlife 2024; California Native Plant Society 2024; California Department of Fish and Game 2003; Hickman 1993; Stebbins 2003)

Table 2.2-9 Special-Status Wildlife Species with Potential to Occur in the Deer Valley Project Site

Common Name	Scientific Name	Regulatory Status	Habitat	Potential to Occur
Pallid bat	<i>Antrozous pallidus</i>	SSC	Roosts in large diameter trees and abandoned buildings	Low; no roosting anticipated in the project site.
Burrowing owl	<i>Athene cunicularia</i>	CC	Nests and overwinters in grassland burrows	Low to moderate; known occurrence and suitable habitat within 1 mile of the project site,
Western bumble bee	<i>Bombus occidentalis</i>	CC	Grassland	Low; potentially suitable habitat is present in the project site, but the last documented occurrence is from 1951.
Western snowy plover	<i>Charadrius nivosus nivosus</i>	FT, SSC	Nests in coastal dunes	Low; potentially suitable habitat over 1.5 miles from the project site.

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Common Name	Scientific Name	Regulatory Status	Habitat	Potential to Occur
Western pond turtle	<i>Emys marmorata</i>	FP	Freshwater ponds and streams	Low to moderate; no suitable habitat within work area, but occurrence within 0.25 miles of the project site across from Smith Ranch Road.
California black rail	<i>Laterallus jamaicensis coturniculus</i>	CT	Wetlands and marshes	Low; potentially suitable habitat over 1.5 miles from the project site.
San Pablo song sparrow	<i>Melospiza melodia samuelis</i>	SSC	Marshes and wetland edges	Low; potentially suitable habitat over 1.5 miles from the project site.
California Ridgway's rail	<i>Rallus obsoletus obsoletus</i>	FE, CE, FP	Saltwater marshes, freshwater marshes, and mangrove swamps	Low; potentially suitable habitat over 1.5 miles from the project site.
Salt-marsh harvest mouse	<i>Reithrodontomys raviventris</i>	FE, CE, FP	Marshes and wetland edges	Low; potentially suitable habitat over 1.5 miles from the project site.
Northern spotted owl	<i>Strix occidentalis caurina</i>	FT, CT	Dense canopies of mature and old-growth forests. Nests in tree hollows	Low; suitable habitat not present in the project site but occurs within 1.5 miles.

Notes:

Species with occurrences within 3 miles of project areas were examined. Species which are considered "extirpated" or those with occurrence data greater than 75 years old were removed from the analysis as they are not anticipated to occur in the vicinity of the work area. Species with occurrence data which was greater than 50 years old were examined for inclusion on a case-by-case basis.

FE	Federally Endangered
FT	Federally Threatened
FC	Federal Candidate
CE	California State Endangered
CT	California State Threatened
CR	California Rare
CC	California State Candidate
FP	Fully Protected
SSC	California State Species of Special Concern
CNPS	California Native Plant Society Ranks

Source: (California Department of Fish and Wildlife 2024; California Native Plant Society 2024; California Department of Fish and Game 2003; Hickman 1993; Stebbins 2003)

2 ENVIRONMENTAL CHECKLIST

Table 2.2-10 Special-Status Wildlife Species with Potential to Occur in the San Rafael Hill Project Site

Common Name	Scientific Name	Regulatory Status	Habitat	Potential to Occur
Pallid bat	<i>Antrozous pallidus</i>	SSC	Roosts in large diameter trees and abandoned buildings	Low to moderate; suitable habitat is present in the project site and one occurrence is documented approximately 2 miles from the project area.
Monarch butterfly	<i>Danaus plexippus</i>	CC, FTP	Meadows, grasslands, and prairies. Also found in urban and wet areas where ample populations of milkweed are found. Overwinters in coastal California in eucalyptus groves.	Moderate to High; one individual was observed on site during reconnaissance surveys. Suitable habitat is present in the project site. Although milkweed was not observed during the survey, milkweed may still be present given access issues due to dense poison oak and steep slopes.
Western pond turtle	<i>Emys marmorata</i>	FP, SSC	Freshwater ponds and streams	Low; no suitable habitat within project site, and occurrences are over 1 mile away.
California black rail	<i>Laterallus jamaicensis coturniculus</i>	CT	Wetlands and marshes	Low; potentially suitable habitat over 2 miles from the project site.
San Pablo song sparrow	<i>Melospiza melodia samuelis</i>	SSC	Marshes and wetland edges	Low; potentially suitable habitat over 2 miles from the project site.
California Ridgway's rail	<i>Rallus obsoletus obsoletus</i>	FE, CE, FP	Saltwater marshes, freshwater marshes, and mangrove swamps	Low; potentially suitable habitat over 2 miles from the project site.
Salt-marsh harvest mouse	<i>Reithrodontomys raviventris</i>	FE, CE, FP	Marshes and wetland edges	Low; potentially suitable habitat over 2 miles from the project site.
Northern spotted owl	<i>Strix occidentalis caurina</i>	FT, CT	Dense canopies of mature and old-growth forests. Nests in tree hollows	Moderate; foraging may occur, suitable nesting habitat not present in the project site but occurs within 1.3 miles.

Notes:

Species with occurrences within 3 miles of project areas were examined. Species which are considered "extirpated" or those with occurrence data greater than 75 years old were removed from the analysis as they are not anticipated to occur in the vicinity of the work area. Species with occurrence data which was greater than 50 years old were examined for inclusion on a case-by-case basis.

FE Federally Endangered

FT Federally Threatened

2 ENVIRONMENTAL CHECKLIST

FC	Federal Candidate
FTP	Federal Threatened Proposed CE California State Endangered
CT	California State Threatened
CR	California Rare
CC	California State Candidate
FP	Fully Protected
SSC	California State Species of Special Concern
CNPS	California Native Plant Society Ranks

Source: (California Department of Fish and Wildlife 2024; California Native Plant Society 2024; California Department of Fish and Game 2003; Hickman 1993; Stebbins 2003)

Sensitive Vegetation and Riparian Communities

Vegetation communities within the project sites primarily consist of oak and mixed woodlands, non-native annual grasslands, and non-native forests. Table 2.2-11 and Table 2.2-12 show the vegetation communities present within the project sites.

Table 2.2-11 Deer Valley Project Site Vegetation Communities

Vegetation community	Vegetation type	Acres
Developed	Developed	0.3
Forest fragment	Forest fragment	0.5
Herbaceous	Californian Annual & Perennial Grassland	14.5
Native forest	<i>Quercus agrifolia</i>	21.4
Native forest	<i>Quercus douglasii</i>	1.1
Native forest	<i>Quercus garryana</i>	3.5
Subtotal Native forest	<i>Quercus sp.</i>	26.0
Native shrub	<i>Baccharis pilularis</i> Alliance	0.3
Non-native shrub	<i>Genista monspessulana</i> Semi-Natural Association	1.2
Shrub fragment	Shrub fragment	0.2
All communities	<i>all vegetation types</i>	42.9

Source: (Marin County 2018)

Table 2.2-12 San Rafael Hill Project Site Vegetation Communities

Vegetation community	Vegetation type	Acres
Developed	Developed	1.8
Forest fragment	Forest fragment	0.5
Herbaceous	Californian Annual & Perennial Grassland	14.0
Native forest	<i>Quercus agrifolia</i>	47.3

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Vegetation community	Vegetation type	Acres
Native forest	<i>Sequoia sempervirens</i> Alliance	0.1
Native forest	<i>Umbellularia californica</i> Alliance	10.9
<i>Subtotal Native forest</i>	<i>Several communities</i>	<i>58.3</i>
Native shrub	<i>Baccharis pilularis</i> Alliance	1.2
Non-native forest	<i>Eucalyptus (globulus, camaldulensis)</i> Provisional Semi-Natural Association	2.0
Non-native forest	Non-native forest	1.2
<i>Subtotal Non-native forest</i>	<i>Several communities</i>	<i>3.2</i>
All communities	All vegetation types	79.0

Source: (Marin County 2018)

Streams intersect and occur adjacent to the project sites, as shown in Figure 2-1. No wetlands are present within the project areas. However, wetlands are located adjacent to the Deer Valley project site.

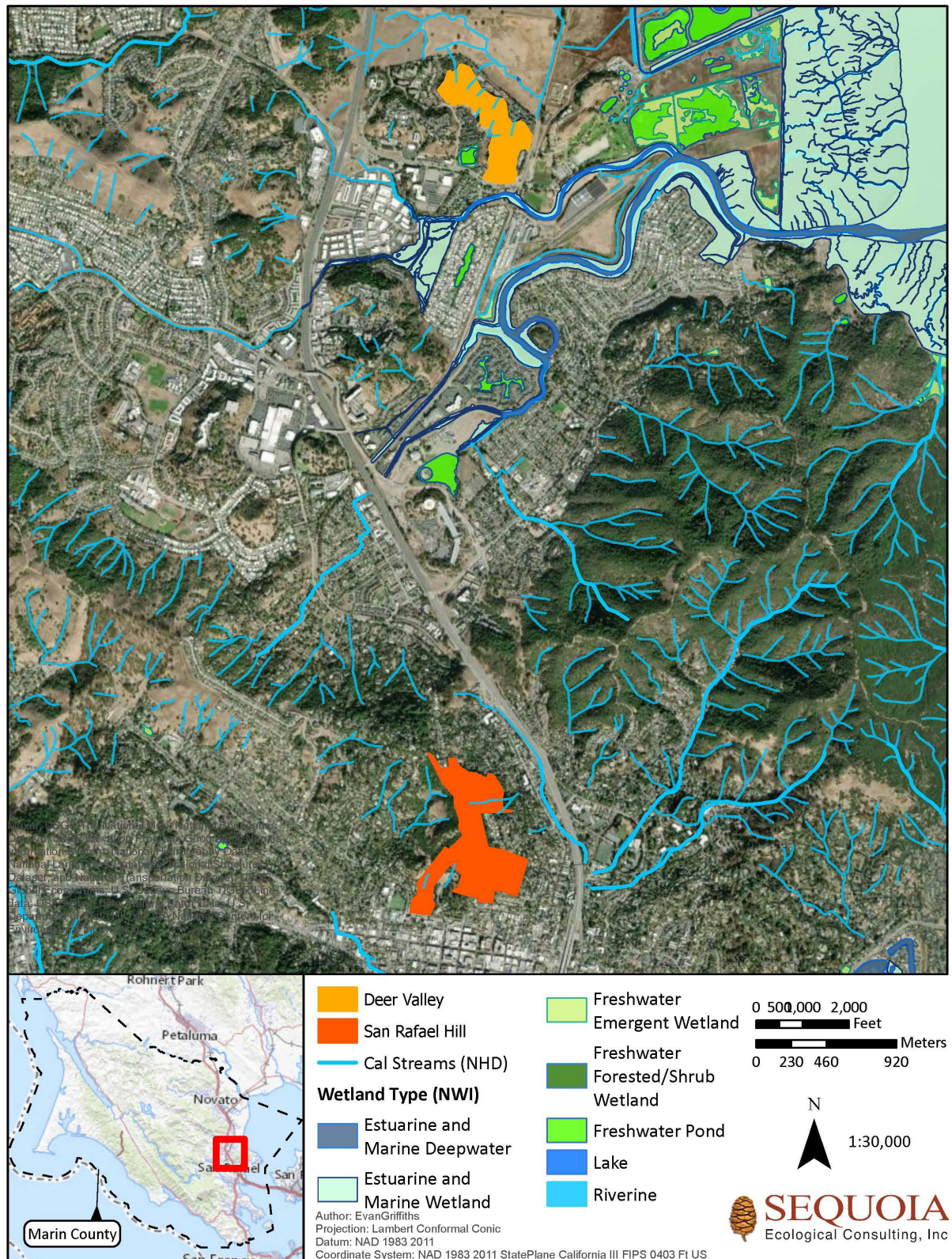
Plant communities are considered sensitive biological resources if they have limited distributions, high wildlife value, include sensitive species, or are particularly susceptible to disturbance. Natural communities with ranks of S1-S3 are considered sensitive natural communities to be addressed in the environmental review processes of CEQA. For alliances with State ranks of S1-S3, all associations within them are also considered sensitive. The following sensitive communities are present within the project sites:

- San Rafael Hill Project Site:
 - Bigleaf maple forest and woodland alliance, G4, S3
 - Coyote brush scrub alliance, G5, S5
 - Chamise chaparral alliance, G5, S5
 - Madrone forest alliance, G4, S4
 - California bay forest and woodland alliance, G4, S3
- Deer Valley Project Site:
 - Chamise chaparral alliance, G5, S5
 - Madrone forest alliance, G4, S4
 - Coyote brush scrub alliance, G5, S5
 - Mixed oak forest and woodland alliance, G4, S4
 - Redwood forest and woodland alliance, G3, S3

Serpentine soils are not documented within the project area as shown in Figure 2-2 and therefore serpentine-associated communities do not have the potential to be present (U.S. Department of Agriculture 2020).

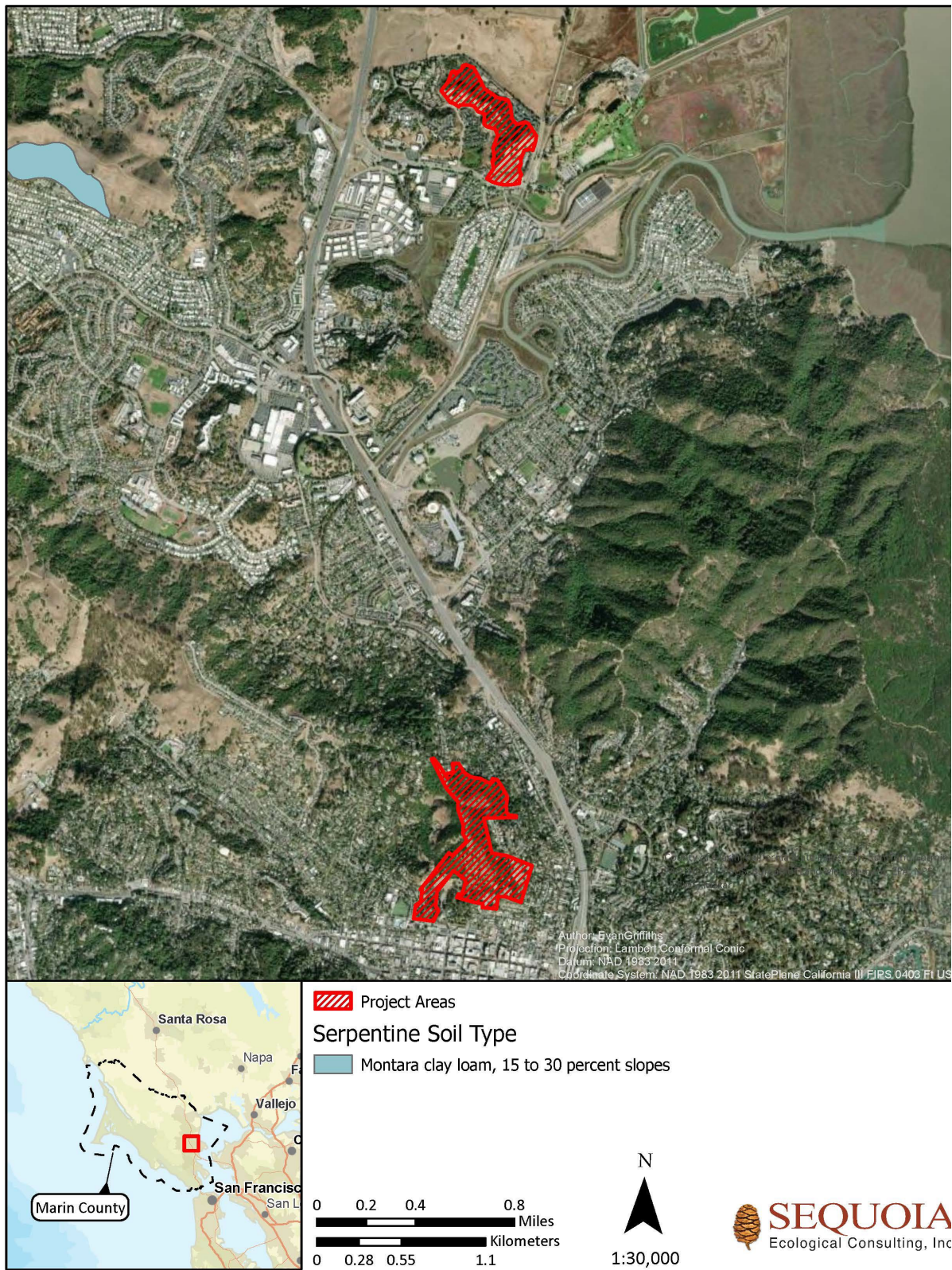
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Figure 2-1 Aquatic Environment



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Figure 2-2 Serpentine Soils



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Discussion

- a) **Would the proposed project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?**

Special-Status Plant Species

One special-status plant species, the congested-headed hayfield tarplant, has a moderate potential to occur in the Deer Valley fuel reduction zone and no special-status plant species have a moderate or high potential to occur in the San Rafael Hill fuel reduction zone (refer to Table 2.2-7 and Table 2.2-8 for a summary of known occurrences in relation to the fuel reduction zones).

The blooming season for the congested-headed hayfield tarplant ranges from April to November. Treatment within the fuel reduction zones would be limited to vegetation thinning and the removal of fire-hazardous and dead vegetation, which would make the communities more resilient to threat of type conversion after wildfire. Broadcast burning would occur within the San Rafael Hill fuel reduction zone. As stated above, no special-status plant species have a moderate or high potential to occur at the San Rafael Hill fuel reduction zone that could be impacted by burning. Mechanical treatment could cause mortality of special-status species if they are crushed by vehicles, heavy equipment, or felled trees (i.e., excavators, skid steers, mounted masticators). Manual and mechanical equipment, including string trimming, could damage the flowering body or seeds of the plant species with a moderate potential to occur. Heavy equipment would operate from existing roads, trails, and fire roads to the extent feasible. The BurnBot may operate off-road to reduce fuels loads where access by hand crews is limited or challenging (e.g., poison oak). The extent of the drive and potential crush would be limited and only one or two passes would occur in any one area, minimizing the potential for significant effects on any special-status plants that may occur in the area. If activities that could damage the flowering plant species for the congested-headed hayfield tarplant would occur during the blooming season, and if a review and professional judgement dictates, surveys would be conducted prior to work (PDIF ES-1). Any individuals found during the pre-treatment surveys would be flagged for avoidance or modified methods of treatment. Workers would receive training from a qualified professional prior to beginning vegetation treatments in areas where sensitive biological resources could occur (PDIF ET-1). Training would include identification of special-status plant species and sensitive communities for avoidance (PDIF ET-1). The training for this proposed project would involve identification of congested-headed hayfield tarplant for avoidance if encountered within the fuel reduction zones. All sensitive plant species have a low to no potential to be impacted by vegetation removal activities with the worker training and surveys for avoidance or modified methods, when needed.

The vegetation trimming and removal would generally focus on removing invasive and fire-hazardous species, leaving native species in place (PDIF IP-4) and the types of activities generally would not disrupt the seed banks of these species. Workers would clean equipment and handle vegetation to avoid introducing or spreading invasive species that could

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outcompete special-status plant species when moving between different project locations (PDIFs IP-1, IP-2, IP-3). Pile burning, air curtain burning, or other types of biomass burning may be conducted as a vegetation disposal method. Pile burning could cause a significant impact if piles are placed on top of, or immediately adjacent to, special-status plants that do not benefit from fire. In addition, pile burning could have a significant indirect impact on special-status plants if invasive plants colonize the burn scars and subsequently spread into the surrounding landscape. Material would not be piled and burned in sensitive habitats (PDIF SH-3). Pile burns would affect a relatively small area within the fuel reduction zones.

Project debris may be chipped and broadcasted on the fuel reduction zones. Chipped material would be chipped to under 3 inches in size and spread onsite. Chipped debris may lead to the death of special-status plant species by reducing soil aeration and inhibiting plant growth if spread to depths over 4 inches (Battaglia et al. 2010; E. M. Miller and Seastedt 2009; Colorado Forest Restoration Institute 2020; Greenly and Rakow 1995). (Klett 2020; Billeaud and Zajicek 1989). In accordance with PDIF GEO-4, mulch would be limited to a depth of 2 to 4 inches. Therefore, chipping and broadcasting would have a less than significant impact on special-status plant species.

Herbicides may be applied in a targeted manner, such as stump treatment, basal-bark treatments, or foliar treatments, to non-native, invasive plant species to prevent resprouting, minimizing risk to non-target species. The proposed project would use Garlon 4 Ultra and Turflon Ester (i.e., herbicide with the active ingredient triclopyr), and Cheetah Pro (i.e., herbicide with active ingredient glufosinate). Particles or vapors from herbicide drift may impact non-target special-status plant species in the immediate vicinity of the target species. Triclopyr and glufosinate are toxic to non-target plant species, and small quantities of herbicide drift can result in dead vegetation (U.S. Environmental Protection Agency 1998b; Minnesota Department of Agriculture n.d.). Off-site drift from backpack applications typically has low risk of damage to plants at distances of greater than 25 to 300 feet depending on the herbicide (U.S. Forest Service, n.d.-a). Herbicide applicators would receive training on the application, storage, and handling of herbicides in accordance with the City of San Rafael IPMP. Herbicides would not be applied within a 50-foot buffer of any ESA or California ESA listed species (PDIF HYD-5). If off-site drift from herbicide application is proposed that could damage the flowering body or seed dispersal of plant species with a moderate potential to occur in areas with suitable habitat and during the blooming season, surveys would be conducted prior to treatment (PDIF ES-1). Any individuals found during the pre-work surveys would be flagged for avoidance or modified methods such as use of an alternative herbicide or different application method (e.g., paint on). In accordance with PDIF ES-1, biologists would determine a buffer around sensitive species based on the type of herbicide and application method utilized.

Most experts agree that misapplications and spills of herbicides are the leading cause of impacts on non-target species. Misapplications and spills are caused by failure to follow label instructions and restrictions, and failure of applicators to apply herbicides correctly. Spill prevention and response measures would be implemented that would ensure that herbicides are properly stored on-site and that any accidental releases of hazardous materials would be

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properly controlled and quickly cleaned up (PDIF HAZ-1). Measures would be implemented to minimize herbicide drift including applying herbicides during low-wind weather conditions, using low nozzle pressures, and spraying nozzles within 24 inches of vegetation (PDIF HAZ-4). Any individuals found during the pre-work surveys would be flagged for avoidance or modified methods. Therefore, impacts on special-status plant species would be less than significant.

Special-Status Wildlife Species

Overview

The burrowing owl, monarch butterfly, western pond turtle, pallid bat, and northern spotted owl have a moderate to high potential to occur within certain portions of the fuel reduction zones (refer to Table 2.2-9 and Table 2.2-10 for information about known occurrences in relation to the proposed project). Workers would be trained to identify and avoid the types of wildlife species with a potential to occur in the work areas (PDIF ET-1).

Nesting Birds and Roosting Bats

Migratory birds and birds of prey have a potential to nest or forage within the project site and are protected under the Migratory Bird Treaty Act and Sections 3503 and 3503.5 of the California Fish and Game Code. Roosting bats could occur in trees across both project sites. The pallid bat, a special-status species, has a low to moderate to occur at the San Rafael Hill fuel reduction zone. Tree limbing and tree removal activities as well as noise-generating activities in the vicinity of nesting birds or maternity roosting bats could result in mortality or loss of life. Smoke and heat from flames from broadcast and pile burning could harm bats, if the burns were to occur in the immediate vicinity of an individual roost, maternity roost, or bat colony. Project activities could occur from February 1 to July 31, during which time appropriate nesting bird and/or maternity roosting bat surveys would be conducted to avoid any effects on nesting birds and maternity roosting bats, including the pallid bat (per PDIFs NB-1, NB-2, NB-3, NB-4, RB-1, RB-2, RB-3, RB-4). If active nests are observed at the project site, an avoidance buffer would be implemented, or a qualified biologist may monitor the nests during work activities if an avoidance buffer is not achievable (per PDIFs NB-3, NB-4). Workers would be trained to identify the special-status birds and bats for avoidance (PDIF ET-1).

Studies have found that forest herbicides (e.g., triclopyr) used according to label directions are nontoxic and do not bioaccumulate or bioconcentrate in birds (L. A. Clark et al. 2009). A study has found that some herbicides (i.e., clopyralid and dalapon) accumulate in bat tissue, although little is known of toxicity in bats (Second et al. 2015). Spot treatment and cut stump herbicide application would be employed, but no broadcast spray would occur. Due to the discrete application of herbicides by hand in a targeted manner on invasive plants, the proposed herbicide application would pose a low risk to bats and nesting birds. Impacts to nesting birds and roosting bats would be less than significant.

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Burrowing Owl

The burrowing owl has a moderate potential to occur within the Deer Valley fuel reduction zone. Ground disturbing activities (i.e., heavy equipment) in areas where burrowing owls could occur at this site, notably grasslands, could result in the direct loss of active burrows. Burn piles could obstruct the openings of burrows if placed over or near the entrance of the burrow. Smoke or fire associated with pile burning could result in nest failure or mortality of burrowing owl if present. Workers would be trained to identify the burrowing owl for avoidance (PDIF ET-1). Work would occur outside of the nesting season or surveys and avoidance of active nests would occur (PDIFs NB-1 through NB-4). Burrowing owls may use the Deer Valley site outside of breeding season. Off-road equipment or pile burning could impact burrowing owl burrows who in turn may have a difficult time leaving the area and finding another suitable burrow as it is surrounded by residences. Impacts to burrowing owl from proposed project activities at the Deer Valley fuel reduction zone could be significant due to the comparatively large area of fuel reduction in relation to the available open space area. Mitigation Measure BIO-1 requires a targeted survey for burrowing owls if off-road equipment use or pile burning is proposed in areas of suitable grassland habitat on the Deer Valley fuel reduction zone. A qualified biologist would search for potential signs of burrowing owls (e.g., feathers, whitewash, etc.) in burrows. Any potentially active burrows would be flagged and avoided by activities that could result in burrow collapse or nest failure. With mitigation, the impact would be less than significant.

Monarch Butterfly

Monarch butterflies have a moderate to high potential to occur within the Deer Valley fuel reduction zone. Monarch butterflies use milkweed plants to lay eggs generally starting in March and April and typically take 60 days to complete metamorphosis from larva to adult, which can extend through June. Individual butterfly larvae or pupae could be killed during pile burning, string trimming, or crushed by equipment if present on milkweed, the species' host plant, and if work occurs during February to April-March to June when monarch butterfly eggs, caterpillars, and pupae could be present. Vegetation management activities generally prioritize removal of woody and/or non-native species and would not target milkweed for removal, which is not a woody plant and is not invasive. Activities conducted in areas dominated by non-native species, such as broom or gorse, would not have the potential to damage host plants and any monarch butterfly larvae or pupae that could be present. Adult monarchs can disperse and would be unlikely to be directly impacted by vegetation treatment activities. While not proposed at the Deer Valley fuel reduction zone, broadcast burning has the potential to stimulate milkweed growth, depending on the timing of burning activities. One study showed that prescribed burning conducted in July can stimulate milkweed growth to support monarchs in late summer (Baum and Sharber 2012; Xerces Society, n.d.). Accordingly, pile burning could be beneficial based on these findings.

Herbicide overspray or drift, if it took place within the project area, could result in the removal of host plants, and may kill individual eggs, larvae, and pupae that are attached. Studies However, studies have shown there is little risk to insects from indirect contact with foliage after direct spray of herbicides (Bureau of Land Management (BLM) 2007). However, Project

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activities pose little risk as herbicides would be applied in a targeted manner using by painting onto stumps and cut vegetation, foliar treatments, or basal-bark treatments. No broadcast or aerial spraying of herbicides would occur. Therefore, impacts to monarchs from herbicide overspray or drift would be unlikely. Species life stages and how to recognize milkweed would be included in environmental training to ensure avoidance (PDIF ET-1). Project activities may occur during February to April, impacts the time of year when milkweed is growing and blooming and during key months for monarch development, which may impact to butterfly eggs, caterpillars, and pupae could be that are present resulting in potentially significant impacts due to the likely presence of milkweed and the comparatively large area of proposed fuel treatments relative to the overall size of the open space. Mitigation Measure BIO-2 requires a pretreatment survey if off-road equipment use, string trimming, or pile burning is proposed in the Deer Valley fuel reduction zone during February to April-September. Any observed individuals and the host plants would be flagged for avoidance. Impacts on monarch butterfly would not be significant with mitigation.

Western Pond Turtle

The western pond turtle has a moderate potential to occur within the Deer Valley fuel reduction zone. Wetland and streams that may provide habitat for these species would be avoided by project activities. Garlon 4 Ultra and Turflon Ester are known to be toxic to aquatic organisms (U.S. Environmental Protection Agency 2008; Corteva Agrosience 2020). Additionally, glufosinate (the active ingredient in Cheetah Pro) is moderately toxic to fish and aquatic invertebrates (Minnesota Department of Agriculture n.d.). Herbicides may cause direct toxicity to adults and eggs. Herbicide could also kill or affect non-target aquatic plants and species that the turtle relies on for food. Herbicides would not be applied within a 50-foot buffer of any ESA or California ESA listed species (PDIF HYD-5). Furthermore, only herbicides approved for use in aquatic environments would be applied by hand in riparian habitats (PDIF HAZ-5). Workers would be trained to identify the western pond turtle for avoidance (PDIF ET-1). Additionally, pile burning would not be performed in sensitive habitats, including wetlands and riparian areas (PDIF SH-3). Therefore, impacts to western pond turtles would be less than significant.

Northern Spotted Owl

Several activity centers and nests are documented within 3 miles of the fuel reduction zones. As such, although there is no suitable habitat, there is a moderate potential for northern spotted owl to forage within specific portions of the San Rafael Hill fuel reduction zone (refer to Table 2.2-9 and Table 2.2-10 for general proximity). Northern spotted owls would not occur at the Deer Valley fuel reduction zone. Vegetation treatment and removal would target invasive, non-native, and fire-hazardous vegetation and accumulative dead biomass within the fuel reduction zones. Small trees, 12 inches DBH and smaller, would be removed, as needed, as part of clearance for horizontal spacing. This vegetation would grow back and be retreated as needed. Northern spotted owls typically prefer dense canopy closure of mature and old-growth trees with logs, standing snags, and live trees with broken tops. Most of the Marin County owls are known to use younger forests than those further north in California (MMWD, 2019). The owls also require open space in the understory or less dense habitats to allow flight under the canopy

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to forage (Gutierrez, Franklin, & Lahaye, 2020). The proposed project would thin vegetation in the understory and reduce the risk of high intensity fire that could permanently damage established nest sites. The proposed project may also improve foraging habitat for northern spotted owl by reducing understory density and therefore permit foraging by owls in flight.

Impacts to prey density should not be affected as no woodrat middens were identified during the surveys although some may occur particularly in the areas with dense poison oak and along the riparian corridor. If any woodrat middens were found during the work, vegetation immediately surrounding the woodrat nests would be left and only a subset of available habitat to woodrats would be treated (PDIF NSO-4). Study findings regarding woodrat abundance and vegetation treatments vary due to the variation in treatment types. One study that assessed understory vegetation's effect on small mammal composition found that "a structurally and compositionally diverse understory provides food and cover for many small mammal species" (Kalies and Chambers 2010). In this study, woodrat and other small mammal abundance were observed to decrease with increased vegetative cover understory vegetative cover, which may be due to the species' reliance on fungi, pine trees, and nuts for food rather than understory vegetation. Dense clumps of trees were also found to be important for small mammals; as well as downed wood and snags (Kalies and Chambers 2010). Another study found that woodrat abundance is promoted by growth of understory vegetation but declines as the forest stand matures, which may be due to the change in the understory reducing available food, limiting suitable nest sites, and increasing predator vulnerability (Hamm and Diller, n.d.). Based on these studies, as density increases in the understory, occupancy of woodrats was reduced and a lack of understory also correlated to reduced occupancy, although both studies indicate that food may ultimately influence abundance in a particular area as well as predation. Understory vegetation (such as poison oak) would also regenerate quickly after treatment and provide cover again within a couple of growing seasons. Dusky-footed woodrats also tend to nest in highest densities in riparian areas (Bravo 2016), which are inherently lower fire-risk areas and typically are not targeted by more intensive vegetation treatments that could disturb woodrats. While woodrats may be affected on an individual basis, no landscape-level change would occur due to the proposed project that could significantly alter woodrat populations to the degree that northern spotted owl may be affected.

There are no known empirical studies that evaluate impacts of vegetation management activities on northern spotted owl (Cormier et al. 2024). However, there are several studies that evaluate impacts to spotted owls from fuels management activities as well as several studies that modeled impacts of fuels management on northern spotted owls. A meta-analysis of impacts on spotted owls from mixed-severity fire was conducted for fifteen journal articles. The meta-analysis concluded that spotted owls were not significantly affected by mixed-severity fire, and there is a positive effect on foraging habitat selection for low-severity burned forest (Lee 2018). One study found that fire management, coupled with tree retention, may contribute to spotted owl conservation by recreating habitat variation (Kramer et al. 2021). A modeling study found that fuel treatments (including underburning) on a relatively minor percentage of the forested landscape (20 percent) results in a 44 percent decrease in the northern

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spotted owl habitat loss (Ager et al. 2007). Smaller scale and low-severity wildfires may increase habitat suitability by opening up the understory for improved hunting; indeed, northern spotted owl are likely accustomed to low and moderate-severity frequent fires in seasonally dry forests (Peery et al. 2019). These types of fires also help prevent larger, more destructive wildfires (Lesmeister et al. 2018). Therefore, low-intensity, broadcast burning could be beneficial for northern spotted owl foraging habitat.

Ecological risk assessments have found that use of forest herbicides (e.g., glyphosate, imazapyr) used according to label directions are low risk on small mammals (e.g., woodrats) (L. A. Clark et al. 2009). Studies have also found that triclopyr have low to no risk to birds of prey that consume contaminated prey or from an accidental spill (Bureau of Land Management (BLM) 2007). As discussed above, forest herbicides do not bioaccumulate or bioconcentrate in birds when used in accordance with label instructions (L. A. Clark et al. 2009). Therefore, herbicide application would not be expected to pose a risk to northern spotted owl by way of accumulating in prey species. Given the work would be focused on removal of hazardous fuels within the fuel reduction zones and the relatively low intensity of the vegetation thinning activities, the work would not alter habitat used by northern spotted owl prey species to the extent that northern spotted owl could be significantly affected. Impacts on special-status wildlife species would be less than significant.

b) Would the proposed project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Vegetation communities in Marin County evolved with the presence of frequent fires and relatively short intervals between wildfires whether ignited by Native Americans or lightning. Periodic wildfires stimulated the regeneration of native grasslands by reducing encroachment of shrubs and trees, opened oak woodlands and forests stimulating seed germination, and benefitting fire-adapted plant and animal species. These pre-European settlement landscapes included fewer shrubs and trees than modern landscapes. Subsequent implementation of fire suppression policies after the arrival of Europeans eliminated beneficial effects, resulting in a reduction of biodiversity and increasing the build-up of fuel loads. Grasslands, oak savannah, and oak woodlands, for example, are at significant risk of loss through invasion by both nonnative and native shrubs and trees, if left unaffected by periodic wildfire. The result is unnaturally dense vegetation throughout the region, transition of grasslands to shrublands, transition of oak woodlands to California bay or Douglas fir forest, as well as increased risk of catastrophic wildfire. While a clear record of the changes to species compositions and densities is generally not available, these pre-European settlement landscapes differ from modern landscape such as in conifer forest communities, lightning- and Native American-set fires maintained lower overall tree density (Anderson and Moratto 1996). Subsequent implementation of fire suppression policies after the arrival of Europeans and most recently in the last couple hundred years particularly eliminated beneficial effects, resulting in a reduction of biodiversity and increasing the build-up of fuel loads. Grasslands, oak savannah, and oak woodlands, for example, are at significant risk of loss through invasion by both non-native and native shrubs and trees, if left unaffected by periodic wildfire. The result is unnaturally dense

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vegetation throughout the region, transition of grasslands to shrublands, transition of oak woodlands to California bay or Douglas fir forest, as well as increased risk of catastrophic wildfire. Forest structure in California over the past 50 to 100 years has generally shifted to be denser, with less large trees and more small trees (McIntyre et al. 2015). At the same time, landscapes have become more homogenous: forested areas in northern California and Marin County specifically have expanded while herbaceous plant communities and shrublands have reduced in size, which reduces the pattern of mosaiced vegetation that occurred previously (Startin 2022; Fertel et al. 2023). Review of historical imagery from 1931⁷ compared to present conditions displayed in Google Earth qualitatively indicate that the forested areas in the San Rafael project site have increased in size, similar to the broader northern California changes (UC Santa Barbara 1931). The altered landscape has also altered public perception around what a “healthy” or “normal” landscape looks like.

The Deer Valley project site has 0.3 acre of chaparral and the San Rafael Hill project site has 1.2 acres of chaparral, specifically *Baccharis pilularis* Association, which includes coyote brush (*Baccharis pilularis*) as well as typically coffeeberry (*Frangula californica*) and/or coast silktassel (*Garrya elliptica*) as the dominant species. The chaparral community in the project sites are intermixed with non-native grassland at the edge of oak woodland and California bay forests. Approximately 1.2 acres of this community would be within the broadcast burn area in the San Rafael Hill project site and could be exposed to low intensity fire. *Baccharis pilularis* Association habitat types have a fire return interval with a mean of 76 years, with a 20- to 120-year mean minimum and maximum (Van de Water and Safford 2011). Chaparral communities are generally considered a fire-adapted community.

In the absence of wildfires and grazing, *Baccharis pilularis* readily invades native grassland habitats on the California coast (Kidder 2015). Although substantial variation exists among chaparral communities, many species rely on post-fire seed germination and/or resprouting (Lucas et al. 2017). In particular, the dominant species in the *Baccharis pilularis* Association are able to resprout from roots and root crowns after disturbance such as a fire (CNPS, n.d.). However, wildfires that are too frequent can shift chaparral habitats to non-native grassland and conversely, long intervals without fire can promote tree invasion (Keeley and Brennan 2012; Syphard et al. 2022; Lucas et al. 2017; Grupenhoff and Safford 2024). Other disturbances such as fuel treatment can also increase the risk of type conversion to non-native grasslands, depending upon the type and frequency of treatment (Martorano et al. 2020; Jones et al. 2023), specifically with higher levels of conversion documented by studies if treatments are frequent and intense resulting in substantial removal of living woody stem densities.

While some study findings vary, recent long-term research in northern California chaparral indicates that while mechanical (e.g., mastication) and prescribed fire treatments can elevate short-term non-native invasion risk—including annual grasses—native shrub diversity, including species like *Baccharis pilularis*, often recovers in the long term beyond 10 years (Potts

⁷ Imagery is available here: https://mil.library.ucsb.edu/apcatalog/report/report.php?filed_by=C-1595

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and Stephens 2009; Wilkin et al. 2017; Martorano et al. 2020). Cool-season prescribed fire appears especially effective at minimizing invasion and promoting native chaparral development (Potts and Stephens 2009). Additional research shows that hand thinning treatments, combined with prescribed fire, can reduce exotic species expansion and limit the risk of habitat type conversion in areas that are treated (Klip et al. 2020). High temperature-wildfire at stem bases can also adversely affect coyote brush (U.S. Forest Service, n.d.-d); the fuel treatments would reduce wildfire risk and intensity and would reduce the likelihood that a wildfire of sufficient temperature to harm chaparral on the project sites would occur. Because of the risk of invasive species spread, PDIFs IP-1 through IP-4 are incorporated into the proposed project, which involve preventing the spread of invasive species and prioritizing removal of invasive and highly flammable species, as well as dead and diseased vegetation.

While there are no native grassland communities at either site, the proposed project would encourage the growth of any native grasses and other species present on the project sites by conducting vegetation treatments in woodland and shrub communities. During post-treatment reviews of other project sites in San Rafael, new patches of native grasses have been observed growing where removal of non-native vegetation occurred. This indicates that there could be dormant native grass seeds lying present in some areas and that the removal of invasive, non-native vegetation could provide an opportunity for these native grasses to grow (Dadmun 2025).

Vegetation treatment activities proposed as part of the project would mimic natural disturbance similar to the pre-fire suppression low intensity wildfires. The types of treatments proposed would reduce the density of fire-hazardous shrubs and trees in the fuel reduction areas, including within sensitive vegetation communities found in the area (e.g., California bay forest and woodland alliance, bigleaf maple forest and woodland alliance), but only where fuel loads and fire risk are high under existing conditions. Forest litter comprised of dead and downed vegetation, such as dead shrubs and large downed limbs, would be removed. Manual and mechanical techniques would involve the use of powered and non-powered hand tools, masticators, chippers, skid steers, and other heavy equipment. Heavy equipment use may occur within riparian areas and sensitive vegetation communities. Vegetation thinning conducted as part of the proposed project would not result in type conversion of native communities. No heavy equipment would be used within any streambed or banks, which would minimize the risk of deposition of materials or rutting that could result in sedimentation. Project activities may occur within riparian areas but any vegetation trimming or thinning would be conducted by hand and alteration to and deposition of debris avoided within the bed, channel, or bank of a waterway (PDIF SH-1). As discussed under a), material would not be piled and burned in sensitive habitats (PDIF SH-3). Furthermore, air curtain burners, carbonators, and kilns would be staged away from riparian habitat and sensitive natural communities.

Broadcast burning in the San Rafael Hill fuel reduction zone would occur in sensitive communities. The broadcast burn area primarily consists of oak woodland communities. It is well known that indigenous peoples in California have burned within oak woodlands, which created heterogeneity in the landscape (Hankins 2022). Oak communities are well-adapted to

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fire, and large trees are usually fire-resistant due to their thick bark (CNPS n.d.). Oak woodland stands may attain 80 to 100 percent of their pre-fire densities within 10 years after a fire (CNPS n.d.). Broadcast burning would likely be beneficial for oak woodlands within the San Rafael Hill fuel reduction zone by removing competing undergrowth of woody species and creating space for new seedlings (NPS n.d.; Standiford 1994). Impacts on riparian habitats or other sensitive natural communities would be less than significant.

c) Would the proposed project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

No wetlands were identified within the fuel reduction zones. However, seasonal wetlands may be encountered within the fuel reduction zones, although there is a low potential due to the topography on the sites. Manual and mechanical treatment methods have the potential to degrade wetland communities from vegetation conversion, erosion through rutting, non-native, invasive species introduction from equipment and vehicles, and compaction of soils that alter their ability to support wetland species. Training would ensure that workers conducting manual and mechanical activities would avoid wetlands (PDIF ET-1). As discussed above, workers would clean equipment and handle vegetation to avoid spreading invasive species and plant pathogens (PDIFs IP-1, IP-2, IP-3). Ground-disturbing work (e.g., use of heavy equipment, pulling large vegetation) would not occur during rain events and would resume when precipitation stops, which would reduce the potential for rutting and subsequent erosion (PDIF GEO-3). Furthermore, heavy equipment would not be used when soils are saturated from a rain event (PDIF GEO-3). Pile burning would not occur in wetlands or other sensitive communities (PDIF SH-3). Broadcast burning, air curtain burning, carbonator use, and kiln burning would also not occur in wetlands habitats. Impacts to wetlands would be less than significant.

d) Would the proposed project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

The fuel reduction zones are undeveloped and surrounded by suburban developments. Some modification of existing habitats can be expected to occur due to vegetation management. The proposed project would thin non-native, invasive vegetation as well as native shrubs to create horizontal spacing due to high fuel loads from historic fire suppression. Broadcast burning would occur at the San Rafael Hill fuel reduction zone that would target the removal of surface fuels leaving the canopy intact. However, vegetation changes would not occur such that habitats would become unsuitable to wildlife or prohibit their movement within or through these vegetated open spaces. Temporary disturbance to wildlife movement may occur during vegetation management work from noise generated by equipment, vehicles, and crews operating within the fuel reduction zones as well as burn scars from broadcast burning in the San Rafael Hill fuel reduction zone, but these disturbances would be temporary in nature, localized in nature as the work occurs throughout the open space areas, and would not result in permanent detrimental changes to wildlife passage. The impact would be less than significant.

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e) Would the proposed project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

The San Rafael Hill and Deer Valley open space areas are owned and managed by the City of San Rafael, and subject to the City of San Rafael General Plan 2040 and code of ordinances. Section 11.12.050 of the City of San Rafael code of ordinances requires the submittal of a permit for the cutting, pruning, breaking, or injury of any living trees in, upon, or along any public street, sidewalk, or walkway in the city. The proposed project would not remove any trees along any public street, sidewalk, or walkway in the city. The proposed project would comply with Policy C-1.14: Control of Invasive Plants of the City of San Rafael 2040 General Plan which requires the removal and control of undesirable non-native plant species from City-owned open space. The City of San Rafael 2040 General Plan Policy C-1.13: Special Status Species requires the conservation and protection of special-status plants and animals and recommends avoidance of impacts to special-status species. As discussed under Impact Biological Resources-1, the proposed project would not impact special-status plant and wildlife species with implementation of Marin Wildfire's PDIFs (i.e., ET-1, ES-1, SH-3, HYD-5, IP-1, IP-2, IP-3, NB-1, NB-2, NB-3, NB-4, RB-1, RB-2, RB-3, RB-4, HAZ-5, NSO-4). Therefore, the proposed project would comply with Policy C-1.13 of the City of San Rafael 2040 General Plan. No impact would occur.

f) Would the proposed project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

There are no adopted Habitat Conservation Plans, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plans. Therefore, no impact would occur.

Mitigation Measures

BIO-1 Burrowing Owl Survey and Avoidance

A burrowing owl survey will occur where off-road equipment use or pile burning is planned to occur in areas of suitable grassland habitat at the Deer Valley fuel reduction zone, as follows:

Pre-Treatment Survey

One pretreatment survey for active burrowing owl burrows will be performed within 7 days prior to the start of treatment activities that have the potential to crush or destroy burrows, for treatments that will occur outside of the nesting season (September 1 through January 31). If none are found, no additional pretreatment surveys are needed for activities outside of the nesting season.

In accordance with PDIF NB-2, a pretreatment survey will be performed within 7 days prior to the start of noise-generating or other high disturbance activities during the nesting season (February 1 and August 31). The nesting surveys, which include specific searches for active burrows, will occur as often as needed. If during ongoing

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maintenance, it becomes clear that burrowing owls are not using the Deer Valley site outside of nesting season, no additional surveys would be required.

A report detailing the pretreatment survey(s) will be submitted to Marin Wildfire and San Rafael Fire Department prior to treatments commencing.

Avoidance Measures

If any actively used burrows are encountered during surveys outside the nesting season (September 1 through January 31), a 50-foot buffer around active burrows would be delineated. A 250-foot buffer around actively nesting or suspected to be actively nesting burrows would be delineated between February 1 and August 31. The biologist will have the authority to establish larger buffers around active nests and to stop work if owls are showing signs of distress.

Visible markers or flagging will be placed around the boundaries of the buffer and near active burrows to ensure that equipment and treatment activities do not collapse burrows.

BIO-2 Monarch Survey and Avoidance

If any treatments occur from February through April that have a potential to damage milkweed, Two species of milkweed are most likely to occur in the project site based on their identified range and field surveys: narrowleaf milkweed (*Asclepias fascicularis*) and showy milkweed (*Asclepias speciosa*). These plants begin to germinate as early as February and bloom through September. This mitigation measure is intended to protect milkweed plants during their above-ground lifecycle, and particularly during the monarch butterfly metamorphosis time period (March through June).

If any treatments occur from February through September that have a potential to damage milkweed species important as host plants to monarch butterflies and known to occur in Marin County (i.e., *Asclepias fascicularis*, *Asclepias speciosa*)— specifically pile burning, off-road equipment use, and string trimming in areas where native plants may be present at the Deer Valley fuel reduction zone—, a pretreatment survey for milkweed with identifiable monarch butterfly eggs, caterpillars, or chrysalis will be conducted. If milkweed plants are observed or suspected to be occupied by immature monarch butterflies, the plants will be flagged for avoidance. During the milkweed growing and blooming period, if substantial populations of unoccupied milkweed are observed at the Deer Valley fuel reduction zone, treatment activities will be staggered to ensure that not all milkweed individuals present are impacted simultaneously, in accordance with Natural Resources Conservation Service Conservation Practices (Borders et al. 2012). If it becomes evident that there is no milkweed in the Deer Valley site, no additional surveys will be required.

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2.2.5 Cultural Resources

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
5. CULTURAL RESOURCES. Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource pursuant to § 15064.5?	☐	☐	☒	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?	☐	☒	☐	☐
c) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☒	☐

Environmental Setting

Cultural Records Search

Overview

Five pre-field methods were conducted to identify previously documented cultural resources within the two project sites Area of Direct Impacts (ADI): literature review, records search, Sacred Lands File, archaeological site sensitivity assessment, and outreach and consultation with Native American tribes (see Section 2.2.18 for more information). A record search was conducted by the Northwest Information Center (NWIC) in Rohnert Park, California (NWIC File No. 23-1342) and assessed by Far Western Anthropological Research Group, Inc (Far Western) (Far Western 2024b). The records search indicated that no previous archaeological studies have been conducted for the project sites within the last 10 years and no previously documented archaeological sites have been identified within the ADI. The below section summarizes the results of these pre-field efforts and is presented below for each project site.

San Rafael Hill

The NWIC identified 25 previously recorded cultural resources within one-quarter mile of the ADI. Resources within one-quarter mile of the ADI include two precontact sites, one multi-component site (including precontact and historic-era artifacts), and 20 historic-era built environment resources (i.e., buildings and structures). One previously recorded built environment resource was identified within the ADI. The historic-era Robert Dollar House and Estate, now referred to as the Falkirk Cultural Center located at 1408 Mission and was listed on the National Register of Historic Places (NRHP) in 1972. The listing includes the house as well as the 12-acre surrounding grounds, which comprises both the formal grounds as well as the natural wooded area behind the grounds. The Giant Sequoia *Glaucia* on the property has historical significance to the Robert Dollar House and Estate. The house and estate grounds are considered historically significant for their architecture, art, and landscaped elements. The San Rafael Hill project site was identified as having a low potential for subsurface and buried archaeological deposits.

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Deer Valley

The NWIC identified eight previously recorded cultural resources within one-quarter mile of the ADI. None of the cultural resources intersect the ADI. Resources within one-quarter mile of the ADI include seven precontact sites and one historic-era built environment resource. The Deer Valley project site was identified as having a low potential for subsurface and buried archaeological deposits.

Cultural Resources Survey

Overview

As a result of the pre-field efforts and consultation with the Federated Indians of Graton Rancheria (Graton Rancheria), Far Western and Graton Rancheria performed a cultural resources pedestrian survey on June 26, 2024 and July 31, 2024 within each project site ADI to identify any cultural resources (Far Western 2024a). The survey work was conducted in transects approximately 15 meters apart using geographic features, printed maps, and a submeter Global Positioning System (GPS) unit to determine survey boundaries. All exposed areas were examined for the presence of cultural materials. Most of the survey area was accessible with the exception of areas with slopes over 30 percent, impenetrable vegetation, and private property without an approved right-to-enter. Ground visibility was generally poor during the survey due to the presence of dense non-native grasses that obscured the ground surface.

San Rafael Hill

The survey identified one previously recorded built environment resource (i.e., Robert Dollar House and Estate) and one newly identified precontact archaeological site. The newly identified site was mapped and photographed, and a California Department of Parks and Recreation (DPR 523) form was completed in accordance with PDIF CUL-2 and submitted to the NWIC and Graton Rancheria. During the survey at the San Rafael Hill fuel reduction zone, goats were observed grazing north of the available survey area, and it appeared that goats had previously grazed in that the project site area, including the location of the newly identified resource.

Deer Valley

No archaeological resources were identified at the Deer Valley fuel reduction zone during the survey.

Discussion

- a) **Would the proposed project result in a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5(a)?**

Under CEQA, a project may cause a substantial adverse change in the significance of a historical resource through demolition, destruction, relocation, or alteration of a resource or its immediate surroundings. Changes to a historic property or resource are considered adverse when the project could diminish the integrity of the property's or resource's location, setting, materials, workmanship, feeling, or association.

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No NRHP or CRHR-listed resources were identified within or adjacent to the Deer Valley fuel reduction zone. As discussed above, the Robert Dollar House and Estate, an NRHP-listed resource, is located within the San Rafael Hill fuel reduction zone. The Robert Dollar House and Estate and manicured landscaping would not be subject to any of the fuel reduction activities. No vegetation, including plants or trees, would be pruned or removed within the landscaped portion of the Robert Dollar House and Estate. The Giant Sequoia *Glaucia* on the property is not proposed to be trimmed as part of this project. Fuel reduction activities could be implemented in the natural wooded area behind the grounds that are within the property. PDIF CUL-3, which is incorporated into the proposed project, provides that monitoring may be identified as an appropriate measure for activities conducted in and around previously documented cultural resources. In accordance with PDIF CUL-3, cultural resource monitoring would be conducted to avoid impacts to the wooded areas on the Robert Dollar House and Estate. Any fuel reduction activities in the wooded portion of the property would be limited to the pruning of overgrowth and understory shrubs, and the removal of small trees, which would not change or alter the important elements of the wooded hillside area that conveys the property's historical significance, as the mature, native trees that comprise the landscape feature would not be removed. The woodland hillside area would remain a landscape feature of the district and would not be adversely impacted by the proposed vegetation management activities. While ground disturbing work within the Robert Dollar House and Estate wooded areas is not anticipated, a qualified archaeologist would be present during any ground disturbing work, such as use of off-road equipment, to ensure the Robert Dollar House and Estate is avoided and protected during project implementation (PDIF CUL-3). The documentation efforts would be recorded on DPR 523 forms at the Falkirk Cultural Center and submitted to the NWIC.

Pile and broadcast burning conducted at the San Rafael Hill fuel reduction zone would avoid the Robert Dollar House and Estate. Pile burning would be conducted in areas away from the Robert Dollar House and Estate in areas devoid of vegetation. In the event that the broadcast burn escapes the limits of the burn unit, the Robert Dollar House and Estate could be impacted by fire. Fire engines, hydrants, and other fire suppression equipment would be onsite during burn activities in the event of an uncontrolled fire. In accordance with PDIF CUL-3, monitoring was identified by a qualified archaeologist as an appropriate measure to avoid damage to the Robert Dollar House and Estate while broadcast burning. While broadcast burning would not occur near the Robert Dollar House and Estate, post-burn spot monitoring would be conducted to examine the ground for evidence of cultural resources that may have been previously obscured by vegetation (PDIF CUL-3). Workers would participate in a cultural resource sensitivity and awareness training for both project sites prior to project implementation (PDIF CUL-1). Impacts on historic resources would be less than significant.

b) Would the proposed project result in a substantial adverse change to a unique archaeological resource pursuant to Section 15064.5?

In accordance with PDIF CUL-3, a cultural resources records search and background review was conducted for both of the fuel reduction zones. The search determined that the Deer Valley project site has not been previously surveyed and no NRHP or CRHR-listed resources were

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identified. The record search of the San Rafael Hill project site identified one previously recorded NRHP-listed resource within the ADI. While the ADI for Deer Valley and San Rafael Hill indicated low potential for buried archaeological deposits, a pedestrian survey was warranted to investigate the potential presence of surface archaeological sites. Furthermore, Graton Rancheria commented that portions of the fuel reduction zones may be sensitive for encountering unrecorded Native American resources. As a result, a site-specific survey was conducted for this project area primarily to address the proposed use of broadcast burning and off-road operation of BurnBots, which have the potential to damage cultural resources, if present. Archaeological surveys conducted at the fuel reduction zones did not identify any resources within the Deer Valley fuel reduction zone, but one new precontact archaeological resource was identified at the San Rafael Hill fuel reduction zone (Far Western 2024a).

The documented boundary of the precontact resource identified at the San Rafael Hill fuel reduction zone would be flagged by a qualified archaeologist and Graton Rancheria tribal monitor prior to treatment in the area to ensure adherence to the avoidance and monitoring measures and that flagging would be removed upon completion of the planned work per PDIF CUL-3. In accordance with PDIF CUL-3, the qualified archaeologist and Graton Rancheria tribal monitor determined that minimal tree limbing or vegetation trimming with mechanical tools would be permitted within the flagged area under the careful guidance and observation of a qualified archaeologist and tribal monitor, if available. Full-time monitoring would occur during all treatment activities within 50 feet of the archaeological site, consistent with the requirements developed by the archaeologist and tribal monitor for this resource per PDIF CUL-3 (Far Western 2024a).

Previously undiscovered archaeological resources could be encountered during ground disturbance or treatment activities. Buried archaeological resources are unlikely to be encountered during treatment activities due to the limited nature and footprint of the work to near surface activities. The treatments that would be implemented as part of the proposed project include surface disturbance associated with the maneuvering of mechanical equipment including crushing existing vegetation as well as removal of broom or other non-native species that requires pulling up the roots. Tracked equipment would be used for fuel reduction activities off existing trails and roads to conduct mastication and vegetation cutting. Vehicles would typically operate from existing established roads. Off-road equipment use could disturb the top layer of soil that could unearth or damage previously undiscovered cultural resources at either of the fuel reduction zones. Use of equipment could also crush and damage cultural resources on or directly below the soil surface. Tracked vehicles used for mastication and areas where extensive pulling of invasive species could occur and disturb soils, would occur in areas that are densely vegetated under existing conditions in some cases with poison oak, making observation of resources via a pre-treatment survey difficult to impossible. As discussed above, vegetation treatments apart from the proposed project, including goat grazing, have occurred at the fuel reduction zones. Workers during those previous treatments did not identify any cultural resources. While workers did not identify any cultural resources during previous treatments, potential resources that were not identified during the surveys may still be present

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at the fuel reduction zones. PDIF CUL-3 provides for monitoring, if identified as an appropriate measure by a qualified archaeologist and tribal monitor. In certain locations where surface and sub-surface disturbance could occur, spot monitoring by monitors may be appropriate to determine whether any cultural resources are unearthed by treatment activities to minimize risk of erosion or vandalism of potential resources following exposure. In accordance with the qualified archaeologist and Graton Rancheria tribal monitor per PDIF CUL-3, spot monitoring would be conducted following treatments to identify any potential cultural resources that were previously obscured by vegetation.

Treatments also include the potential for pile burning and broadcast burning. Pile burning may be implemented particularly in areas where hauling vegetation out or where access by a chipper is a challenge due to topography. Heat from broadcast burning and pile burning may scorch, create a buildup of residue on the resource, fracture the resource, or destroy the resource (Sturdevant et al. 2009). Pile burning and broadcast burning would pose little-to-no risk of ground disturbance because ignition is performed by hand application to the surface. Pile burning would be primarily conducted in areas devoid of vegetation or plant litter. Pile burning would only occur in areas that have been identified and inspected for the presence of cultural resources depending on the location and previous use, as appropriate, or in areas that have had a cultural survey conducted and evidence of no resources to ensure avoidance of any cultural resources (PDIF CUL-3). Broadcast burning conducted at the San Rafael Hill fuel reduction zone would avoid the known precontact archaeological resource. However, impacts to known cultural resources could occur if the broadcast burn escapes the limits of the burn unit. As discussed under Impact a), fire engines, hydrants, and other fire suppression equipment would be on site during burn activities in the event of an uncontrolled fire. Most buried cultural resources would not be affected by broadcast and pile burning. Control line installation for broadcast burning activities could disturb the top layer of soil that could disturb cultural resources. Broadcast burning is not proposed near the newly identified precontact site, however, post-burn spot monitoring would be conducted to examine the ground for evidence of cultural resources that may have been previously obscured by vegetation as identified by the qualified archaeologist and tribal monitor (PDIF CUL-3).

Workers would participate in a cultural resource sensitivity and awareness training for both project sites prior to project implementation (PDIF CUL-1). Areas devoid of vegetation or plant litter are readily observable by the workers who would avoid any potential resources as per the worker training. Should a previously unidentified cultural resource be discovered during the work, work would halt in the area and the resource would be fully avoided and assessed by the archaeological monitor and tribal monitor, if available (PDIF CUL-2). If any resources are discovered during implementation that require monitoring for treatment to continue in the area, a qualified archaeologist and tribal monitor would be present to determine the appropriate level of monitoring and oversight, (PDIF CUL-5). In accordance with Mitigation Measure CUL-1, site record documentation would be prepared (DPR 523 forms) and shared with Graton Rancheria for review and input (for precontact/Native American sites) prior to

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submittal to the NWIC (refer to Section 2.2.18 for more information). Impacts on archaeological resources would be less than significant with mitigation.

c) Would the proposed project disturb any human remains, including those interred outside of formal cemeteries?

Although no known cemeteries and/or burials have been documented at the fuel reduction zones, the inadvertent discovery of unknown human remains and associated funerary objects during construction from ground-disturbing activities is possible. Several vegetation management methods may directly expose or disturb human remains, particularly removal of vegetation with heavy equipment. Areas in Marin County near bay shorelines, perennial creeks in lowland valleys and within or in proximity to known Native American sites have a high potential for encountering human remains than other areas, such as along peaks and ridgelines. Given the lack of perennial creeks at the site, it is unlikely that human remains are located within the project sites. The proposed project would be subject to the provisions of Section 7050.5 of the California Health and Safety Code, with respect to the discovery of human remains. Section 5097.98 of the PRC would regulate the treatment and disposition of human remains encountered during vegetation treatment activities. Impacts on human remains would be less than significant.

Mitigation Measures

CUL-1 Review of Draft California State Department of Parks and Recreation Cultural Resource Record Form

All California State Department of Parks and Recreation (DPR 523) cultural resource record forms drafted per PDIF CUL-2 for any precontact resources or Tribal Cultural Resources encountered during project activities will be provided to Graton Rancheria THPO for review and feedback. Graton Rancheria will provide any feedback on the draft DPR forms within 20 workdays or request an extension for review for another 20 workdays. After this review period, the final DPR 523 form will be submitted to the Northwest Information Center (NWIC) and to Graton Rancheria for their records.

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2.2.6 Energy

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
6. ENERGY. Would the project:				
a) Result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation?	☐	☐	☒	☐
b) Conflict with or obstruct a State or local plan for renewable energy or energy efficiency?	☐	☐	☒	☐

Environmental Setting

The San Rafael Hill and Deer Valley project sites do not contain major facilities that require energy consumption, although there are a few existing structures within the project sites that consume some energy including the Falkirk Cultural Center. Existing maintenance activities, such as landscaping, use vehicles and equipment which use energy.

Discussion

a) Would the proposed project result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation?

Vehicles and handheld and ground-based equipment used during treatment activities would consume energy in the form of petroleum products, notably gas and diesel. Consumption of energy would be temporary, lasting approximately 6 weeks during initial implementation at each site and approximately 1 to 2 days per broadcast burn unit. Worker trips requiring the use of gasoline would occur daily. The use of fuel to implement the initial treatments would be minimal and the proposed fuel consumption would not be considered wasteful because the only fuel used would be required for the proposed project. The proposed project would have an overall positive outcome by creating fuel reduction zones with decreased wildfire hazards in open space areas surrounded by the community. CARB in its 2022 Scoping Plan for Achieving Carbon Neutrality included the proactive management of forests and shrublands as a recommended action which can lessen the loss of carbon due to wildfires (California Air Resources Board 2022c).

Maintenance activities are anticipated to be similar to the proposed treatment activities but would likely require less energy than initial treatment activities due to the frequency of maintenance activities. Similar to initial treatment activities, maintenance of the fuel reduction zones would be temporary and occur over short periods of time each year. Therefore, the proposed project would not cause a significant impact due to wasteful, inefficient, or unnecessary consumption of energy resources. Impacts would be less than significant.

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b) Would the proposed project conflict with or obstruct a State or local plan for renewable energy or energy efficiency?

The proposed project is a vegetation treatment project in open space areas. Vehicle engines and fuel used during implementation of the proposed project would comply with State and local energy reduction and efficiency requirements such as the goals and policies set forth in the Low Carbon Fuel Standard (LCFS) (California Air Resources Board, n.d.-c). The LCFS aims to impact greenhouse gas emission reduction by addressing vehicle technology improvements, fuel consumption reduction, and the increase transportation mobility option (California Air Resources Board, n.d.-c). The Advanced Clean Cars program combines several regulations, including low-emission vehicle criteria, greenhouse gas regulations and zero-emission vehicle regulations (California Air Resources Board, n.d.-b). The Advanced Clean Cars Program was adopted in 2012, addressing model years 2015 through 2025 (California Air Resources Board, n.d.-b). Additionally, the CARB Advanced Clean Cars II program will continue to scale down light-duty passenger car, pickup truck, and SUV emissions starting with 2026 models and extending through 2035 models (California Air Resources Board, n.d.-a). For these reasons, implementation of the proposed project would not conflict or obstruct with a state or local plan for renewable energy or energy efficiency. Impacts would be less than significant.

Mitigation Measures

No mitigation measures are required.

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2.2.7 Geology and Soils

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
7. GEOLOGY AND SOILS. Would the project:				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist–Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☒	☐
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project and, potentially, result in on- or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	☒	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒

Environmental Setting

Geology

The underlying geology at the San Rafael Hill project site consists of Franciscan complex mélange and Franciscan complex, chert (Cretaceous and Jurassic). This site has slopes of 15 to 30 percent (Topographic-Map.com n.d.). The underlying geology at the Deer Valley project site

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consists of Franciscan complex, sandstone, and shale (late Cretaceous) (Marin County, n.d.-c). The Deer Valley project site has slopes of 30 to 50 percent (Topographic-Map.com n.d.). Franciscan mélange is a weak matrix of sheared and altered shale and sandstone that contains serpentine, greenstone, chert, limestone, and schist. Franciscan mélange is susceptible to landslides, whereas Franciscan sandstone and shale are more stable (City of San Rafael 2021).

Seismicity and Ground Shaking

The San Andreas Fault Zone dominates this geologically active area and is located approximately 11 miles west of the project sites. The San Andreas Fault system forms the boundary between the North American and Pacific tectonic plates. There are two pre-quaternary faults nearby the San Rafael Hill Project site; one is located approximately 0.2 mile northeast of the site and the other is approximately 0.3 mile southwest of the site (California Department of Conservation 2015). One pre-quaternary fault runs alongside the northern portion of the Deer Valley Project site (California Department of Conservation 2015). Pre-quaternary faults are older than 1.6 million years and are not necessarily active. The project area is not located within a mapped Earthquake Fault Zone as defined by the Alquist-Priolo Act of 1972 and there are no known earthquake faults that could result in surface rupture within the project sites; however, the project area is subject to strong seismic ground shaking in the event of a large magnitude earthquake on these nearby faults.

The severity of ground shaking depends on several variables, such as the earthquake magnitude and epicenter; underlying geology, including the properties of unconsolidated sediments; groundwater conditions; and topographic setting. In general, ground shaking hazards are most pronounced in areas that are underlain by loosely consolidated soil/sediment (City of San Rafael 2021). The project sites are in areas that are considered to have the least amount of ground shaking to some ground shaking due to their distance from known active faults (Branum et al. 2016).

Liquefaction and Lateral Spreading

Liquefaction typically occurs in areas where moist, fine-grained, cohesionless sediment or fill materials are subjected to strong, seismically induced ground shaking. Strong ground shaking can trigger liquefaction in loose granular soils in saturated conditions (City of San Rafael 2021). The project sites are located in areas with little to no potential for liquefaction to occur (Marin County, n.d.-c). Under certain circumstances, ground shaking can temporarily transform an otherwise solid material to a fluid state, which can result in the horizontal movement of soils on gentle slopes, called lateral spreading. Due to the minimal potential for liquefaction and moderate to steep slopes throughout the sites, lateral spreading also has little to no potential to occur.

Landslides

A landslide refers to the downslope movement of materials such as rock, soil, or fill under the direct influence of gravity. The presence of landslides is due to several influences and factors related to slope stability, including slope angle, weathering, climate, water content, vegetation, overloading, erosion, earthquakes, and human-induced factors. The underlying geologic units

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and soil conditions, in addition the slope stability factors are key in determining susceptibility to destabilization. The San Rafael Hill project site is surrounded by areas with higher susceptibility to landslide events but not within the project site itself, whereas a portion of the Deer Valley project site is indicated as having a probable potential for landslide events (U.S. Geological Survey n.d). The potential threat of a significant number of failures occurring at the same time is greatest during strong seismic shaking or during intense rainfall events. Evidence of historic landslides is present at both sites. The San Rafael Hill project site is comprised of areas with few and mostly landslides⁸. The Deer Valley project site is mostly shown as an area with few landslides with a swath of land shown to be mostly landslides (Marin County, n.d.-c). This data is used to predict where future landslides could occur. Some small proportion of the identified historic landslides may become active in any one year, with movements concentrated within all or part of the landslide masses or around their edges.

Soils

Soils within the San Rafael Hill project site are comprised mostly of Tocaloma-Saurin Association, Extremely Steep, with a small portion comprised of Tocaloma-McMullin-Urban Land Complex, 15 to 30 Percent Slopes. Tocaloma-Saurin association is characterized as fine, loamy, moderately well-draining soils typically found on uplands. Tocaloma-McMullin complex is characterized as weathered from soft sandstone or shale, well drained deep soil, and with moderate to moderately rapid permeability with a very low to low water capacity. Tocaloma soils are well-drained, moderate permeability soils formed from sandstone or shale, with an average depth of between 20 and 40 inches to bedrock. Runoff is characterized as rapid, and the erosion hazard is high. Tocaloma soils are found on north and east-facing slopes and in drainages (Natural Resources Conservation Service 2024). Soils within the Deer Valley project site are comprised of Saurin-Bonnydoon Complex, 30 to 50 Percent Slopes (Marin County, n.d.-c). Saurin soils are moderately drained, formed from sandstone or shale, with an average depth of between 20 to 40 inches to bedrock. Runoff is characterized as rapid, and the erosion hazard is high. Saurin soils are found on ridgetops and side slopes.

Subsidence and Expansive Soil

Subsidence commonly occurs in areas containing artificial fill and bay mud materials. The project sites are not within areas of potential subsidence (U.S. Geological Survey n.d.). Expansive soils are typically very fine grained with a high to very high percentage of clay, typically montmorillonite, smectite, or bentonite clay. They exist in localized areas such as the

⁸ The Marin County landslide data defines the landslide risk as follows: few landslides are areas that contain few, if any, large mapped landslides, but locally contains scattered small landslides and questionably identified larger landslides; defined in most of the region by excluding groups of mapped landslides but defined directly in areas containing the 'Many Landslides' unit by drawing envelopes around areas free of mapped landslides. Mostly landslide is defined as areas that consists of mapped landslides, intervening areas typically narrower than 1500 feet, and narrow borders around landslides; defined by drawing envelopes around groups of mapped landslides.

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bay mud geologic units. The project sites are not within areas of expansive soils (Marin County 2023).

Paleontology

Paleontological resources are the fossilized remains of organisms from prehistoric environments found in geologic strata, typically sedimentary formations. The underlying geologic formations are important in determining whether fossils may be present. Paleontological resources include fossils of life that existed prior to the start of the Holocene Epoch, approximately 11,700 years ago. The Franciscan Complex dates to the Jurassic Period, approximately 88 to 124 million years ago. The Franciscan complex has produced only small collections of significant fossils, none of which occurred in Marin County (Bero et al. 2020). Generally, vertebrate and marine fossils in the Franciscan Complex are extremely rare though micro-fossils, including single-celled organisms, are sometimes found, particularly in cherts.

Discussion

- a) **Would the proposed project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:**
 - i) **Rupture of a known earthquake fault, as delineated on the most recent Alquist–Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.**

The fuel reduction zones are not located within a mapped Earthquake Fault Zone as defined by the Alquist-Priolo Act. There are no known earthquake faults that intersect the fuel reduction zones that could result in surface rupture.

- ii) **Strong seismic ground shaking?**

The fuel reduction zones are in areas that are considered to have the least amount of ground shaking to some ground shaking due to their distance from known active faults.

- iii) **Seismic-related ground failure, including liquefaction?**

The fuel reduction zones have little to no potential for liquefaction.

- iv) **Landslides?**

The fuel reduction zones are in areas with some potential for landslides and with evidence of historic landslides, which are discussed more in impacts b) and c) below. Workers may be at risk of injury or death from vegetation management activities if activities are conducted in an area where fault rupture, seismic-related ground failure, or landslide occur; however, seismic ground shaking events are unpredictable, and the potential occurrence of such events coinciding with the proposed project is minimal. The proposed project does not include construction of any structures that could pose a safety hazard to contractor crew conducting the fuel proposed project in the event of an earthquake. Implementation of the proposed project would not alter or introduce new risk of loss, injury, or death as a result of fault rupture, ground shaking, liquefaction, or landslide. Impacts would be less than significant.

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b) Would the proposed project result in substantial soil erosion or the loss of topsoil?

Implementation of the proposed project would include treatments that could cause erosion and loss of topsoil through removal of vegetation covering slopes and exposure of bare soil, and through the removal of plants by the root systems that bind soil, particularly on slopes. Removal of vegetation could also result in increased speeds of surface flows during storm events and subsequent erosion. Additionally, implementation of the proposed project would involve some level of off-road travel by equipment with the potential to disturb soils and accelerate erosion, although existing roads and trails will be used when feasible. Erosion could degrade soil nutrient levels and could result in downstream sedimentation. Natural rates of erosion can vary depending on slope, soil type, and vegetative cover. The soils underlying the fuel reduction zones have a very high erosion potential. Additionally, the fuel reduction zones are in areas with moderate to steep slopes, which could exacerbate erosion in areas with bare soils or disturbance after treatment.

Broadcast burning would require the installation of control lines that are linear areas cleared of vegetation through mowing, scraping, wetting, blacklining, or mastication to contain the burn to the intended burn unit. Control lines, particularly if scraped, created for the broadcast burn would result in additional denuded areas that are more prone to erosion. Broadcast burning would result in the removal of vegetation on the surface, increasing the potential for erosion in the burned area. Water-repellent, or hydrophobic, soils can be created within areas that burn at a moderate to high intensity and severity (including, to a lesser extent, within broadcast burns). Storm water can then flow more quickly over the exposed soils and pick up silt and small soil particles, eroding the surface at a greater rate. Broadcast burns would take place in areas where vegetation management activities have reduced fuel loading and, therefore, reduced fire intensity and severity would make it unlikely that project activities would create hydrophobic soil conditions. Groundcover of less than 70 percent has been found to result in excessive runoff and erosion (Lang and McDonald 2005). The proposed project would include the implementation of PDIFs GEO-1 and GEO-3 that would reduce the potential for landslides. The implementation of PDIF GEO-1 requires that soils be stabilized if a vegetation management activity leaves less than 70 percent groundcover or native mulch/organic material. In accordance with PDIF GEO-1, for areas with 50 percent to 70 percent ground cover left, erosion control measures may include sowing native grasses and other native vegetation, using slash or chips to prevent erosion, installing biodegradable erosion control measures and geotextiles (e.g., coir, jute), and installing sediment control devices. For areas with less than 50 percent ground cover, a qualified professional would determine whether project activities could result in substantial sediment discharge from soil disturbance (PDIF GEO-1). PDIF GEO-1 additionally requires areas to be inspected by a qualified professional until slopes have stabilized or groundcover exceeds 70 percent. PDIF GEO-3 would also be implemented, which requires that any ground disturbing treatment would not occur during any rain event, and that any area with ground disturbance would be inspected after a rain event to ensure the ground is properly stabilized to prevent any soil erosion that could lead to landslide. PDIF GEO-3 further requires any area of erosion that will result in substantial sediment discharge to be remediated within 48 hours of a rain event. Additionally, it requires that activities with ground disturbance be

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inspected by a qualified professional for proper erosion control, and that erosion control measures be implemented prior to the first rainfall event (PDIF GEO-3). Because the proposed project includes implementation of PDIFs to reduce erosion, the impact would be less than significant.

c) Would the proposed project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the proposed project and, potentially, result in on- or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse?

As discussed above, the fuel reduction zones are not at risk for subsidence, liquefaction, lateral spreading, or collapse, and these topics will not be discussed further.

Steep slopes, and soil types, namely Saurin soils, in the fuel reduction zones render the areas susceptible to landslides particularly during intense rainfall events that quickly saturate the soil. Landslides are a significant geologic hazard that have the risk of occurring at the project sites based on existing site conditions. Landslides are a natural part of the landscape and are a continuous geologic process that creates unique landforms and hillside topography important to the ecological environment. This natural process, however, can be hastened or worsened by human-induced alteration of the land such as where comparatively large areas of tree removal or slopes are cut into or fills are placed on slopes resulting in changing the slope equilibrium from a state of stability to one of instability due to the removal of root support (California Geological Survey 2013). Since the fuel reduction zones may be vulnerable to landslides, mudslides, and slope instability due to the relatively steep hillsides and soil type, implementation of the proposed project could result in a risk to property or public safety because of the habitable structures and public roads downslope from the fuel reduction areas, depending upon the treatment methods. As discussed above, the fuel reduction zones are not at risk for subsidence, liquefaction, lateral spreading, or collapse, and these topics will not be discussed further.

As discussed under impact b), the fuel reduction zones may be vulnerable to landslides due to the steep hillsides and soil types, which could result in a risk to property or public safety because of the habitable structures and public roads downslope from the fuel reduction areas, depending upon the treatment methods. Manual treatments include use of hand tools and hand-operated power tools to cut, clear, girdle, or prune herbaceous woody species and remove dead woody vegetation and low-lying shrubs and brush as well as trees. Invasive species removal would occur via pulling, cutting, and/or herbicide treatment. Mechanical treatment methods of vegetation removal often include cutting or scalping of vegetation at the surface, leaving roots intact, which would also minimize the potential for slope failures or landslides. The proposed project would include motorized equipment that would be used to cut uproot crush/compact, masticate, or chop existing vegetation, but no tilling or discing would occur. These treatments could expose more soil to rainfall saturation of the fuel reduction zones.

Broadcast burning and pile burning would remove surface vegetation that could potentially result in destabilization. Soil heating from moderate to high severity fires can create a hydrophobic soil layer that can increase stormwater runoff rates and associated erosion.

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Broadcast burns would be relatively low in intensity and take place in areas where vegetation management activities have reduced fuel loading and, therefore, it is unlikely that project activities would create hydrophobic soil conditions. Pile burning, if implemented, would be localized and relatively small in size. Although pile burning can increase hydrophobic soils, the burn scars would not occur across any areas significant enough to result in increased erosion (Atwood et al. 2023). Burn scars from broadcast burning as well as scraping and blacklining for the installation of control lines at the San Rafael Hill fuel reduction zone could result in an increase in erosion. However, existing roads and trails would be prioritized as control lines and broadcast burns would be generally lower in intensity. Stormwater can flow over the exposed soils and pick up silt and small soil particles, eroding the surface. Plant root systems provide cohesion to surface soils and reduce soil water content, which tends to reduce the possibility for landslides. The magnitude of decrease in soil cohesion would depend on the existing level of slope stability, dependence on root systems for stability and density of vegetation in the area, and intensity of root system removal (e.g., removal of weeds over a large area versus spot removal).

As mentioned above, the implementation of the proposed project would require vehicle travel and potential off-road travel which could reduce soil structure and cohesion, resulting in potentially higher rates of erosion. Proposed project treatments that expose soil to more saturation from rain events may increase landslides, primarily through vegetation removal that can weaken soil matrix strength. Because the fuel reduction zones are underlain by soils that erode easily, and geology that is susceptible to landslides, the proposed project could become unstable as a result of the project, potentially resulting in an on- or off-site landslide. The fuel reduction zones are located along or near roads and habitable structures and the decreased slope stability could result in a greater landslide or debris flow risk that could affect important infrastructure and habitats.

As discussed under impacts a) and b), the proposed project would include the implementation of PDIFs GEO-1 and GEO-3 that would reduce these potential risks. The implementation of PDIF GEO-1 requires that soils be stabilized if a vegetation management activity leaves less than 70 percent groundcover or native mulch/organic material. PDIF GEO-3 would also be implemented, which requires that any ground disturbing treatment would not occur during any rain event, and that any area with ground disturbance would be inspected after a rain event to ensure the ground is properly stabilized to prevent any soil erosion that could lead to landslide. With the implementation of the PDIFs, the impacts would be less than significant.

d) Would the proposed project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

The fuel reduction zones are not within areas of expansive soils. The proposed project would not involve construction of new structures that could result in risks to life or property associated with expansive soil. Implementation of the proposed project would not result in an impact associated with substantial direct or indirect risks to life or property associated with expansive soils. No impact would occur.

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- e) **Would the proposed project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?**

Implementation of the proposed project would not include installation or use of any septic tanks or alternative wastewater disposal systems. Depending upon the scale of implementation, it is possible that portable potties could be used for crews which would be managed by a licensed facility. For these reasons, implementation of the proposed project would result in no impact associated with septic tanks and alternative wastewater disposal systems.

- f) **Would the proposed project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?**

Soil disturbance is minimal for most activities included in the proposed project. Vegetation removal would not disturb soil depths in excess of the depth of shrub roots. Trees would typically be cut and the stump left in place unless the stump poses a hazard. The potential for ground-disturbing activities to uncover and destroy a unique paleontological resource, therefore, is very unlikely because resources are usually found at least a few feet but often many feet below the ground surface. Additionally, unique paleontological resources are not typically found in the Franciscan Complex. For these reasons, no impact on unique paleontological resources or geologic features would occur.

Mitigation Measures

No mitigation measures would be required.

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2.2.8 Greenhouse Gas Emissions

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
8. GREENHOUSE GAS EMISSIONS. Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

Environmental Setting

Greenhouse Gas Emissions

Greenhouse gas (GHG) emissions are global pollutants, unlike criteria air pollutants and toxic air contaminants. Gases that trap heat in the atmosphere are referred to as GHGs because they capture heat radiated from the sun as it is reflected back into the atmosphere, much like a greenhouse does. The accumulation of GHGs is the driving force for global climate change, which can result in increased temperatures; changes in snow and rainfall patterns; and an increase in droughts, tropical storms, heavy rain events, and an increased potential for catastrophic wildfires. The primary GHGs are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), ozone, and water vapor.

Although GHGs occur naturally in the atmosphere, CO₂, CH₄, and N₂O are also emitted from human activities, accelerating the rate at which these compounds occur in Earth's atmosphere. Emissions of CO₂ are mainly by-products of fossil fuel combustion, whereas methane results from off-gassing associated with agricultural practices, coal mines, and landfills. Other GHGs include hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, and they are generated in certain industrial processes.

CO₂ is the reference gas for climate change effects because it is the predominant GHG emitted. The effect that each of the aforementioned gases can have on global warming is a combination of the mass of their emissions and their global warming potential (GWP). GWP indicates, on a pound-for-pound basis, how much a gas is predicted to contribute to global warming relative to how much warming would be predicted to be caused by the same mass of CO₂. CH₄ and N₂O are substantially more potent GHGs than CO₂, with GWPs of 27 to 30 and 273 times that of CO₂, respectively (U.S. Environmental Protection Agency 2024b).

In emissions inventories, GHG emissions are typically reported in terms of pounds or metric tons of CO₂ equivalents (CO₂e). CO₂e is calculated as the product of the mass emitted of a given GHG and its specific GWP. Although CH₄ and N₂O have much higher GWPs than CO₂, CO₂ is emitted in such vastly higher quantities that it accounts for the majority of GHG emissions in CO₂e (Intergovernmental Panel on Climate Change 2023).

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Major sources of greenhouse gas emissions in the city of San Rafael are electricity, natural gas, transportation, and waste disposal. Overall emissions in the City have reduced by 14 percent from 1990 levels (Marin Climate & Energy Partnership and City of San Rafael 2021).

Carbon Sequestration

Carbon sequestration is the process by which atmospheric CO₂ is absorbed by vegetation through photosynthesis and stored as carbon in trunks, branches, foliage, roots, and soils and also in forest litter. Carbon sequestration in terrestrial ecosystems is defined as the net removal of CO₂ from the atmosphere into long-lived stocks of carbon (Shaw et al. 2009). Forests serve as large reservoirs of sequestered carbon. In the U.S., forest carbon sinks have been estimated to offset between 12 and 19 percent of the nation's total carbon emissions (Ryan et al. 2010). Forests store carbon in virtually all their components: soils, litter (forest floor), understory, and trees (Wayburn et al. 2007). Forest-soil carbon is a large, reasonably stable pool (Scharlemann et al. 2014). Grasslands contain approximately 12 percent of the terrestrial carbon stocks in the world. Approximately 81 percent of the carbon is stored in the soil of a grassland, with most of the remaining carbon stored in the belowground biomass of the grasses (U.S. Forest Service 2017).

Wildland fire is the single largest source of carbon storage loss and GHG emissions from forested lands. In California, an estimated 120 million metric tons of carbon was lost through wildland fire over the period from 2001 to 2010, out of a total estimated carbon storage loss of 150 million metric tons, where the balance was lost from tree thinning, prescribed fire and other vegetation management or removal activities (California Air Resources Board 2017). An estimated 20 million acres of forestland in California has a high wildland fire threat that would benefit from fuels reduction treatment, which would serve to both reduce the risk of wildland fire (and the resulting carbon loss and GHG emissions) and improve ecosystem health (CAL FIRE 2016).

Assembly Bill 32 (California Global Warming Solutions Act of 2006)

AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and establishes a cap on statewide GHG emissions. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. This reduction has been accomplished by enforcing a statewide cap on GHG emissions that was phased in starting in 2012. Towards this progress, in 2018, California emitted approximately 425 million metric tons of CO_{2e}, 6 million metric tons of CO_{2e} below the 2020 GHG limit of 431 million metric tons of CO_{2e} and 2 million metric tons of CO_{2e} below the 1990 GHG limit of 427 million metric tons of CO_{2e}. To effectively implement the cap, CARB developed and has implemented regulations to reduce statewide GHG emissions from stationary sources. The State has taken these measures because no project individually could have a major impact (either positively or negatively) on the global concentration of GHG emissions.

California Air Resources Board – California Forest Carbon Plan

California's Natural and Working Lands (previously the Forest Sector) play a role in helping California meet the GHG reduction goals. These lands include both forests and rangelands and can act as both a carbon source and sink, with the levels of each fluctuating widely from year to

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year based on climatic and biotic factors that impact vegetative growth. The scoping plans, as well as the Final California Forest Carbon Plan (Forest Climate Action Team 2018) recognize that some actions taken to address ecosystem health may result in temporary, short-term reductions in carbon sequestration but are necessary to maintain forest health and reduce massive carbon storage losses due to wildland fire. California's overarching climate goals for forests are to (a) secure them as resilient net sinks of carbon; (b) minimize the GHG emissions associated with management activities and wildfire events; and (c) employ management actions that deliver a full suite of ecosystem benefits to California forest health. These goals will continue to complement broader, ambitious climate goals and support existing natural resources policies. Since tree and vegetation removal would be conducted under the Program, the Program is subject to the goals defined in the California Forest Carbon Plan. Three primary objectives support these goals:

1. **Protect:** Increase protection of California's forested lands and reduce conversion to non-forest uses, resulting in a more stable forested land base.
2. **Enhance:** Expand and improve forest management to ameliorate forest health and resilience, resulting in enhanced long-term carbon sequestration and storage potential.
3. **Innovate:** Pursue innovations in wood products and biomass utilization and in markets that result in productive use of harvested woody material in a manner that reduces or offsets GHG emissions; promotes land stewardship; and strengthens rural economies and communities.

Climate Change Scoping Plan

AB 32 required the CARB to develop a scoping plan describing the approach for California to take to reduce GHG emissions, to achieve the goal of reducing emissions to 1990 levels by 2020. The Scoping Plan was first approved by the CARB in 2008, with an update every five years. The initial AB 32 Scoping Plan contained the main strategies for California to use to reduce the GHG emissions that cause climate change. The initial Scoping Plan had a range of GHG emissions reduction actions, including direct regulations, alternative compliance mechanisms, monetary and nonmonetary incentives, voluntary actions, market-based mechanisms such as a cap-and-trade system, and an AB 32 program implementation fee regulation to fund the program. In August 2011, the initial Scoping Plan was approved by the CARB.

The Scoping Plan was updated in 2013 and 2017, with the most recent being the CARB's 2022 Scoping Plan adopted in December 2022 (California Air Resources Board 2022a). The three previous scoping plans focused on specific GHG emissions reduction targets for the state's industrial, energy, and transportation sectors—first to meet 1990 levels by 2020, then to meet the more aggressive target of 40 percent below 1990 levels by 2030. The 2022 Scoping Plan addresses recent legislation and direction from Governor Newsom, extending and expanding on earlier scoping plans with a target of reducing anthropogenic emissions to 85 percent below 1990 levels by 2045.

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Greenhouse Gas Emission Thresholds

In 2023, BAAQMD adopted its 2022 CEQA Guidelines, which updated and superseded prior BAAQMD 2017 CEQA Guidelines. The 2022 CEQA Guidelines provide BAAQMD recommended procedures for evaluating climate impacts in CEQA documents. The 2022 CEQA Guidelines recommend GHG thresholds of significance for land-use development or stationary-source projects, but do not recommend GHG thresholds of significance directly relevant to vegetation management projects (BAAQMD 2022a; A Flores and C Gilleran, "Interview," 2020)

Marin County – Countywide Plan

The Marin Countywide Plan contains goals, policies, and programs relevant to GHG emission generation within the County (Marin County 2007). The City of San Rafael adheres to the Countywide Plan. The following policies are potentially relevant to the proposed project:

- Policy AIR-4.1** **Reduce Greenhouse Gas Emissions.** Adopt practices that promote improved efficiency and energy management technologies; shift to low-carbon and renewable fuels and zero emission technologies.
- Policy AIR-4.2** **Foster the Absorption of Greenhouse Gases.** Foster and restore forests and other terrestrial ecosystems that offer significant carbon mitigation potential.
- Program AIR-4.j** **Acquire and Restore Natural Resource Systems.** Take and require all technically feasible measures to avoid or minimize potential impacts on existing natural resource systems that serve as carbon sinks.

San Rafael Climate Change Action Plan

The Climate Change Action Plan (CCAP) incorporates State reduction strategies that have been approved, programmed and/or adopted and will reduce local community emissions from 2016 levels. The goal outlined in the CCAP is to achieve GHG emissions reductions in the community of approximately 37,800 MTCO_{2e} in 2020 and 98,085 MTCO_{2e} in 2030 (City of San Rafael 2019). The CCAP includes specific measures to reduce GHG emissions. The following measures are potentially relevant to the proposed project:

LCT-C10: Electric Landscape Equipment. Encourage the use of electric landscape equipment instead of gasoline-powered equipment through engagement campaigns.

SA-C2: Carbon Sequestration. Increase carbon sequestration in the built environment, developed landscapes, and natural areas.

SA-C2-C. Manage parks and open spaces to steadily increase carbon in vegetation and soil.

Discussion

- a) **Would the proposed project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?**

Vegetation management activities would consist of manual and ground-based mechanical treatments and herbicide application. Workers would travel to and from the site. For biomass

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disposal chipping and pile burning could be used. Chips may be spread on site to decompose or hauled off site to compost facilities.

Estimated Project Emissions

GHG emissions associated with the proposed project implementation would be generated from three primary sources: equipment, worker vehicles and haul trucks, and burning. For the purposes of this assessment, all biomass cut in a given year is conservatively assumed to be burned via pile burning, although it is more likely that much of the vegetation would be chipped and broadcast on site, resulting in a slow release of emissions as the material decomposes. As shown in Table 2.2-13, the majority of the GHG emissions are emitted by the proposed broadcast burning (refer to Section 2.2.3, Air Quality for the methodology and assumptions associated with the emission calculations). The estimate of GHG emissions emitted by broadcast burning is very conservative as the analysis assumes the entire burnable areas are burned in one year.

Table 2.2-13 Estimated Maximum Annual GHG Emissions Generated During Implementation

Activity	Proposed Project Emissions (metric tons CO ₂ e)
Equipment and Vehicle Emissions	171.8
Pile Burning	3.8
Broadcast Burning	947.7
Total GHG Emissions	1,123.3

Air Curtain Burning and Pyrolysis

Air curtain burning and pyrolysis, which includes carbonators and kiln burners, may also be used for debris disposal, which would also emit GHGs. GHG emissions from pile burning generally consist of CO₂, CH₄, and N₂O emissions. Use of air curtains and kiln burners would reduce CO₂ emissions compared to pile burning as forms of biomass processing. Based on some studies, air curtain burners and kiln burners have been found to emit 54 percent less CO₂ emissions compared to pile burning as shown in Table 2.2-14 (Ascent Environmental. 2022). Another study found an approximately 10 percent higher CO₂ emissions factor as shown in Table 2.2-15 (Zahn 2005). Due to the higher combustion efficiency and temperatures, air curtain burners may release slightly more CO₂ than pile burning since pile burning leaves more debris for further decomposition. This same study found that other GHGs, such as methane, were substantially lower when using an air curtain burner compared with pile burning (Zahn 2005). Additionally, air curtain burners only release biogenic CO₂, in the same amount that the tree while living has taken in from the surrounding air, releasing oxygen through photosynthesis, and is ultimately the same amount that would be released from the total decomposition of the wood matter over time. The estimated carbon dioxide equivalent emissions are similar to pile burning. Thus, the operation of air curtain burners and kiln burners would be fairly similar or reduce GHG emissions compared to pile burning.

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Table 2.2-14 Air Curtains and Kiln Burners Percent Reduction in Emissions compared to Pile Burning

Pollutant	Air curtains percent reduction in emissions	Kiln burners percent reduction in emissions
CO ₂	54	54
CH ₄	43	43
CO	96	96
NO _x	73	39

Source: (Ascent Environmental. 2022)

Table 2.2-15 Average Greenhouse Gas Emission Factors for Pile Burning versus Air Curtain Burning (Pounds of Emissions per Ton of Vegetation)

Type	CO ₂	CH ₄	Estimated CO ₂ e
Pile burning – ponderosa pine	3,268	13.9	3,643
LLC air curtain burner	3,616	1.4	3,654
McPherson air curtain burner	3,613	1.1	3,643

Source: (U.S. Environmental Protection Agency, n.d.-a; Zahn 2005)

Biochar

In general, research suggests that the effects of the production and use of biochar as a soil amendment vary in terms of their net release or sequestration of carbon from factors such as environmental setting (agriculture or forestry), biochar conversion efficiencies, rate of biochar decay itself, soil type biochar is applied to, if fertilizer is applied alongside biochar, and the rate of decay of the treatment residue that would otherwise be left (Campbell et al. 2018; Fidel et al. 2019; Biofuelwatch 2011; Siddiqui 2025). While there remain unknowns surrounding the carbon effects of biochar application, there is ample evidence that the creation of biochar through the use of a carbonator results in less carbon emissions than other burning. For example, more carbon is retained in the soil after application of biochar than if the woody material was combusted such as from a wildfire or prescribed burn (Rockwood et al. 2020; Rodriguez Franco et al. 2024). Beyond reducing potential carbon emissions from treatment, biochar can also sequester carbon because it is generally stable in the soil and has a high carbon content (Ingle et al. 2024), has been estimated to sequester carbon in the soils across a variety of scenarios (Kabir et al. 2023), and has been shown to increase soil carbon in certain situations (such as agricultural settings; Bo et al. 2023; Yin et al. 2022).

Overall, although the use of biochar may slightly influence the quantity of GHG emissions emitted during project implementation from the disposal of biomass and sequestered in the soil relative to existing conditions, it would not substantially change net emissions of the overall project or sequestration ability of the soil because only a portion of vegetative biomass produced by treatment activities would be disposed of in this way.

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Carbon Sequestration and Wildfire-Associated Emission Risk Reduction

The purpose of the proposed fuel reduction zones would be to reduce the wildfire hazards to the adjacent communities by minimizing fuel loads, which would slow wildfire spread, reduce wildfire intensity, extend the time residents would have to evacuate, and provide firefighters better access to the fire's edge should a wildfire occur. Fuel treatments have been shown to reduce fire intensity and severity, as well as the associated loss of carbon stocks (J. J. Moghaddas et al. 2018). In the event of a wildfire, vegetation thinning has been shown to both reduce the quantity of carbon released and also increase live tree carbon compared to unmanaged stands (Hurteau et al. 2008). In addition to the avoidance of wildfire releasing carbon, thinning treatments can result in greater sequestration rates by reducing competition with larger, more resilient trees (Forest Climate Action Team 2018). Although the removal of small trees would eliminate their ability to sequester carbon, the remaining larger trees generally can sequester more carbon because of their size and reduction in competition. Ultimately, fuel treatments are intended to minimize the risk of catastrophic wildland fire in areas with a high fire probability and the associated loss of carbon stocks (J. J. Moghaddas et al. 2018).

Wildfire is the single largest source of carbon storage loss and GHG emissions from forested lands. While removal of vegetation under the proposed project may result in temporary, short-term reductions in carbon sequestration, the long-term benefits are necessary to maintain forest health and reduce massive carbon storage losses due to wildland fire. Over the last 10 years, the number of acres burned by wildland fires has generally increased in California (CAL FIRE 2018b). Wildland fires have accounted for a generally⁹ increasing quantity of GHG emissions over the last 20 years, accounting for a greater quantity of California's overall GHG emissions (California Air Resources Board 2020). The climate is anticipated to become drier and hotter. These changes are expected to lead to increased frequency and intensity of large wildfires and greater fire risks if fuel management activities are not expanded across the state (California Natural Resources Agency 2018). It is expected that a wildfire on the project sites in areas without proposed project treatments could have greater GHG emissions than the proposed vegetation treatment activities due to greater wildfire intensity (e.g., rate of spread, flame lengths) and less opportunities for firefighters to attack the wildfire. These benefits are not readily quantifiable for comparison to the project emissions because the likelihood of a wildfire, the location, and the size cannot be accurately estimated. Although the proposed project would emit a greater quantity of GHG emissions than existing conditions, in the long-term the outcome of project implementation would be beneficial.

The application of broadcast burning is intended to reduce the risk and severity of wildfires. Wildfires generally emit more GHGs than broadcast burning. One study found that fires burning under broadcast burning conditions have lower emissions of CO₂, CO, and PM_{2.5} than wildland fires, with a reduction in PM_{2.5} by approximately 50 percent (Kiely et al. 2024). Another study found that wide-scale broadcast burning applications can reduce CO₂ emissions

⁹ The high GHG emissions in 2008 are an exception.

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by 18 to 25 percent in the western U.S (Wiedinmyer and Hurteau 2010). Changes in climate are expected to lead to increased frequency and intensity of large wildland fires (California Natural Resources Agency 2018). Broadcast burning and vegetation treatments may result in a net carbon benefit in the long term, particularly in the context of avoiding GHG emissions from reducing the risk of a catastrophic wildland fire or intensity of a wildfire if one were to ignite.

Conclusion

The impact from emissions of GHGs on the environment from project implementation would be less than significant.

b) Would the proposed project conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

2022 Scoping Plan

The 2022 Scoping Plan lays out the path to achieve targets for carbon neutrality and reduce anthropogenic GHG emissions by 85 percent below 1990 levels no later than 2045. The 2022 Scoping Plan identifies goals and objectives for each sector. The two relevant sectors to the proposed project are the natural and working lands, and transportation sectors.

One of California's climate objectives is to minimize net GHG emissions caused by wildfires. California experienced an overall loss of carbon stock between 2000 and 2010, of which wildfires accounted for the largest reduction of carbon (approximately 80 percent of the total carbon stock change) (California Air Resources Board 2017). In the last half-decade, the largest and most devastating wildfires in the State's history have occurred, resulting in even more carbon stock losses. The 2022 Scoping Plan establishes a target reduction goal in the natural and working lands sector through increased carbon sequestration and a reduction in wildland fires. Land management via fuel reduction treatments to reduce wildfire risks and increase wildfire resiliency, such as those included in the proposed project, are recommended to establish the forests as reliable carbon sinks instead of emission sources due to ongoing fires. The proposed project would involve managing vegetation to reduce wildfire risks, which supports the 2022 Scoping Plan's goals and objectives of minimizing wildfire and associated emissions. The proposed project would not conflict with the target goal and objectives identified for natural and working lands in the 2022 Scoping Plan for the State.

Relevant goals and objectives identified for the transportation sector include electrification and use of low carbon fuels as well as policies and regulations intended to reduce mobile-source emissions. The vehicles used during vegetation management treatments are required to comply with the applicable GHG reduction programs for mobile sources. The equipment and vehicles used for the proposed project are required to provide verification of compliance to CARB or the USEPA under State and federal law. The proposed project would not conflict with relevant mobile-source goals, programs, and recommended actions detailed in the 2022 Scoping Plan.

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2017 Clean Air Plan

One of the goals of the 2017 CAP is to protect the climate by reducing GHG emissions. The specific control measures identified in the 2017 CAP to achieve this goal do not apply to the proposed project. As shown in Table 2.2-13, GHG emissions generated by project treatments would increase compared to existing conditions. However, as discussed under Impact a), the purpose of the proposed project would be to reduce wildfire hazards, which may correlate to lower overall GHG emissions over the long term. The proposed project would not directly conflict with the 2017 CAP.

California Forest Carbon Plan

The Forest Carbon Plan identifies several goals to support the 2022 Scoping Plan's 2030 GHG reduction targets, with a focus on improving overall forest health, enhancing carbon storage resilience, and increasing sequestration. The Forest Carbon Plan promotes and supports the treatment of the State's publicly and privately owned forests to reduce wildland fire risks, primarily through thinning and forest treatments that improve forest health.

One of the applicable stated goals of the plan is to increase the pace and scale of forest and watershed improvements on nonfederal forest lands with a quantitative goal of achieving a rate of forest restoration and fuel-reduction treatments (including prescribed fire) of 60,000 acres per year by 2030 (compared to the average of 17,500 acres per year at the time the plan was developed) and to increase the rate of all treatment to 500,000 acres per year. The proposed project would increase the size of the existing fuel reduction zones in the city of San Rafael. The increase in fuels treatments would be consistent with the goal to increase treatments across the State on non-federal lands. The project activities would be consistent with the goals of the Forest Carbon Plan and would not conflict.

Marin Countywide Plan

The proposed project would not create any new stationary sources of GHG emissions, alter land use, or otherwise inhibit carbon sequestration (refer to analysis above). The proposed project would be consistent with the 2007 Marin Countywide Plan, which contains goals, policies, and programs relevant to GHG emission generation within the county which aims to study the effects of climate change on fire ecology and fire hazards and use this information to prepare response strategies.

San Rafael Climate Change Action Plan

The proposed project would not create any structures or result in the addition of new residents to the city of San Rafael, nor would the proposed project substantially increase local GHG emissions. Two of the relevant measures in the CCAP are relevant to the proposed project, specifically encouraging the use of electric landscaping equipment (LCT-C10) and increasing carbon sequestration in parks and open spaces (SA-C2). The City of San Rafael as the implementing agency would encourage the vegetation contractors to use electric landscaping equipment, when and where applicable and safe to do so. The proposed project would involve thinning trees, particularly hazardous and non-native trees, and shrubs. One of the primary methods to reduce wildfire risk is to transfer carbon stocks from many small, fire-vulnerable

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shrubs and trees into resilient large trees. Thinning can result in greater sequestration rates by reducing competition for the larger, more resilient trees (CAL FIRE 2018a). Another consideration is that fuel treatments reduce the risk of type conversion from higher carbon dense forests to lower carbon density vegetation types such as grassland or shrubland, a conversion that can occur after a high severity wildland fire (Hurteau and Brooks 2011). Another study determined that although aboveground carbon is lost from tree thinning and pile burning, stands that were treated will return to pre-treatment carbon levels between 10 and 34 years faster (i.e., a total of up to 58 to 83 years) following a wildland fire, compared to untreated stands that required up to 93 years (Carlson et al. 2012). While shrubs and trees would be removed, the remaining vegetation would likely increase in health and size, increasing carbon sequestration over the long term, particularly in areas with overly dense, fire-hazardous trees and shrubs, or areas heavily dominated by non-native shrubs and other vegetation. The proposed project would include broadcast burning to remove surface fuels within the San Rafael fuel reduction zone. While broadcast burning would emit GHGs, studies have found that ecosystem carbon emitted from broadcast burning is offset by reduced carbon losses from wildfire (Volkova et al. 2021). Another study found that broadcast burning does not significantly alter carbon sequestration at the stand or landscape scale (K. L. Clark et al. 2014). The proposed project would be consistent with the CCAP, which has the overall goal of achieving 2050 GHG reduction levels in the coming decades.

Mitigation Measures

No mitigation measures would be required.

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2.2.9 Hazards and Hazardous Materials

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
9. HAZARDS AND HAZARDOUS MATERIALS. Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☒	☐
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☒
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☐	☒

Environmental Setting

Definitions

Hazardous Materials. As used in this section, the term “hazardous material” is defined as any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment. As used in this section, the term “hazardous waste” generally refers to a hazardous material that has been used for its original purpose and is about to be discarded or recycled. In California, a hazardous waste is defined as

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a waste, or combination of wastes that, due to its quantity, concentration, or physical, chemical, or infectious characteristics, may either:

- Cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or
- Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Federal and State regulations require adherence to specific guidelines regarding the use, transportation, disposal, and accidental release of hazardous materials. The United States Environmental Protection Agency (USEPA) is responsible for administering the Federal Toxic Substances Control Act and Resource Conservation and Recovery Act (RCRA), which regulate the generation, transportation, treatment, storage, and disposal of hazardous waste. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is a federal database that records the known hazardous contaminated sites and facilitates remediation actions. The management of hazardous materials and waste within California is under the jurisdiction of California Environmental Protection Agency (CalEPA), which coordinates the State's Unified Program for permitting, inspecting, and enforcing regulations related to hazardous materials.

The Hazardous Waste and Substances Sites (Cortese) List is a planning document used by the state, local agencies, and developers to provide information about the location of hazardous materials release sites. Government Code Section 65962.5 requires the California Environmental Protection Agency to update the Cortese List annually.

Wildfire Hazard. As used in this section and consistent with CAL FIRE's definition, the term "wildfire hazard" is based on the physical conditions that create a likelihood and expected fire behavior over a 30- to 50-year period without considering measures such as home hardening, recent wildfire, or fuel reduction efforts (CAL FIRE 2024).

Wildfire Risk. As used in this section and consistent with CAL FIRE's definition, the term "wildfire risk" is defined as the potential damage a fire can do to a given area under existing conditions, accounting for any modifications such as fuel reduction projects, defensible space, and ignition resistant building construction (CAL FIRE 2024).

Hazardous Materials and Sites

The project sites are located on non-developed plots of land characterized by a mix of native and non-native vegetation. The areas surrounding the Deer Valley project site and the San Rafael Hill project site are predominantly residential. The Deer Valley project site also neighbors the Gallinas Golf Club.

A search of the current Cortese List identifies the nearest cleanup sites being approximately 0.2 mile south of San Rafael Hill fuel reduction zone (Former Maxim Gas Plant Office) and 0.10 mile south of the Deer Valley fuel reduction zone (Captains Cove Housing Development). The Former Maxim Gas Plant Office requires no further action, and the Captains Cove Housing

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Development was referred to the Regional Water Quality Control Board (RWQCB) in May of 1990 and is now considered a historical site. Only one of the 43 of the Cortese sites located in the city of San Rafael is considered active. This site is not located near either of the project sites. The project sites are not included on the Cortese list (California Department of Toxic Substances 2024).

Airport Land Use

The project sites are not located within an airport land use plan or within 2 miles of a public airport. The private San Rafael Airport is located approximately 0.2 mile southeast of the Deer Valley fuel reduction zone. The public Gness Field Airport is located approximately 8.2 miles north of the Deer Valley project site (GoogleEarth 2024).

Wildfire Hazards and Risk

The Deer Valley project site is located within an area identified as high to very high wildfire risk and a high wildfire hazard severity zone by the Marin Maps dataset Community Wildfire Protection Plan (CWPP). The San Rafael Hill project site is located within an area identified as very high wildfire risk and a high wildfire hazard severity (MarinMap 2024).

Discussion

a) Would the proposed project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

The proposed project would involve conducting vegetation management activities to establish fuel reduction zones in open spaces surrounded by communities within the city of San Rafael. Equipment used for the project activities includes fuel-operated equipment. Through the use of small quantities of fuel, lubricants, and other similar materials, maintenance activities on equipment may result in releases of hazardous materials. In accordance with PDIF HAZ-1, the proposed project would properly dispose of any contaminated soils and materials, inspect the sites and equipment for leaks and spills as part of daily procedures, ensure proper emergency response should a spill occur including access to emergency spill supplies and response materials, train workers on specific procedures for hazardous materials and clean up, and ensure all fuel powered equipment would be maintained per the manufacturer's specification. California Occupational Safety and Health Administration (CalOSHA) is responsible for developing and enforcing workplace safety standards, including the handling and use of hazardous materials. The federal Department of Transportation (DOT) and the California DOT (Caltrans) regulate the transportation of hazardous materials. Together, federal and state agencies determine driver-training requirements, load labeling procedures, and container specifications designed to minimize the risk of accidental release. Herbicides used under the proposed project would include those with the active ingredients, triclopyr and glufosinate. No broadcast or aerial herbicide spraying would occur. All herbicide applications under the proposed project would be targeted. In accordance with PDIFs HAZ-4 and HAZ-5, the proposed project would be implemented according to all applicable regulations, including the City of San Rafael IPMP to ensure proper use and disposal of herbicides. Therefore, the transport, use, storage, handling, and disposal of hazardous materials for the project would be adequately controlled through existing regulatory requirements. For these reasons,

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implementation of the proposed project would result in a less than significant impact associated with creation of a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.

b) Would the proposed project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

Small quantities of fuel, lubricants, and other similar materials would be used during the proposed project. In accordance with PDIF HAZ-1, the proposed project would properly dispose of any contaminated soils and materials, inspect the sites and equipment for leaks and spills as part of daily procedures, ensure proper emergency response should a spill occur including access to emergency spill supplies and response materials, train workers on specific procedures for hazardous materials and clean up, and ensure all fuel powered equipment would be maintained per the manufacturer's specification. Use of the hazardous materials would not result in upset and accident conditions that would create a significant hazard to the public or environment.

All herbicide applications under the proposed project would be targeted. Herbicides used would include Garlon 4 Ultra (i.e., herbicide with the active ingredient triclopyr), Turflon Ester (i.e., herbicide with the active ingredient triclopyr), and Cheetah Pro (i.e., herbicide with active ingredient glufosinate), as allowed in the City of San Rafael IPMP. The three herbicides do not contain any chemicals known to the State of California to cause cancer, birth defects, or any other reproductive harm under California Proposition 65. The USEPA classified glufosinate and triclopyr as slightly toxic or non-toxic (Toxicity Categories III and IV) (U.S. Environmental Protection Agency 1998a; 2022). Garlon 4 Ultra is known to be highly toxic to aquatic organisms (refer to Section 2.2.4, Biological Resources for further assessment) (Corteva Agrosience 2020). However, the Garlon 4 Ultra and Turflon Ester active ingredient triclopyr has little if any potential to bioaccumulate due to the tendency for triclopyr to dissipate quickly (Strid et al. 2018; The Nature Conservancy 2001). Turflon Ester is known to cause eye and respiratory irritation and mild skin irritation depending on level of exposure (Dow AgroSciences 2009). In accordance with PDIFs HAZ-4 and HAZ-5, the proposed project would require all herbicide containers be properly rinsed at approved sites and disposed of accordingly, and applications of herbicide would be subject to label specifications, precipitation events, and wind speeds. All spray nozzles would also be configured to minimize any potential herbicide drift. In accordance with PDIF HAZ-4, the public would be properly notified of any herbicide application. Signs would be posted a minimum of 1 day before and 1 day after herbicide application whenever herbicides were used within 500 feet of a public area or as required by the IPMP, whichever is more stringent. In accordance with PDIF HAZ-5 specifically, the proposed project's pesticide application would not impact any federal Endangered Species or California ESA listed plant species, and only herbicides labeled for use in aquatic environments would be used in areas where the herbicide could come into contact with water. Additionally, herbicide application under the proposed project would comply with requirements outlined in the San Rafael IPMP, in addition to the measures outlined under PDIF HAZ-5. The IPMP requires that all applicators

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shall possess a Qualified Applicator Certificate or Qualified Applicator License, issued by the California Department of Pesticide Regulation (City of San Rafael 2018).

Up to 2 to 4 gallons of fuel may be needed for drip torches during a broadcast burn. Any spills during drip-torch refilling, if needed, would be generally small and not pose a significant impact on the environment or the public. As discussed above, PDIF HAZ-1 requires the proposed project to inspect the sites and equipment for leaks and spills as part of daily procedures, ensure proper emergency response should a spill occur, and provide emergency spill supplies and equipment if an incident should occur.

The use of small quantities of fuel, lubricants, and other similar materials vegetation management activities, including herbicide use, may have the potential to result in accidental releases of hazardous materials. However, in accordance with PDIFs HAZ-1, HAZ-4, and HAZ-5, detailed above, and all applicable federal, state, and local laws and regulations governing hazardous materials, implementation of the proposed project would result in a less than significant impact associated with creation of a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

c) Would the proposed project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

The closest school to the San Rafael Hill fuel reduction zone is the Coleman School which is located approximately 0.3 miles east of the project site. The closest school to the Deer Valley fuel reduction zone is Miller Creek Middle School which is located approximately 0.9 miles northwest of the project site (*GoogleEarth* 2024). There are no schools within a one-quarter mile of the fuel reduction zones and any accidental release of hazardous materials such as oils, lubricants, and other fluids used for the equipment, or herbicides which would be on site in small quantities and would be extremely unlikely to affect any nearby school.

Broadcast and pile burning would emit smoke. In accordance with PDIF HAZ-3, pile burning would only be allowed on days when wind speeds are low, and piles would be in areas where burns can be safely controlled with a 10-foot clearance around them. Additionally, piles would be set back from any public roads to minimize risk to the public and during fire season a fire suppression crew or local fire department would be on-site during any pile burns. All broadcast burning would be conducted in compliance with the BAAQMD Regulation 5 for open burning and burn day restrictions. Broadcast burning would require the preparation of a Smoke Management Plan and burn plan to manage the burn and smoke emissions. Given the distance, terrain, and quantity of hazardous substances, and the projects adherence to PDIFs HAZ-1, HAZ-3, HAZ-4, and HAZ-5 detailed above, there is low potential for a spill to affect any nearby school and the impact would be less than significant.

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- d) **Would the proposed project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?**

The proposed project is not included on the Cortese list and implementation of the proposed project would result in no impact associated with the creation of a significant hazard to the public or the environment due to its location on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5.

- e) **For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the proposed project result in a safety hazard or excessive noise for people residing or working in the project area?**

The proposed project is within 2 miles of the private San Rafael Airport and not within two miles of a public airport or within an airport land use plan. The proposed project consists of reducing fuel loads within City owned and managed open space areas and would not involve the construction of any structures or residences. All fuel reduction and monitoring activities would be temporary. A single vegetation treatment crew would consist of 3 to 20 workers at each fuel reduction zone for approximately 6 weeks after which the sites would be annually monitored and reassessed for maintenance needs. Broadcast burning at the San Rafael Hill fuel reduction zone may require control line installation and vegetation management using hand tools prior to burning. Broadcast burning would require at least 25 crew members for a single burn day, but up to 50 personnel. For these reasons, implementation of the proposed project would not result in a safety hazard or excessive noise for people residing or working in the project area.

- f) **Would the proposed project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?**

The City of San Rafael adheres to its Emergency Operations Plan which serves as the basis for response to any hazard that threatens the city or its inhabitants. The San Rafael Hill fuel reduction zone falls within evacuation zones SNR-E582 and SNR-E583. This means fire station 58 would provide first response to the San Rafael Hill fuel reduction zone in the event of a wildfire. The Deer Valley fuel reduction zone falls within evacuation zone SNR-E519, which means fire station 51 would provide first response in the event of a wildfire. Implementation of the proposed project would not change these evacuation zone boundaries or their assigned communities (City of San Rafael 2023). Temporary lane and road closures may occur along Robert Dollar Drive within the San Rafael Hill fuel reduction zone; however, in accordance with PDIF TR-1, if an emergency event were to occur, crews along roadways would cease work and restore emergency vehicles access. Implementation of the proposed project would slow potential wildfire spread, reduce wildfire intensity, extend the time that residents would have to evacuate, and improve firefighter access to the fires edge. Therefore, the proposed project would not impact an adopted emergency response plan or evacuation plan. Impacts would be less than significant.

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g) Would the project expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?

The San Rafael Hill and Deer Valley open space areas are at higher risk for wildfires due to the invasive fire-hazardous vegetation, decades of dead vegetation accumulation, as well as increased risk of anthropogenic ignition due to the interface with urban development and history of ignitions from unhoused individuals in camps. Removal and thinning of vegetation would reduce fire risk including flame length and intensity for the adjacent community as well as provide an opportunity for native, less fire hazardous plant species to recolonize and restore these areas to native and more fire-resilient habitat. Additionally, implementation of the proposed project would improve access for emergency responders in the event of a wildfire ignition and provide defensible space for fire suppression crews to safely defend communities. The proposed project would use some equipment which could temporarily increase the risk of ignitions during the work itself. In accordance with PDIF HAZ-2, the proposed project would maintain fire suppression equipment in work vehicles, train workers regarding flammable materials, prohibit smoking, utilize spark arrestors, monitor for any ignited vegetation from equipment or tool use, avoid certain equipment use on high fire danger days, avoid metal string or blade weed trimmers, and maintain a fire extinguisher for any chainsaw use.

Broadcast burning would typically occur over the course of one day for each burn unit. While unlikely, broadcast burning could become uncontrolled, which may place firefighters and residents, or other sensitive receptors, at risk of injury or death. Structures within and adjacent to the San Rafael Hill fuel reduction zone could be placed at risk as well. A Smoke Management Plan would be prepared and implemented in accordance with BAAQMD's Regulation 5 and Title 17 of the CCR for any broadcast burn and would contain information regarding contingency actions to reduce exposure of sensitive receptors to smoke and specifications for monitoring and verifying meteorological conditions and smoke behavior. A burn plan would also be prepared for each broadcast burn. The plan would include parameters for burning, including the topography, the vegetation, the weather, and the wind speed; contingency plans; and public notification. Burns are planned for and conducted under optimal weather conditions, including low wind, high moisture, and cool temperatures, which among other reasons, allows firefighters to ensure containment. When weather or fuel conditions do not fall within the desired conditions described in the burn plan, burn activities could be delayed. The burn plan would also include provisions specifying when burns could occur, as allowed by BAAQMD, and the permits and notifications required. Adherence to the burn plan, Smoke Management Plan, and PDIF HAZ-2 requirements would limit potential for the escape of a broadcast burn. Therefore, the proposed project would not expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildfire.

Mitigation Measures

No mitigation measures would be required.

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2.2.10 Hydrology and Water Quality

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
10. HYDROLOGY AND WATER QUALITY. Would the project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?	☐	☐	☒	☐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
i) result in substantial erosion or siltation on- or off-site;	☐	☐	☒	☐
ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	☐	☐	☐	☒
iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☐	☒	☐
iv) impede or redirect flood flows?	☐	☐	☐	☒
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☒	☐

Environmental Setting

Surface Water

The project sites are within the jurisdiction of the San Francisco Bay RWQCB (Region 2). Region 2 first adopted the *San Francisco Bay Basin Water Quality Control Plan* (Basin Plan) in 1995 and most recently amended it in 2017. The *Water Quality Control Policy for the Enclosed Bays and Estuaries of California*, as adopted by the SWRCB in 1995 and last amended in 2018, which also provides water quality principles and guidelines to prevent water quality degradation and protect the beneficial uses of waters of enclosed bays and estuaries (City of San Rafael 2021).

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The San Rafael Hill project site is in the Larkspur Creek-Frontal San Francisco Bay Estuaries watershed (180500020902) of the U.S. Geological Survey-delineated Hydrologic Unit Code (USEPA, n.d.). The San Rafael Hill project site is in the San Rafael watershed. The San Rafael Creek watershed encompasses 11 square miles and is densely developed from the hills to the filled wetlands. Elevations of the San Rafael Creek watershed range from 1,100 feet in the hills above Tamalpais Cemetery to sea level at the San Rafael Bay. The San Rafael Creek watershed encompasses several tributary watersheds, including Irwin Creek, Black Canyon Creek, Sister's Creek, and Mahon Creek (City of San Rafael 2021).

The San Rafael Hill project site does not have any waterbodies, except for several ephemeral streams that drain off the hillsides. The nearest water body to the project site is the San Rafael Creek and canal that drains to the San Rafael Bay (Marin County, n.d.-c). The San Rafael Creek is located approximately 0.8-mile northeast of the San Rafael Hill project site. San Rafael Creek is designated as impaired due to presence of diazinon (based on the Clean Water Act Section 303(d) 1998 list) from urban runoff (State Water Resources Control Board 2010). Land uses typical of Marin County including residential and commercial development have increased pollutant loading of stormwater discharged into local waterways including San Rafael Creek. This pollutant loading process is typically generated and concentrated over impervious surfaces. Contaminants found include fine sediments, heavy metals, and trace organics (pesticides, PCBs), nutrients, and oil and grease (Hinds et al. 2005). San Rafael Creek flows into the San Francisco Bay, which is not meeting water quality standards for several pollutants including herbicides (i.e., chlordane, dichlorodiphenyltrichloroethane, dieldrin), invasive species, dioxin compounds, furon compounds, mercury, polycyclic aromatic hydrocarbons, polychlorinated biphenyls, and selenium (State Water Resources Control Board 2010).

The Deer Valley project site is in the Miller Creek-Frontal San Pablo Bay Estuaries watershed (180500020607) of the U.S. Geological Survey-delineated Hydrologic Unit Code (USEPA, n.d.). The Deer Valley site is in the Gallinas Creek watershed. The Gallinas Creek watershed encompasses 5.6 square miles that is split into two drainage areas, the North Fork and the South Fork of Gallinas Creek. Elevations of the Gallinas Creek watershed range from 1,100 feet in the western portion to sea level in the eastern portion of the drainage area. The upper slopes of the watershed are County-owned open space, and the creek is tidally influenced and channelized east of U.S. 101. A significant portion of the watershed consists of tidal marshes, and the marshes adjacent to San Pablo Bay contain man-made levees (City of San Rafael 2021). The Deer Valley project site does not have any waterbodies within the project site, except for a few ephemeral streams that drain off the hillsides. The nearest water body to the project site is a fresh water pond northeast from the intersection of Deer Valley Road and Smith Ranch Road and Gallinas Creek to the south (Marin County, n.d.-c). Portions of the Deer Valley project site are assumed to drain into Gallinas Creek through storm drains. Gallinas Creek, located a couple hundred feet away, is designated as impaired due to presence of diazinon (based on the Clean Water Act Section 303(d) 1998 list) from urban runoff (State Water Resources Control Board 2010). San Pablo Bay is directly downstream from Gallinas Creek and is not meeting water quality standards for several pollutants including herbicides (i.e., chlordane,

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dichlorodiphenyltrichloroethane, dieldrin), invasive species, dioxin compounds, furon compounds, mercury, polychlorinated biphenyls, and selenium (State Water Resources Control Board 2010).

The project sites are not within a Federal Emergency Management Agency (FEMA) Special Flood Hazard Area that is delineated to have a 1 percent annual chance of flooding (Zone A), also known as the 100-year flood zone (Marin County, n.d.-c)

Groundwater

The San Rafael Valley and Novato Valley groundwater basins are identified within or nearby the project areas. A small northern portion of the Deer Valley project site is within the Novato Valley Basin, whereas the San Rafael Valley Basin is located approximately 0.5 mile southeast of the San Rafael Hill project site. Both the San Rafael Valley and Novato Valley Basins are considered a low priority for groundwater management (California Department of Water Resources n.d.).

Discussion

a) Would the proposed project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?

Residential and commercial land uses typical of Marin County can result in increased pollutant loading of stormwater discharged into local waterways which is typically generated and concentrated over impervious surfaces. Nearby creeks, into which portions or all of the fuel reduction areas would drain, currently are designated as in violation of water quality standards for diazinon. Contaminants found in waterways, such as San Rafael Creek, include fine sediments, heavy metals, and trace organics (pesticides, PCBs), nutrients, and oil and grease (Hinds et al. 2005). Sedimentation from erosion can increase downstream turbidity, which is considered a water quality impact. Transported sediments can also carry contaminants or naturally occurring heavy metals if any are present in soils. To the extent that sediment delivery to the downstream water bodies is reduced, the input of contaminants and naturally occurring heavy metals to the streams and reservoirs that could affect water quality would also be reduced.

The proposed project treatment would result in some minor modifications to the hydrologic conditions in the fuel reduction areas. Implementation of the proposed project would include treatments that could cause erosion, topsoil loss, and increased flow speeds due to the removal of vegetation, including the pulling of invasive species. Additionally, implementation of the proposed project would require vehicle travel including potential off-road travel, which could accelerate erosion. Erosion could degrade soil nutrient levels and result in water quality impacts due to downstream sedimentation and siltation. Several ephemeral drainages intersect the fuel reduction zones. Physical alteration of these drainages would not occur, but minor alteration could occur from landslides or debris flows that result from work, or from sedimentation due to erosion. Project activities may also involve pile burning of vegetation, however studies have shown that pile burning produces inconsequential changes in soil and water quality (U.S.

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Department of Agriculture 2013). Areas selected for pile burning would be located away from waterways.

Broadcast burning involves land alteration and could result in localized erosion and subsequent siltation or sedimentation of downstream areas. The type and degree of water quality impacts from broadcast burns are related to many factors, including location of the burn in proximity to riparian areas, fire severity, burn patchiness, percent of slope, size of burn compared to catchment, and rainfall following the burn (U.S. Environmental Protection Agency 2005). Fires that burn on steep slopes in close proximity to waterways are more likely to adversely impact water quality. Wildfire can alter erosion rates by removing vegetative soil cover and heating of soils can result in the creation of a hydrophobic soil layer that results in a decrease in stormwater infiltration and an increase in runoff rates that can mobilize silts (U.S. Environmental Protection Agency 2005). Studies of sediment yields following broadcast burns have found broadcast burns and low-severity fires to minimally increase fine sediment volumes in creeks within a burn area. Large, high severity wildfires have been shown to significantly increase concentrations of trace elements (i.e., arsenic, selenium, and cadmium), while watersheds burned by broadcast burns did not increase concentrations of trace elements (Beyene et al. 2023). Low-severity fires have been found to have a minimal impact on stream-water chemistry (Cawson et al. 2012; Bêche et al. 2005) as long as they are carefully planned with consideration for downstream slopes. Broadcast burns are typically low severity resulting in relatively low potential for water quality impacts. The potential for downstream water quality impacts from a future wildfire, if one ignites, could be less if the broadcast burn reduces the severity of fires in the landscape.

The proposed project would implement PDIFs GEO-1 and GEO-3 to prevent erosion and sedimentation from the project sites. The implementation of PDIF GEO-1 requires that soils be stabilized if a vegetation management activity leaves less than 70 percent groundcover or native mulch/organic material, intended for erosion-control and slope-stability. GEO-1 would also require the installation of biodegradable erosion-control measures and sediment control devices. PDIF GEO-3 requires that any ground disturbing treatment would not occur during any rain event, and that any area with ground disturbance would be inspected after a rain event to ensure the ground is properly stabilized to prevent any soil erosion or sedimentation.

In addition to sediment-related impacts, herbicide treatments can also contribute to water quality degradation by introducing herbicide contaminants. Herbicides used under the proposed project would include those with the active ingredients, triclopyr and glufosinate. The half-life of triclopyr varies dependent on the type of plant it is sprayed on. Triclopyr has a half-life range of 3 to 24 days in plants, and 8 to 46 days in soil. Due to its solubility, triclopyr has a half-life of around 1 day in water with light and 142 days without light (Strid et al. 2018). The aerobic half-life of glufosinate in soil is typically 3 to 11 days with an anaerobic half-life of 5 to 10 days (National Center for Biotechnology Information n.d.) The half-life of glufosinate in aerobic water is estimated to be between 38 to 87 days (Beyond Chemical 2016). Herbicides would be applied in a targeted manner, and no broadcast or aerial spraying would occur. The herbicides proposed for use do not include the active ingredients that impair the nearby creeks

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and waterbodies. The proposed project would implement PDIFs HAZ-4 and HAZ-5. PDIF HAZ-4 would require that the project comply with all herbicide application regulations by ensuring that herbicide containers be triple rinsed with clean water at an approved site, and that herbicide application would not occur during rain events or if rain events are forecasted. PDIF HAZ-5 would ensure that herbicide mixing sites are located in areas devoid of vegetation and where there is no potential of a spill reaching non-target vegetation or a waterway, as well as using herbicides labeled for use in aquatic environments when using near aquatic habitats, such as ephemeral drainages.

Worker activities such as trash disposal and vehicles can also contribute to water quality degradation by introducing other types of contaminants such as solid and liquid contaminants (e.g., litter, oily residue from vehicles or equipment, accidental spill of fuels). PDIF HAZ-1 would be implemented to prevent leaks and spills from equipment or vehicles by ensuring that daily inspection of vehicles and equipment occur, and that emergency response, reporting, and spill supplies are known and available on site.

With the implementation of the PDIFs to ensure that the proposed project would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality, the impacts would be less than significant.

b) Would the proposed project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

The San Rafael Hill fuel reduction zone does not lie within any identified groundwater basin. A small northern portion of the Deer Valley fuel reduction zone is within the Novato Valley Basin. Groundwater recharge for the Novato Valley basin occurs mainly from infiltration of streambeds through the percolation of precipitation, and the Deer Valley fuel reduction zone is not located near enough to streambeds to interrupt this process (Department of Water Resources 2004). The proposed project would not add any impervious surface to the project site resulting in no change to groundwater recharge. Additionally, the proposed project does not include development of a water supply or use of water that could decrease groundwater supplies. For these reasons, implementation of the proposed project would result in no impact associated with substantially decreased groundwater supplies or substantial interference with groundwater recharge such that the project may impede sustainable groundwater management of the basin.

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- c) **Would the proposed project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:**

- i) **result in substantial erosion or siltation on- or offsite.**

Potential erosion and siltation that could result from the proposed project and the associated PDIFs designed to reduce erosion and siltation are discussed above under impact threshold a). The proposed project would not substantially alter existing drainage patterns in the fuel reduction areas to the extent that substantial erosion or siltation on- or off-site could occur. The impact would be less than significant.

- ii) **substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite.**

Since the proposed project would not include the addition of impervious surface, the proposed project would not substantially increase the rate or amount of surface runoff. The implementation of certain treatments such as mechanical ground-based treatments, the removal of invasive species through vegetation pulling methods, broadcast burning, and pile burning could expose some soils. Changes to understory cover and overstory cover can potentially alter drainage patterns through increased stormwater surface runoff that could cause gulying and redirection of surface flows. Burning can result in increased stormwater surface runoff by removing surface litter and vegetation, which can cause soil to become hydrophobic (Page and Zygmunt 2013). The proposed project would implement PDIFs GEO-1 and GEO-3. The implementation of PDIF GEO-1 requires that soils be stabilized if a vegetation management activity leaves less than 70 percent groundcover or native mulch/organic material, intended for erosion-control and slope-stability. PDIF GEO-3 would also be implemented which requires that any ground disturbing treatment would not occur during any rain event, and that any area with ground disturbance would be inspected after a rain event to ensure the ground is properly stabilized to prevent any soil erosion. These PDIFs would prevent erosion and sedimentation and decrease the temporary increase in rate of surface runoff. For these reasons, implementation of the proposed project would not alter the existing drainage pattern of the site or area, in a manner which would substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site or result in flooding on- or off-site and no impact would occur.

- iii) **create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or**

Herbicides would be applied in a targeted manner; however, it is possible that storm events could result in polluted runoff if the herbicide residue is still present on stumps, bark, or foliage. If spills occur during filling and preparation of herbicide mixes, herbicide could be carried downstream by stormwater. Limited quantities of herbicides would be used, and any spills or residue would be unlikely to be substantial sources of polluted runoff. In accordance with PDIF HAZ-4, no herbicide would be applied during precipitation events or if precipitation is forecast 24 hours before or after project activities. The proposed project would also implement PDIF HAZ-5 which would require herbicide mixing sites be located in areas devoid of vegetation and where there is no potential of a spill reaching non-target vegetation or a

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waterway, as well as using herbicides labeled for use in aquatic environments when using near aquatic habitats, such as ephemeral drainages. As discussed above, worker activities such as trash disposal and vehicles can also contribute to water quality degradation by introducing other types of contaminants such as solid and liquid contaminants (e.g., litter, oily residue from vehicles or equipment, accidental spill of fuels). PDIF HAZ-1 would be implemented to prevent leaks and spills from equipment or vehicles by ensuring that daily inspection of vehicles and equipment occur, and that emergency response, reporting, and spill supplies are known and available on site. With the implementation of the PDIFs the impact would be less than significant.

iv) impede or redirect flood flows?

Certain project activities have the potential to alter drainage patterns through increased stormwater surface runoff and alteration of surface flows if gullies begin to form. Due to the hilly topography of the fuel reduction zones and the lack of perennial or intermittent streams, flood flows from the fuel reduction zones into surrounding areas would not occur. The potential for minor alteration of drainage patterns would not result in redirection or impedance of flood flows. No impact would occur.

d) Would the proposed project in flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

The fuel reduction zones are not within a flood hazard, tsunami, or seiche zone, and therefore have no risk release of pollutants due to project site inundation. There would be no impact.

e) Would the proposed project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

The Basin Plan is San Francisco Bay Regional Water Quality Control Board's master water quality control planning document for waterbodies and waterways in and around the project sites. It designates beneficial uses and water quality objectives for Waters of the State, including surface waters and groundwater, and includes programs of implementation to achieve water quality objectives. The proposed project would not result in substantial ground disturbance of one acre or more and therefore would not be subject to Clean Water Act Section 401 Water Quality Certification and/or Report of Waste Discharge permit from the San Francisco Bay Regional Water Quality Control Board. The proposed project would implement PDIFs GEO-1, GEO-3, HAZ-1, HAZ-4, and HAZ-5, all of which are detailed above. Application of PDIFs would prevent any stormwater pollution, including sedimentation or spills of herbicides or petroleum products, and therefore the proposed project would not conflict with or obstruct implementation of a water quality control plan. No sustainable groundwater management plan has been prepared that encompasses the total project area or addresses the groundwater basins in the area. For these reasons, implementation of the proposed project would not conflict with or obstruct implementation of a water quality control plan or a sustainable groundwater management plan. The impact would be less than significant.

Mitigation Measures

No mitigation measures would be required.

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2.2.11 Land Use and Planning

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
11. LAND USE AND PLANNING. Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☒	☐

Environmental Setting

The project sites are within City of San Rafael open space areas within Marin County and surrounded by residential uses. The San Rafael Hill project site is located on six parcels designated as Parks/Open Space District (P/OS) and one parcel designated as Public/Quasi-Public District (P/QP). The Deer Valley project site is located on ~~three~~ four parcels designated as P/OS.

Discussion

a) Would the proposed project physically divide an established community?

The proposed project would involve vegetation treatment to develop fuel reduction zones on 122 acres adjacent to communities on vegetated, open space lands in the City of San Rafael. The proposed project would not change the existing land uses on the project sites. Therefore, the proposed project would not divide an established community. No impact would occur.

g) Would the proposed project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

Several plans and regulations apply to the project area that avoid or mitigate an environmental effect. As discussed in Section 2.2.9, the proposed project would be implemented according to all applicable regulations, including the City of San Rafael IPMP to ensure proper use and disposal of herbicides. As discussed in Section 2.2.10, the proposed project would comply with Section 401 of the Clean Water Act as well as the San Francisco Bay RWQCB San Francisco Bay Basin Water Quality Control Plan and the Water Quality Control Policy for the Enclosed Bays and Estuaries of California. Additionally, the proposed project would comply with BAAQMD's 2022 CEQA Guidelines and the City of San Rafael Climate Change Action Plan 2030. The San Rafael Municipal Code Chapter 4.12.030 – Vegetation Management Standards requires any person owning, leasing, controlling, operating or maintaining a property containing a structure in the city of San Rafael to maintain defensible space within one hundred feet of the structure. The following Marin Wildfire objectives, which apply to agencies including the City of San Rafael, within the joint power agreement boundaries are relevant to the proposed project (Marin Wildfire Prevention Authority n.d.):

- Objective 1.1. Maintain appropriate vegetation management in areas between neighborhoods and wildlands.

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- Objective 1.2. Maintain appropriate vegetation management in the wildlands.

The San Rafael Wildfire Prevention and Protection Action Plan is a master planning document to reduce the wildfire risk in San Rafael (City of San Rafael 2020). The following objectives and associated actions in the City of San Rafael Wildfire Prevention and Protection Action Plan are applicable to the proposed project:

- Objective 1. Eliminate highly flammable vegetation throughout San Rafael.
- Objective 2. Apply vegetation management and defensible space and fire mitigation standards citywide.
- Objective 5. Establish additional fuel interruption zones.
 - Action. Remove hazardous fuels on public land within 100 feet of structures. Strategically remove hazardous fuels within 30-50 feet of private, improved property to create fuel interruption zones. Efforts will focus on shaded fuel breaks and removal of ground and ladder fuels.
- Objective 16. Reduce likelihood of ignition in undeveloped land.

Additionally, the Marin County CWPP includes recommended actions to reduce wildfire risk, such as supporting the removal of hazardous plants and trees and managing vegetation in open space and common space areas, and promoting the use of broadcast burning to reduce fuels and restore forest health (Sonoma Technology 2020).

The purpose of the proposed project is to reduce fuel loads in City of San Rafael open spaces that would reduce wildfire risk for the communities surrounding the fuel reduction zones. The proposed project would also target non-native, invasive vegetation and other flammable vegetation for removal including acacia, gorse, broom, ~~and eucalyptus~~, and conifers encroaching in native oak woodlands. Implementation of vegetation management activities would reduce the likelihood of ignition while creating defensible space between open space areas and adjacent residences. Therefore, the proposed project is consistent with San Rafael Municipal Code Chapter 4.12: Wildland Urban Interface – Vegetation Management Standards, the objectives of Marin Wildfire, the Marin County CWPP (2020), and the City of San Rafael Wildfire Prevention and Protection Plan (2020). The proposed project would not conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect. The impact would be less than significant.

Mitigation Measures

No mitigation measures would be required.

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2.2.12 Mineral Resources

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
12. MINERAL RESOURCES. Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

Environmental Setting

The San Rafael Hill project site is within the Mineral Resource Zone (MRZ)-3 (R. V. Miller and Busch 2013). MRZ-3 Zones are classified as “areas containing mineral occurrences of undetermined mineral resource significance” (R. V. Miller and Busch 2013). The Deer Valley project site is within the Mineral Resource Zone MRZ-1 (R. V. Miller and Busch 2013). MRZ-1 Zones are classified as “areas where available geologic information indicates that little likelihood exists for the presence of significant mineral resources” (R. V. Miller and Busch 2013).

Discussion

- a) **Would the proposed project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?**
- b) **Would the proposed project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?**

The open spaces within which the vegetation treatment activities would occur are managed for recreational uses by the City of San Rafael. The fuel reduction zones are surrounded by agricultural, residential, and other urban uses that are not compatible with mineral resource extraction activities. The fuel reduction zones are not located on, adjacent, or near existing mining operations or known mineral resources (Division of Mine Reclamation, California Department of Conservation, n.d.). No impact on locally important mineral resource recovery sites would occur.

Mitigation Measures

No mitigation measures would be required.

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2.2.13 Noise

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
13. NOISE. Would the project result in:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b) Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

Environmental Setting

Definitions

Sound Pressure

Sound is an air pressure fluctuation from a source that travels through a medium, such as air, to a receiver, such as the human ear (California Department of Transportation 2009). Sound is measured on a logarithmic scale of sound pressure level known as a decibel (dB). A sound level of 0 dB corresponds to the minimum threshold of human hearing for those without hearing damage (Ray 2013). The average threshold of hearing is close to 10 dB (California Department of Transportation 2009).

Individual dB ratings for different noise sources cannot be added directly to give the combined noise level from all sources; instead, the combined noise level produced by multiple noise sources is calculated using logarithmic summation. For example, if one noise source produces a noise level of 80 dB, then two of the identical sources side by side would generate a combined noise level of 83 dB, or an increase of approximately 3 dB. Sound-pressure levels are not a reliable indicator of loudness (California Department of Transportation 2009).

A-Weighted Sound Level

The A-weighted sound level (dBA) is a sound pressure measurement that de-emphasizes the very low- and very high-frequency components of the sound. The de-emphasis of the very low and high frequencies mimics the frequency response of the human ear and correlates well with subjective reactions to noise (California Department of Transportation 2009). The A-weighting, therefore, assists in the analysis of how humans perceive and respond to sound and noise.

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Equivalent Sound Level

Equivalent sound level (L_{eq}) is the average A-weighted sound level during the entirety of a stated time period (Caltrans, 2009). L_{eq} time periods in this analysis are one hour unless otherwise noted. The L_{dn} is the L_{eq} , or Energy Equivalent Level, of the A-weighted noise level over a 24-hour period with a 10-dB penalty applied to noise levels between 10 p.m. to 7 a.m.

Maximum Sound Level

Maximum sound level (L_{max}) is the highest instantaneous noise level during a specified time period. This descriptor is sometimes referred to as “peak [noise] level” (California Department of Transportation 2009).

Noise Attenuation

Most noise sources can be classified as either point sources, such as stationary equipment, or line sources, such as a roadway. Sound generated by a point source nominally diminishes (attenuates) at an approximate rate of 6 A-weighted decibels (dBA) for each doubling of distance away from the source. For example, a 60 dBA noise level measured at 50 feet from a point source would be approximately 54 dBA at 100 feet from the source and 48 dBA at 200 feet from the source. Noise from a line source (e.g., roadways or corona noise from a transmission line) nominally attenuates at approximately 3 dBA per doubling of distance (U.S. Department of Transportation 1995).

Vegetation, topography, and other structures can reduce noise levels that reach a receiver by serving as a barrier that deflects or absorbs sound. The effects of vegetation on noise levels varies widely based on the type, height, and density of the vegetation in relation to the location of a noise receptor. Generally, the forest floor provides the greatest noise attenuation due to absorption within a forest. A lower level of noise attenuation occurs within the canopy of a forest primarily because tree stems and branches scatter rather than absorb noise (Herrington and Brock 1977). Provided trees are taller than the noise receptor, dense trees can appreciably reduce noise levels (Chih-Fang Fang 2003). The effect topography has on noise levels varies substantially and is highly dependent upon the complexity of the terrain, location of the source of noise, and location of the receptors.

Topography, such as a hill, can serve as a noise barrier for receptors on the opposite side of the hill from a source of noise. Topography must be at least high enough to obscure a line of sight between a noise source and receptor to serve as a noise barrier. The area behind the hill where noise would be dampened is considered the shadow region (Salomons 2001). Conversely, sound can reverberate or reflect off of topography (such as in a canyon), increasing noise on the side of the hill where the noise was created (Truax 1999).

Meteorological Effects on Noise

Noise levels can be affected by changes in atmospheric conditions, including wind, humidity, and air temperature. Wind bends sound waves, resulting in greater noise downwind of the source and less noise upwind of the source. High winds can result in localized noise-level changes. Temperature gradients can affect noise levels. As humidity decreases, so does noise.

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Changes in temperature and humidity can result in significant noise variations over long distances (California Department of Transportation 2009).

Groundborne Vibration

Groundborne vibration spreads through the ground and diminishes in magnitude with increases in distance. The effects of ground vibration or noise may be imperceptible at the lowest levels, low rumbling sounds and detectable vibrations at moderate levels, and slight damage to nearby structures at the highest levels.

Existing Noise Environment

Typical noise sources and their associated dBA levels are presented in Table 2.2-16, below.

Table 2.2-16 Typical Noise Levels

Common Outdoor Activities	Noise Level (approximate dBA)	Common Indoor Activities
Jet flyover at 1,000 feet	110	Rock band
Gas Lawnmower at 3 feet	100	<i>No example provided</i>
Diesel truck at 50 feet at 50 mph	80-90	Food blender at 3 feet Garbage disposal at 3 feet
Noise urban area, daytime Gas lawn mower, 100 feet Commercial area Heavy traffic at 300 feet	60-80	Vacuum cleaner at 10 feet Normal speech at 3 feet
Quiet urban daytime	50-60	Large business office Dishwasher in next room
Quiet urban nighttime Quiet suburban nighttime	40	Theater, large conference room (background)
Quiet rural nighttime	20-30	Library Bedroom at night, concert hall (background)
<i>No example provided</i>	20	Broadcast/recording studio

Source: (California Department of Transportation 2013)

The project sites are open space areas surrounded by residential uses. Noise typical of urban nighttime and daytime (40 to 60 dBA) would be consistent with the noise sources found at the project sites. Typical noise sources of residential areas nearby would include yard maintenance, emergency vehicles, and general vehicle noise. Highway noise may be audible in some locations, depending upon the topography.

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Noise-Sensitive Receptors

Noise-sensitive land uses generally include those areas of habitation where the intrusion of noise could adversely affect occupancy, use, or enjoyment of the environment. The California Department of Transportation considers lands on which serenity and quiet are of extraordinary importance and which service an important public need to be sensitive receptors (such as hospitals, schools, churches, libraries, auditoriums, public meeting rooms, motels, hotels, residences, and recreational facilities) (California Department of Transportation 2021). The closest sensitive receptors to both project sites are directly bordering residences and recreational users of the sites themselves. The San Rafael Hill project site is surrounded primarily by residential properties and the Elks Lodge. The closest school to the San Rafael Hill project site is the Coleman School which is located approximately 0.3 mile east of the project site. The Deer Valley project site is adjacent to a skilled nursing facility and high-density residential buildings. The closest school to the Deer Valley project site is Miller Creek Middle School which is located approximately 0.90 mile northwest of the project site (*GoogleEarth* 2024).

Noise Standards

City of San Rafael

Noise (Chapter 8.13.050 – Standard exceptions to general noise limits). Any construction project on property within the city, construction, alteration, demolition, maintenance of construction equipment, deliveries of materials or equipment, or repair activities otherwise allowed under applicable law shall be allowed between the hours of seven a.m. (7:00 a.m.) and six p.m. (6:00 p.m.), Monday through Friday, and nine a.m. (9:00 a.m.) and six p.m. (6:00 p.m.) on Saturdays, provided that the noise level at any point outside of the property plane of the project shall not exceed ninety (90) dBA. All such activities shall be precluded on Sundays and holidays. Violation of the foregoing may subject the permittee to suspension of work by the chief building official for up to two (2) days per violation.

Discussion

- a) **Would the proposed project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?**

As stated in the environmental setting section of this section, existing noise at the fuel reduction zones are typical of open space areas surrounded by residential uses (40 to 60 dBA). All noise generation from the proposed project would be limited in duration and confined to a specific area depending on vegetation management needs. The duration of fuel reduction work, as stated above, would last 6 weeks maximum a year and would occur during weekdays between 8:00 am and 5:00 pm. As such, residents and recreational users would not experience any permanent increases in noise levels (refer to Section 2.2.16, Recreation for the recreational analysis). Intermittent noise would occur during initial and maintenance treatments. Equipment would be used to cut uproot crush/compact, masticate, or chop existing vegetation. Hand tools would be used to cut and trim vegetation. Equipment use would also include ATVs and chippers to process cut vegetative materials. Broadcast burning would use manual and mechanical equipment (e.g., chippers, masticators, hand tools, chainsaws) during site

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preparation and mop-up. During the burn, firing equipment, hoses, backpack pumps, fire engines, saws, and hand tools would be used to control the burn. Pile burning and the use of an air curtain burner, carbonator, or kiln burner would generate some noise. Air curtain burners and carbonators would generate noise primarily limited to the small diesel engine that powers a fan and the blower fan itself. Kiln burners typically consist of burning debris in open-top metal containers and would generate noise levels similar to pile burning. Noise generated by the project activities and equipment would not exceed 90 dBA at 50 feet as is shown in Table 2.2-17.

Table 2.2-17 Noise Generation Levels of Representative Equipment Used to Implement the Project

Treatment Method	Key Equipment	L _{max} Noise Levels at 50 feet (dBA)
Manual and Mechanical; Broadcast Burning	Excavator	81
Manual and Mechanical; Broadcast Burning	Skid steer	79
Manual and Mechanical	Tractor	84
Manual and Mechanical; Broadcast Burning	Brushcutter	78
Manual and Mechanical; Broadcast Burning	Chainsaw	84
Manual and Mechanical; Broadcast Burning	Power pole saw	66
Manual and Mechanical; Broadcast Burning	String trimmer	64-69
Manual and Mechanical; Broadcast Burning	Hand tools	40
Herbicide Application	ATV	60
Chipping	Chipper	79-85
Pile or Broadcast Burning	Water pump (on fire engine)	81
Manual and Mechanical; Pile or Broadcast Burning	Leaf blower	76
Broadcast Burning	Fire engines (Wildland Type 3 or 6)	77

Source: (U.S. Forest Service 2006; U.S. Department of Transportation 2008; Husqvarna. n.d.; Brueck 2008; CHC n.d.; U.S. Nuclear Regulatory Commission 2012; Balanay et al. 2016; Federal Highway Administration 2017; Root et al. 2013)

In accordance with PDIF NOI-1, all powered equipment and power tools would be used and maintained per manufacturer specifications. All diesel- and gasoline-powered treatment equipment would be properly maintained and equipped with noise-reduction intake, exhaust mufflers, and engine shrouds, in accordance with manufacturers' recommendations. PDIF NOI-1 includes measures to minimize noise disruption to sensitive receptors including limits on where noise sources can be located, limits on when equipment can be used, and requiring all equipment to be shut down while not in use. Therefore, although vegetation management and maintenance activities would temporarily increase ambient noise, the increase would not be in excess of the City of San Rafael noise standards of 90 dBA outside of the property plane at each

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fuel reduction area and activities would not occur outside allowable hours. The impact would be less than significant.

b) Would the proposed project result in generation of excessive groundborne vibration or groundborne noise levels?

Implementation of the proposed project would involve use of ground-based equipment that would not generate significant groundborne vibration. Haul trucks bringing equipment to the fuel reduction areas or hauling chipped or cut vegetation away, and fire engines traveling to and from the San Rafael Hill fuel reduction zone during broadcast burn activities, could travel past vibration-sensitive structures and receptors. Vibration created by haul trucks and fire engines are expected to be below the threshold for human perception of vibration, similar to buses or typical trucks (Federal Transit Administration 2018). For these reasons, implementation of the proposed project would result in a less than significant impact associated with the generation of excessive groundborne vibration or groundborne noise levels.

c) For a proposed project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the proposed project expose people residing or working in the project area to excessive noise levels?

The fuel reduction zones are not located within an airport land use plan or within 2 miles of a public airport. The private San Rafael Airport is located approximately 0.2 mile southeast of the Deer Valley fuel reduction zone. The public Gness Field Airport is located approximately 8.2 miles north of the Deer Valley fuel reduction zone (*GoogleEarth* 2024). Additionally, establishment of the fuel reduction zones would not require the establishment of any new structures or result in additional sensitive receptors. Therefore, implementation of the proposed project would not result in excessive noise for people residing or working in the project area.

Mitigation Measures

No mitigation measures would be required.

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2.2.14 Population and Housing

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
14. POPULATION AND HOUSING. Would the project:				
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Environmental Setting

The San Rafael Hill and Deer Valley project sites are surrounded by residential uses. The project sites are located within the city of San Rafael in Marin County on existing open space. The city of San Rafael has a population of approximately 59,971 persons as of 2022 (United States Census Bureau 2022b). Marin County as a whole is home to approximately 256,154 persons, and approximately 111,963 housing units (United States Census Bureau 2022a).

Discussion

- a) **Would the proposed project induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?**

The proposed project would involve the reduction of fuel loads in two of the City of San Rafael open spaces and would not include construction of residential or other structures that could directly increase population. Project activities would result in temporary increases in demand for vegetation management crews during the 6 weeks of project activities at each site, for a total of 12 weeks. Additionally, broadcast burning and mop-up for a single burn unit would last approximately 1 to 2 days, and would require a minimum of 25 crew members, which would temporarily increase the demand for burn crews. The workers implementing the fuel reduction activities are anticipated to be sourced from existing contractor crews in the region including Marin and Sonoma counties. Crew members would commute to the fuel reduction zones daily, and the workers are unlikely to relocate to the City of San Rafael due to the short-term duration of treatment activities. No impact would occur.

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b) Would the proposed project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

The fuel reduction zones would be located on existing open space areas, and there is no existing housing within the project sites. The proposed project would reduce fuel loads within City of San Rafael open space and would not involve the construction of housing or other structures that would result in the displacement or relocation of any existing people. For these reasons, implementation of the proposed project would not displace a substantial number of existing people or housing or necessitate the construction of replacement housing. No impact would occur.

Mitigation Measures

No mitigation measures would be required.

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2.2.15 Public Services

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
15. PUBLIC SERVICES.				
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?	☐	☐	☒	☐
Police protection?	☐	☐	☒	☐
Schools?	☐	☐	☒	☐
Parks?	☐	☐	☒	☐
Other public facilities?	☐	☐	☒	☐

Environmental Setting

Fire Protection

The open spaces are serviced by SRFD. There are six fire station locations within the San Rafael's jurisdiction (City of San Rafael, n.d.-b). San Rafael Fire Station 51 is approximately 0.10 mile south of the San Rafael Hill project site. San Rafael Fire Stations 56 and 57 are within 2 miles of the Deer Valley project site.

Police Protection

The San Rafael Police Department (SRPD) provides police protection services to the city of San Rafael (City of San Rafael, n.d.-e). The SRPD consists of more than 63 sworn officers (San Rafael Police Department, n.d.). The SRPD's main office is located approximately 0.10 miles south of the San Rafael Hill project site and approximately 3.10 miles south of the Deer Valley project site.

Schools

San Rafael City Schools includes the San Rafael Elementary School District and the San Rafael High School District, and serves students in Transitional Kindergarten through 12th grade (San Rafael City Schools, n.d.). A list of schools within 1 mile of the San Rafael Hill project site is included in Table 2.2-18 below.

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Table 2.2-18 Schools Within 1 Mile of the San Rafael Hill Project Site

School Name	Distance From Project Site (approximate miles from project site, direction)
Marin Academy	0.20 mile, Southwest
James B. Davidson Middle School	0.80 mile, South
San Rafael/Madrone High School	1 mile, Southeast
Saint Raphael School	0.20 mile, South
Coleman Elementary School	0.30 mile, East
Trinity Preschool and Kindergarten	0.70 mile, South
Laurel Dell Elementary School	0.85 mile, South
All Children Academics	0.40 mile, East
Sun Valley Elementary	1 mile, West

The Miller Creek Elementary School District serves approximately 2,000 students in northern San Rafael (Miller Creek Elementary School District, n.d.). A list of schools within 1 mile of the Deer Valley project site is included in Table 2.2-19 below.

Table 2.2-19 Schools Within 1 Mile of the Deer Valley Project Site

School Name	Distance From Project Site (approximate miles from project site, direction)
Caulbridge School	0.70 mile, North
Miller Creek Middle School	0.90 mile, Northwest
Star Academy	0.40 mile, Southwest
Fusion Academy	0.65 mile, West
Oakview Preschool	1 mile, West
Marin Formative Christian Preschool	0.80 mile, West
Marin Montessori Junior High	0.65 mile, North
St. Vincent's School for Boys	0.70 mile, North
GATE Academy	0.70 mile, North
Dunham Academy	0.65 mile, North
Mary E. Silveira Elementary	1 mile, Northwest

Parks

Boyd Memorial Park and Mountain Park are located within the San Rafael Hill project site. Albert Park, Sun Valley Park, San Rafael open spaces areas, and Gerstle Park are parks located within 1 mile of the San Rafael Hill project site.

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McInnis Park and McInnis Skatepark are located approximately 0.3 mile east of the Deer Valley project site. Adrian Rosal Park, Pueblo Park, Santa Margarita Island, Castro Park, Marinwood Parklet, are parks within 1 mile of the Deer Valley project site.

Other public facilities

The San Rafael Public Library is approximately 0.20 miles south of the San Rafael Hill project site, and the Civic Center library is approximately 1.5 miles south of the Deer Valley project site.

Discussion

- a) **Would the proposed project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services: fire protection, police services, schools, parks, and other public facilities?**

Fire Protection and Police Services

Implementation of the proposed project would establish and expand fuel reduction zones within existing City of San Rafael open spaces, which would reduce fire risk for the surrounding communities. The use of equipment and vehicles for vegetation management activities may produce sparks that could result in a wildfire ignition, which could require fire protection and emergency services. Broadcast and pile burning could become uncontrolled and spread beyond the burn perimeter, which would require fire protection services. Qualified broadcast burn personnel (e.g., Burn Boss, firefighters) would be on site during pile burning and broadcast burning activities to manage the burn in the event of a wildfire ignition. PDIF HAZ-2 requires maintenance of fire suppression equipment in work vehicles, avoiding certain equipment use on high fire danger days, and other measures to minimize risk of sparks. Temporary trail closures could slow response times for fire and emergency services in the event of a wildfire or other emergency. However, the initial vegetation treatment activities would be temporary, lasting approximately 6 weeks at each fuel reduction zone and approximately 1 to 2 days per burn unit for broadcast burning, and would not permanently impact emergency service response times. The proposed project would implement PDIF TR-1, which includes contacting emergency response agencies for potential road closures, clearing obstructed roads for vehicles to pass, and the use of flaggers to control traffic and allow emergency vehicles to pass. Additionally, the proposed activities would reduce fire risk for the surrounding communities, which would reduce the need for fire protection and emergency services. As analyzed in Section 2.2.14, Population and Housing, the proposed project would not induce population growth. No new facilities would be needed. Therefore, the impact would be less than significant.

Parks

Trails and other recreational facilities within the fuel reduction zones may be closed for short durations during fuel reduction activities as well as for biomass disposal such as burning or chipping. If discrete areas of the fuel reduction zones are unavailable due to vegetation management activities, displaced recreationalists may use other parks within the vicinity of the fuel reduction zones (e.g., Sun Valley Park, Gerstle Park, and McInnis Park). However, initial

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treatment activities would last approximately 6 weeks at each site and approximately 1 to 2 days per burn unit at the San Rafael Hill fuel reduction zone, and access to trails and portions of the open spaces would be restored immediately following treatment activities. As analyzed in Section 2.2.14, Population and Housing, the proposed project would not induce population growth. Therefore, implementation of the proposed project and temporary closures of trails and recreational facilities within the fuel reduction zones would not result in an increased demand for parks to the extent that new facilities would be needed. The impact would be less than significant.

Schools and Other Public Facilities

As discussed under Section 2.2.14, Population and Housing, the proposed project would not generate additional permanent employees or residents. Workers are anticipated to commute to the fuel reduction zones daily and would not indirectly affect schools from workers moving into the area. Implementation of the proposed project would not result in the need for new or physically altered schools or other public facilities. The impact would be less than significant.

Mitigation Measures

No mitigation measures would be required.

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2.2.16 Recreation

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
16. RECREATION.				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☒	☐
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☒	☐

Environmental Setting

San Rafael Hill Project Site

The San Rafael Hill project site contains Boyd Memorial Park and Mountain Park, which include picnic tables, a playground, and grass areas for recreational use (City of San Rafael 2016). The San Rafael Hill project site also includes the Falkirk Cultural center, a historic cultural resource that offers a variety of programs to guests (City of San Rafael, n.d.-a). Albert Park, Sun Valley Park, San Rafael open spaces areas, and Gerstle Park are among the parks located near the San Rafael Hill project site. The San Rafael Hill project site is open to the public for recreational use.

Deer Valley Project Site

The Deer Valley project site is within an open space parcel that includes passive recreational resources such as trails. Recreational resources directly east of the Deer Valley project site, across Silveira Parkway and Smith Ranch Road include McInnis Park, McInnis Park Golf Center, soccer fields, McInnis Park Creekside Field, McInnis Kayak and Canoe Dock, McInnis Skatepark and the Gallinas Golf Club. Adrian Rosal Park, Pueblo Park, Santa Margarita Island, Castro Park, and Marinwood Parklet are parks within 1 mile of the Deer Valley project site. The Marin YMCA is approximately 0.75 mile southwest of the Deer Valley project site. The San Rafael Tennis Center and the Santa Venetia Swimming Club are approximately 1 mile southeast of the Deer Valley project site. The Las Galinas baseball field is approximately 0.95 mile southeast of the Deer Valley project site. The Marin County Fairgrounds are approximately 1 mile south of the Deer Valley project site. The Deer Valley project site is open to the public for recreational use.

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Discussion

- a) **Would the proposed project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated? and**
- b) **Would the proposed project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?**

As discussed in Section 2.2.14, Population and Housing, the proposed project would not directly or indirectly induce population. Therefore, the proposed project would not introduce population into surrounding areas that would increase the use of neighborhood and regional parks or other recreational facilities. Additionally, as the population surrounding the project sites would not increase due to the proposed project, the proposed project would not create a need for the construction or expansion of recreational facilities.

The proposed project would not include the construction of any recreational facilities in or near the fuel reduction zones. Fuel reduction activities would occur within areas used for recreation that may require the temporary closure of some trails and portions of the recreational areas for safety reasons. Pile burning, broadcast burning, air curtain burning, kiln burning, and carbonator use could generate smoke within the project sites. The use of heavy equipment partnered with smoke from pile burning and broadcast burning could pose a threat to users of the open space areas within the project sites due to impacts on air quality. To prevent pile burning impacts to recreationists such as smoke inhalation, the proposed project would adhere to PDIF HAZ-3. PDIF HAZ-3 outlines policies to reduce hazards associated with broadcast burning, pile burning, or other biomass removal techniques. These policies include having fire suppression crews on site, adhering to BAAQMD thresholds for criteria pollutants, and burning in accordance with Regulation 5 for open burning. Broadcast burning would also require the preparation of a Smoke Management Plan and burn plan as discussed in detail in Section 2.2.9, Hazards and Hazardous Materials.

The duration of initial fuel reduction work would last approximately 6 weeks at each site. Broadcast burning ignition and mop-up for a single burn unit would last for approximately 1 to 2 days. Closures of portions or all of the recreational facilities during fuel reduction activities, if needed, would be temporary and access would be restored following the completion of work in the discrete area. Use of surrounding recreational resources would not permanently increase due to vegetation management activities as closure would only affect small portions of the open spaces at any one time and would not result in the displacement of users.

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Herbicide application would occur within the fuel reduction zones. Treatment areas and trails that are accessible to the public may be closed during herbicide application activities. Recreational trails may be unavailable or flagged during herbicide application. The treatments would be for a short duration in any one area, typically for only a few hours to a few days. Signs would be posted at each end of herbicide applications areas and any intersecting trails notifying the public of the use of herbicides in recreational areas in accordance with PDIF HAZ-4 and the San Rafael IWMP. Ample recreational opportunities are available within and surrounding the fuel reduction zones (e.g., McInnis Park, Sun Valley Park, and Gerstle Park) that the few displaced recreationalists could use if discrete areas are unavailable due to herbicide application activities. The impact would be less than significant.

Mitigation Measures

No mitigation measures would be required.

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2.2.17 Transportation

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
17. TRANSPORTATION. Would the project:				
a) Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☒	☐
b) Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	☐	☐	☒	☐
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
d) Result in inadequate emergency access?	☐	☐	☒	☐

Environmental Setting

Access to the San Rafael Hill site is provided by Robert Dollar Drive and Mission Avenue. Parking is available for the San Rafael Hill site at the Falkirk Cultural Center. Access to the Deer Valley project site is provided by Deer Valley Road. The San Rafael Hill and Deer Valley sites contain existing fire roads and trails that are used by recreationists.

Discussion

- a) **Would the proposed project conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?**

Treatment

Vegetation management activities for the proposed project would occur during the working hours from 8:00 a.m. to 5:00 p.m., Monday through Friday. Equipment and vehicle staging would occur on existing paved roads, fire roads, and trails. Temporary lane and road closures may occur along Robert Dollar Drive within the San Rafael Hill fuel reduction zone. Trails and fire roads may be temporarily closed to pedestrians and bicyclists during project activities. Vegetation treatments would occur for a short duration in any one area, typically for only a few hours to a few days. As treatment activities move throughout the fuel reduction zones, trails and fire roads would be reopened for recreationalists.

In accordance with PDIF TR-2, traffic control measures would be implemented to maintain traffic and pedestrian circulation on streets affected by project activities. Traffic control measures would conform with the latest editions of the Manual on Uniform Traffic Control Devices (MUTCD) and would include maintaining a minimum of 12-foot travel lanes on public roads, utilizing flaggers and/or warning signage of work ahead, and providing alternate routes for pedestrians if sidewalk closures are required. In the event of an emergency, crews along roadways would cease work and restore emergency vehicles access (PDIF TR-1). Therefore, the

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proposed project would not conflict with adopted policies, plans, or programs regarding transit, roadway, bicycle, and pedestrian facilities. Impacts would be less than significant.

Maintenance

Maintenance activities would be conducted annually for non-native vegetation and every 2 to 5 years for shrubs and oak woodlands. Vehicle trips generated by maintenance activities would represent a negligible increase in traffic and would not impact the performance of the transportation system. Traffic through the fuel reduction zones would not increase after construction is completed. Maintenance transportation impacts would be less than significant.

b) Would the proposed project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

In accordance with the *Technical Advisory on Evaluating Transportation Impacts in CEQA*, section 21099 of the Public Resources Code states that the criteria for determining the significance of transportation impacts must promote 1) reduction of GHG emissions; 2) development of multimodal transportation networks; and 3) a diversity of land uses (Governor's Office of Planning and Research 2018). The Governor's Office of Planning and Research identifies a screening threshold for identifying small land use projects that generate or attract fewer than 110 trips per day. Projects that generate fewer than this threshold may be assumed to cause a less-than-significant transportation impact (Governor's Office of Planning and Research 2018)

During proposed project construction, vehicle miles traveled (VMT) would temporarily increase due to construction vehicles and equipment. A single crew of up to 20 workers would likely be at a single work area. Treatment activities would require an estimated 6 to 140 daily one-way vehicle trips during the 3 months of initial treatment activities. The higher number of daily one-way vehicle trips would be required if hauling biomass were used at any given site. The daily maximum number of vehicle trips associated with the proposed project could exceed 110 trips per day; however, averaged over a year, the vehicle trips would be less than 20 a day. Furthermore, it is anticipated that crews would carpool to and from the fuel reduction zones, which would substantially reduce daily one-way vehicle trips. The increase in the number of vehicles trips would be temporary, and there would be no permanent increase in VMT. As discussed above, maintenance activities would likely be less intensive than initial treatments and therefore occur over a shorter duration as most maintenance activities would occur in areas that were previously treated. Therefore, maintenance activities would result in a negligible increase in VMT. The impact would be less than significant.

c) Would the proposed project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

Implementation of the proposed project would not reconfigure any roadways. Heavy equipment and vehicles would use existing roads and trails to access treatment areas where feasible. Off-road vehicles and heavy equipment use may be required to access the fuel reduction zones. Vehicles, chippers, air curtain burners, carbonators, fire engines, and other heavy equipment may be staged on public roads where parking is permitted or parking lots in the area. Temporary closure of vehicle travel lanes or roads may be required at the San Rafael

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Hill fuel reduction zone along Robert Dollar Drive. As discussed above, traffic control measures would be implemented in accordance with PDIF TR-2. Traffic control measures may include, but are not limited to, providing alternate routes to pedestrians if pedestrian routes are closed, using warning signage or flaggers of work ahead, and maintaining access to driveways and private roads unless other arrangements have been made. All traffic control devices would be required to conform with the latest edition of the MUTCD. Pile burning and broadcast burning would generate smoke that could pose a hazard to vehicles on nearby roadways, pile burning would be set back from roads so as to not pose a hazard to roadway users including motorists and bicyclists. Burning would be performed in accordance with BAAQMD Regulation 5 on designated burn days, which include meteorological requirements for wind velocity, temperature, and atmospheric stability that would limit smoke hazards on nearby roadways. A Smoke Management Plan would be prepared in accordance with BAAQMD Regulation 5 which would contain information for managing smoke, smoke travel projections, and smoke minimization techniques that would minimize smoke from posing a hazard to roadway users. No new impacts from incompatible uses with the public on roadways would occur due to pile burning. Therefore, the proposed project would not result in a significant impact related to hazards associated with the construction of the project. The impact would be less than significant.

d) Would the proposed project result in inadequate emergency access?

The proposed project would treat vegetation within the City of San Rafael-owned and managed San Rafael Hill and Deer Valley open spaces. The purpose of the proposed project is to reduce fuel loads that would extend the time residents would have to evacuate and improve emergency access for firefighters should a wildfire occur. Public roadways surrounding the fuel reduction zones provide emergency access to the project sites. Vehicles and heavy equipment may be staged within the parking lanes of public roadways and would not interfere with transportation circulation. Temporary or full road closures may be required during treatment activities along Robert Dollar Drive within the San Rafael Hill fuel reduction zone. In accordance with PDIF TR-1, the proposed project would reduce impacts due to inadequate emergency access during treatment activities by notifying emergency responders of the closure and any temporary detours at least one week prior to the closure and using flaggers to direct traffic. During an emergency, crews along roadways would cease operations and the roadway would be reopened to emergency vehicles. Additionally, the proposed project would create fuel reduction zones that would provide better access long term for emergency responders in the event of a wildfire. With implementation of PDIF TR-1, impacts to emergency access would be less than significant.

Mitigation Measures

No mitigation measures would be required.

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2.2.18 Tribal Cultural Resources

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
18. TRIBAL CULTURAL RESOURCES				
a) Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☐	☐	☒	☐
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☒	☐	☐

Environmental Setting

The Native American Heritage Commission (NAHC) was contacted to provide a Sacred Lands File search and provide a list of Native American tribes affiliated with the project region. The Sacred Lands File search for the proposed project was negative, indicating there are no documented tribal cultural resources or sacred sites on file with the NAHC in the proposed project area. A list of four Native American contacts associated with two tribes, specifically the Federated Indian Graton Rancheria (Graton Rancheria) and Guidiville Indian Rancheria, were provided by the NAHC.

In lieu of PDIF CUL-4, Marin Wildfire initiated Assembly Bill 52 consultation with the tribes that were identified by the NAHC for the proposed project on May 7, 2024. A response was received from the Graton Rancheria only. Graton Rancheria identified cultural sensitivity within the ADI and requested consultation to discuss the proposed project. Marin Wildfire, Graton Rancheria, and Far Western participated in a virtual meeting on May 29, 2024, to discuss the project and the results of the records search and buried site sensitivity assessment. Graton Rancheria requested a copy of the inventory report and to participate in the field survey. Far Western delivered the draft report to Graton Rancheria on June 4, 2024, and coordinated the field survey efforts. A tribal monitor from Graton Rancheria was present during the field

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survey. On July 3, 2024, Marin Wildfire shared the results of the survey with Graton Rancheria, including the site record documentation for the newly identified precontact site at the San Rafael Hill fuel reduction zone. A second meeting between Marin Wildfire, SRFD, Graton Rancheria, and Far Western was held on July 30, 2024, to review the survey results and treatment activities.

An administrative draft Initial Study was provided to Graton Rancheria on February 5, 2025 for review and feedback. Several email correspondences between Marin Wildfire and Graton Rancheria occurred during the review of the administrative draft Initial Study, which culminated in a meeting that took place on April 14, 2025 to discuss new information and requests from Graton Rancheria. At the meeting, the Graton Rancheria Tribal Heritage Preservation Officer (THPO) identified the precontact archaeological site as a Tribal Cultural Resource (TCR)¹⁰. Clarification was provided to Graton Rancheria regarding implementation of the PDIFs, inclusive of the monitoring requirement around the precontact resource, and that tribal monitors would be involved in all monitoring. Graton Rancheria requested that a mitigation measure be added that expands upon PDIF CUL-2 by requiring provision of any draft DPR 523 forms for precontact resources to Graton Rancheria for review and input prior to finalizing.

Marin Wildfire provided the revised administrative draft Initial Study with the requested edits to Graton Rancheria on April 24, 2025 to confirm the revisions adequately addressed the concerns raised at the April 14, 2025 meeting. On May 5 and May 27, 2025, Marin Wildfire followed up with Graton Rancheria via email correspondence to confirm the revisions to the administrative draft Initial Study. Marin Wildfire requested Graton Rancheria provide any additional comments or input on the revised administrative draft Initial Study by June 10, 2025, to meet the Draft Initial Study publication date. At this time, no additional comments have been received from Graton Rancheria. Therefore, consultation with Graton Rancheria is considered complete as of publication of the Draft Initial Study (June 16, 2025).

Discussion

- a) **Would the proposed project result in an impact on a tribal cultural resource pursuant to Section 21074 of the PRC or the contextual setting of such a resource, resulting in a substantial loss of the resource's cultural value?**

The precontact archaeological resource discussed in Section 2.2.5, Cultural Resources, is a TCR, as identified by Graton Rancheria. As analyzed, the documented boundary of the precontact resource identified at the San Rafael Hill fuel reduction zone would be flagged by a qualified archaeologist and a Graton Rancheria tribal monitor prior to treatment in the area to ensure adherence to the avoidance and monitoring measures and that flagging would be removed upon completion of the planned work per PDIF CUL-3. In accordance with the archaeologist and tribal monitor and PDIF CUL-3, minimal tree limbing or vegetation trimming with mechanical tools would be permitted within the flagged area under the careful guidance and

¹⁰ It should be noted that both cultural and natural resources can constitute a TCR.

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observation of the archaeologist and tribal monitor, if available. Full-time monitoring would occur during all treatment activities within 50 feet of the archaeological site, consistent with PDIF CUL-3 (Far Western 2024a).

Furthermore, the project sites are considered culturally sensitive by the Graton Rancheria, and the inadvertent discovery of unknown precontact archaeological sites and/or TCRs during project implementation from ground-disturbing activities is possible. If any culturally sensitive resources or unknown TCRs were impacted by ground disturbance associated with the project treatment, the impacts would be significant. As discussed in Section 2.2.5, Cultural Resources, workers would participate in a cultural resources awareness and sensitivity training prior to proposed project implementation (PDIF CUL-1). Should a previously unidentified precontact archaeological site and/or TCR be discovered, work would halt in the area and the resource fully avoided (PDIF CUL-2). A DPR 523 form would be drafted by a qualified archaeologist (PDIF CUL-2) and shared with Graton Rancheria for review and feedback prior to finalizing and submitting to NWIC per Mitigation Measure CUL-1. If any such resources are discovered during implementation that require monitoring to continue treatment in the area, a qualified archaeologist and Graton Rancheria tribal monitor would be present, if available, during ground disturbance (PDIF CUL-5). Impacts would be less than significant with mitigation.

Mitigation Measures

Mitigation Measure CUL-1 would be required.

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2.2.19 Utilities and Service Systems

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
19. UTILITIES AND SERVICE SYSTEMS. Would the project:				
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☐	☒
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☐	☒
c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☒	☐

Environmental Setting

The San Rafael Hill and Deer Valley project sites are open spaces in the City of San Rafael. The San Rafael Hill project site contains water tanks and telecommunication infrastructure. The Falkirk Cultural Center, which is open to the public, contains gardens. The Falkirk Cultural Center is served by existing utilities, including on-site bathrooms.

The Marin Municipal Water District (MMWD) owns approximately 21,600 acres of watershed and serves approximately 192,961 people from north of the Golden Gate Bridge to southern Novato and west from the San Francisco Bay to the San Geronimo Valley, including the city of San Rafael (Marin LAFCo, n.d.). Under existing conditions, a small amount of water is used at the San Rafael Hill project site for existing facilities such as the Falkirk Cultural Center and associated landscaping.

Pacific Gas & Electric (PG&E) serves the city of San Rafael (Pacific Gas & Electric Company 2014). Both project sites are within the PG&E service area.

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Discussion

- a) **Would the proposed project require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?**

The fuel reduction zones are located within mostly undeveloped open space areas. Implementation of the proposed project would not require the relocation, construction, or expansion of any new utilities. Proposed activities would not require the expansion of water within the region. Broadcast burning activities would use water during site preparation, burning, and mop-up. The existing hydrant system would likely be used for fire suppression and broadcast burning activities, due to the proximity of the hydrant system to the burn area. Therefore, no new or expanded water facilities would be required. Implementation of the proposed project would utilize equipment powered by diesel fuel and gasoline and would not require any electrical infrastructure or interconnection to the PG&E power system. For these reasons, implementation of the proposed project would not require the relocation or construction of new or expanded utilities. No impact would occur.

- b) **Would the proposed project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?**

The proposed project involves vegetation treatment activities to establish and expand fuel reduction zones. Implementation of the proposed project would not require water for most activities. Hose lays would be required to provide small amounts of water in order to ensure all embers resulting from pile burning are extinguished at the end of pile burning (Coastal Country, n.d.). As discussed under impact a) above, water may be used for broadcast burning during site preparation, burning, and mop-up. Control lines could be installed through wetting, which involves applying water along the boundary of a burn unit to prevent the fire from spreading beyond the burn unit boundaries. During the broadcast burn, hoses, backpack pumps, and fire engines would use water to control the burn. Hydrants would likely be used for fire suppression, as the broadcast burn area is close enough to the existing hydrant system. Water may be used during mop-up activities to extinguish smoldering vegetation, hot spots, and any remaining flames. The quantity of water used during broadcast burning depends on fuel load moisture and content, weather conditions, and vegetation type. Guidance is not available on the amount of water typically required per acre of broadcast burning, however, a minimum of 200 gallons of water is recommended to be available for broadcast burns (Garza and Taylor 2007; Ohlenbusch et al. 1993). The relatively low quantity of water used for broadcast burn management would not substantially affect local water supplies. The proposed project would not require the development of water services to either site. The proposed project would not result in the expansion of the surrounding facilities and population (refer to Section 2.2.14, Population and Housing). Workers would use bottled water throughout treatment activities. Therefore, implementation of the proposed project would not create new, substantial demands for the water supply. No impact would occur.

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- c) **Would the proposed project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?**

Wastewater usage would not be required to conduct the proposed activities. Additionally, the proposed project activities would not produce wastewater except for waste from porta-potties, if used. As a result, the proposed project would have no impact on wastewater treatment facilities that service the area. No impact would occur.

- d) **Would the proposed project generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?**
- e) **Would the proposed project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?**

The proposed project would generate waste from project activities, primarily in the form of vegetative material. Incidental solid waste may be encountered and collected in the field, and waste generated by workers would be collected and disposed of offsite. Most of the vegetative waste generated would be treated at each site through treatment methods such as chipping and pile burning. The remaining waste generated by fuel reduction activities, consisting mostly of vegetative materials, would be hauled from the project sites and disposed of at a permitted waste facility, including the West Marin Compost, Redwood Landfill, Marin Resource Recovery Center, or another appropriate biomass-processing facility or used as appropriate in other areas of Marin County. West Marin Compost has the permitted capacity to receive 8,000 tons per year (CalRecycle, n.d.). Redwood Landfill has the permitted capacity to receive 2,310 tons of material per day (WM Intellectual Property Holdings, LLC, n.d.). The surrounding facilities would be able to accommodate the vegetative biomass and the minimal amounts of solid waste that would be generated from the proposed project. Impacts would be less than significant.

Mitigation Measures

No mitigation measures would be required.

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2.2.20 Wildfire

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
20. WILDFIRE. If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒

Environmental Setting

The project sites are within the Local Responsibility Area (LRA) (California Department of Forestry and Fire Protection (CAL FIRE) 2023). The project sites are not located in or near a Very High Fire Hazard Severity Zone or State Responsibility Area as mapped by CAL FIRE. The nearest Very High Fire Hazard Severity Zones are approximately 2.4 miles southwest of the San Rafael Hill project site and approximately 0.8-mile northwest of the Deer Valley project site.

Discussion

a) Would the Project impact an adopted emergency response plan or emergency evacuation plan?

The fuel reduction zones support existing fire roads that may be used by emergency vehicles in the event of a wildfire or other emergency. As discussed under Hazards and Hazardous Materials impact f), the San Rafael Hill fuel reduction zone is located within evacuation zones SNR-E582 and SNR-E583, and the Deer Valley fuel reduction zone is located within evacuation zone SNR-E519. Temporary lane or road closures may occur along Robert Dollar Drive within the San Rafael Hill fuel reduction zone. In accordance with PDIF TR-1, if an emergency event were to occur, crews along roadways would cease work and restore emergency vehicles access. Implementation of the proposed project would improve access for emergency responders in the event of a wildfire ignition and provide defensible space for fire suppression crews to safely defend communities. The proposed project would not impact an adopted emergency response plan or evacuation plan. Impacts would be less than significant.

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b) Due to slope, prevailing winds, and other factors, would the Project exacerbate wildfire risks and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

Implementation of the proposed project would reduce and not exacerbate wildfire risks. The proposed project would reduce fuel loads throughout the San Rafael Hill and Deer Valley fuel reduction zones. The proposed project would remove invasive, fire-hazardous vegetation including eucalyptus, French and scotch broom, gorse, and acacia, and conifers encroaching in native oak woodlands. Additionally, understory ladder fuels would be thinned or removed. The determination that the project treatments would achieve the purpose of reducing wildfire risk and severity is supported by a substantial amount of research. A comprehensive meta-analysis shows that surface fuel treatments have a large and substantial effect on fire behavior, including reductions in canopy volume scorch, scorch height, and reductions in flame length (Martinson and Omi 2013). Residual tree diameter – the retention of large trees with the removal of smaller ones and surface fuels – is a primary predictor of treatment effectiveness, which is proposed as part of this project. Under both modeled conditions and in analysis of real wildfires, the treatments proposed as part of the project (reducing surface fuels followed by prescribed fire and/or pile burning) have been shown to reduce flame lengths and burn severity (J. Moghaddas et al. 2018). Shaded fuel breaks specifically reduce surface and ladder fuels while retaining upper canopy and large trees (Low et al. 2023), and surface and ladder fuels are a driving force of severe wildfire as crown fires require heat and fuel sources from surface fires to be sustained (Thomas and McAlpine 2010). Shaded fuel breaks have been shown to reduce wildfire char, improve post-burn vegetation health relative to untreated areas, and decrease probability of torching (i.e., crown fire) of trees (Bajinath-Rodino et al. 2023; Low et al. 2023). Although thinning of the understory may marginally increase wind turbulence in the understory itself, it does not affect turbulence in the canopy (Russell et al. 2018) and open wind speed at 10 meters above canopy height is generally predictive of wildfire rate of spread (Cruz and Alexander 2019). The general reduction in fuel loading, decrease in probability of torching, and associated lack of increase in canopy wind speed decrease the risk of severe wildfire such as a crown fire. Furthermore, fuel breaks can occur in concert with other treatments, such as defensible space and home hardening, to reduce fire severity and structure loss (U.S. Forest Service 2014). A more recent meta-analysis of 220 research papers concludes that treatments that include a reduction in surface fuels (i.e., thinning and removal of surface fuels via prescribed burning, pile burning, or manual/mechanical removal) reduce wildfire severity within treated areas by over 60 percent on average (Davis et al. 2024).

Fuel treatments in chaparral specifically reduce potential wildfire intensity by reducing dead woody vegetation, shrub height, and vegetation continuity, thereby reducing flame heights and heat during a wildfire. Studies have found that hand thinning or removal of chaparral was effective at reducing shrub height and dead vegetation (Martorano et al. 2020). Required measures included in the project would reduce the risk of type conversion of chaparral to non-native grasslands (refer to Section 2.2.4, Biological Resources for an assessment of this risk). Wildfire hazards in chaparral differ from non-native grasslands in that fine fuel loads and the rate of wildfire spread is higher in grasslands, but the fire intensity and flame length are much lower and may be easier to control (Gruppenhoff and Safford 2024). The proposed treatments

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and thinning in shrub communities and across the fuel reduction zones as part of this project would not increase wildfire risks.

Vehicles and equipment used during treatment activities could generate sparks that could increase the risk of wildland fire ignition. PDIF HAZ-2 requires that fire suppression equipment is maintained in work vehicles, vehicles and equipment must be outfitted with spark arrestors, and workers would be trained to properly handle and store flammable materials to minimize potential ignition sources. With implementation of HAZ-2, vehicles and equipment would not exacerbate wildfire risk.

Pile burning, broadcast burning, air curtain burners, carbonators, and kiln burners could release embers that could ignite a wildland fire. Pile burning, air curtain burners, carbonators, kiln burners would be used in areas with minimal vegetation and low risk for fire spread. All burning would be conducted by a qualified professional in accordance with the appropriate burn permits (if required), regulations, and standard industry practices, which would ensure that people and structures would not be exposed to significant risks. BAAQMD requires any fire set for the purpose of removing forest debris for forest management must be set or allowed by a public fire professional and a Smoke Management Plan is required prior to burning. A burn plan would be prepared by a burn boss for broadcast burning. The burn plan would include a description of the site, weather parameters for burning, ignition techniques, contingency plans, burn treatment protocols, and post-burn monitoring. In accordance with PDIF HAZ-3, pile burning would only be allowed on days when fire is less likely to spread, piles would only be constructed in the flattest area possible, and fire suppression crews would be on-site. With implementation of a burn plan, Smoke Management Plan, and PDIF HAZ-3, the proposed project would not exacerbate wildfire risk, such that project occupants would be exposed to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire. Therefore, the impact would be less than significant.

c) Would the Project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

The proposed project would not require the installation or maintenance of associated infrastructure, such as fuel breaks, roads, emergency water sources, power line, or other utilities that would exacerbate fire risk. As discussed under impact b), the proposed project would establish fuel reduction zones in the San Rafael Hill and Deer Valley open space areas, which would reduce fire risk. The proposed fuel reduction zones would reduce wildfire risk, improve emergency access for fire suppression crews, and enhance the fuel reduction zone's defensibility against wildfires. Maintenance activities would use similar vehicles and equipment as initial treatment activities. The proposed project would implement PDIF HAZ-2, which requires equipping vehicles and equipment with spark arrestors and maintaining fire suppression equipment in work vehicles. For these reasons, implementation of the proposed project would not exacerbate fire risk. The impact would be less than significant.

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d) Would the Project expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

As discussed above, the purpose of the proposed project is to reduce wildfire risk within the San Rafael Hill and Deer Valley fuel reduction zones. The proposed project does not include construction of any structures that would be at risk due to post-fire slope instability. Vegetation treatment activities would involve the manual and mechanical removal of dead/downed woody vegetation, non-native, invasive vegetation, small diameter trees (less than 12 inches DBH), and understory ladder fuels. As discussed in Section 2.2.7, Geology and Soils, manual and mechanical treatments would not result in substantial erosion or soil loss that could result in destabilization after a fire as most groundcover would be retained. Broadcast burning at the San Rafael Hill fuel reduction zone would remove surface vegetation that could expose people or structures downslope to landslides as a result of runoff. As discussed in Section 2.2.10, Hydrology and Water Quality, broadcast burns, which are generally low severity fires, minimally increase fine sediment volumes in creeks within a burn area. Broadcast burns would result in less downstream impacts than high severity wildfires. As discussed in Section 2.2.7, Geology and Soils, the implementation of PDIF GEO-1 requires that soils to be stabilized if a vegetation management activity leaves less than 70 percent groundcover or native mulch/organic material. For areas with 50 percent to 70 percent ground cover left, erosion control measures may include sowing native grasses and other native vegetation, using slash or chips to prevent erosion, installing biodegradable erosion control measures and geotextiles (e.g., coir, jute), and installing sediment control devices. For areas with less than 50 percent ground cover, a qualified professional would determine whether project activities could result in substantial sediment discharge from soil disturbance (PDIF GEO-1). Pulling of large vegetation would not occur during rain events or when soils are saturated (PDIF GEO-3). PDIF GEO-1 requires the installation of erosion control devices in areas where erosion could occur. Implementation of PDIFs GEO-1 and GEO-3 would reduce the potential for erosion, stormwater runoff, and subsequent sedimentation. Burn piles would be four feet in diameter and would not impact a large enough area to cause a significant change in stormwater runoff patterns that could result in downstream flooding. Furthermore, the purpose of the proposed project is to reduce wildfire risk within City of San Rafael open space areas. While the project sites contain steep slopes, the proposed project would not result in runoff, slope instability, or drainage changes. Impacts would be less than significant.

Mitigation Measures

No mitigation measures would be required.

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2.2.21 Mandatory Findings of Significance

Environmental Impacts	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
21. MANDATORY FINDINGS OF SIGNIFICANCE:				
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☒	☐	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☒	☐

Discussion

- a) **Would the proposed project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?**

Construction of the proposed project has the potential to result in significant impacts to special-status species not covered by the federal or state endangered species acts as well as migratory birds. Common wildlife species may live on the project sites, such as woodrats, deer, lizards, snakes, and insects. The range and distribution of wildlife species that could occur on the project site is quite large relative to the size of the project. Additionally, the proposed project would not result in habitat change, but would rather result in potential temporary impacts to the species habitat. As such, the proposed project would not cause a wildlife population to drop below self-sustaining levels. Potential impacts to wildlife species include crushing of individuals, nest destruction, or nest failure. Piles for burning would be lit from one side and allowed to burn slowly to the other side of the pile to allow any wildlife time to vacate the pile (PDIF SH-3). As analyzed under Section 2.2.4, Biological Resources, special-status plant and wildlife species have potential to occur within the fuel reduction zones. Impacts on nesting birds and maternity roosting bats would be reduced with implementation of PDIFs NB-1, NB-2, NB-3, NB-4, RB-1, RB-2, RB-3, and RB-4. Workers would be trained to identify and avoid

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special-status wildlife species with a potential to occur in the fuel reduction zones (PDIF ET-1). The proposed project could potentially impact burrowing owl individuals and nests as well as monarch butterflies during the larval and pupal stages. Although impacts to special-status species could occur (e.g., injury or mortality to individuals if they are present within the fuel reduction zones during vegetation management activities), Mitigation Measures BIO-1 and BIO-2 would reduce impacts to candidate, sensitive, and special-status species to a less-than-significant level. Accordingly, the proposed project would not substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, or substantially reduce or restrict the range of a rare or endangered plant or animal.

Archaeological resource surveys conducted for the fuel reduction zones identified one newly identified precontact site at the San Rafael Hill fuel reduction zone. As discussed in Cultural Resources, PDIFs CUL-1 through CUL-5 are incorporated into project implementation that addresses worker training, monitoring of the precontact resource, avoidance of impacts to any unanticipated discovery of cultural resources and/or human remains, post-burn spot monitoring, as well as monitoring where surface and sub-surface disturbance could occur. In accordance with Mitigation Measure CUL-1, any precontact resources or Tribal Cultural Resources encountered during project activities would require the preparation of DPR 523 form, which would be shared with Graton Rancheria for review and input prior to submittal to the NWIC. As a result, the proposed project would not eliminate an important example of major periods of California history or prehistory. This impact would be less than significant.

b) Would the proposed project have impacts that are individually limited, but cumulatively considerable?

The geographic scope for the analysis of cumulative impacts is within 1-mile or less of the fuel reduction zones. Several cumulative fuel reduction projects occur within the vicinity of the fuel reduction zones, as shown in Air Quality

The SFBAAB is currently designated as a non-attainment area for federal and state ozone standards, the State PM₁₀ standard, and the Federal and State PM_{2.5} standards. Past and present projects in the SFBAAB have resulted in the non-attainment statuses. As discussed in Section 2.2.3, Air Quality, past, present, and future development projects contribute to the SFBAAB's adverse air quality impacts on a cumulative basis and no individual project is sufficient in size to result in nonattainment of ambient air quality standards. If a project's emissions do not exceed the numerical thresholds in the SFBAAB, the project would not considerably contribute to the cumulatively significant air quality impact.

Implementation of the proposed project would result in minor criteria pollutant emissions and would not generate emissions in excess of the SFBAAB's significance thresholds. Equipment, broadcast burning, and pile burning would emit criteria air pollutants below the thresholds of significance. Therefore, the proposed project's contribution to a significant cumulative impact would not be cumulatively considerable.

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Vehicles and equipment used during implementation of the cumulative projects would generate localized diesel and fugitive dust emissions near sensitive receptors. Construction of the cumulative projects has the potential to subject sensitive receptors to elevated TAC emissions for a prolonged period. Receptors near broadcast or pile burns would be especially at risk of elevated TAC emissions. TAC emissions from the cumulative projects would be similar to the proposed project. Burns conducted as part of the cumulative projects would be required to comply with BAAQMD Regulations 5 including burn notification requirements and burn day restrictions. Localized TAC emissions from cumulative prescribed burns are not expected to accumulate. The proposed project in combination with the cumulative projects would result in a less than significant cumulative impact on sensitive receptors from air toxics.

Figure 2-3 through Figure 2-4. Table 2.2-20 describes each cumulative project within 1-mile of the fuel reduction zones. The cumulative projects focus on fuel reduction projects due to the similar environmental resource impacts that would occur. Additionally, the goal of the cumulative projects is to maintain fuel reduction areas to help slow or stop the spread of wildfire and provide safe access to emergency responders.

There are 11 cumulative projects within 1-mile of the fuel reduction zones. Of the 11 cumulative projects, three cumulative projects would overlap with each fuel reduction zone. The San Rafael Zone Open Space Management Project and San Rafael Zone Marinwood and Open Space Prescribed Herbivory Project overlap the Deer Valley fuel reduction zone, and the San Rafael Zone Marinwood and Open Space Prescribed Herbivory Project, Mountain Park Open Space Fuel Reduction Project, and San Rafael Zone South San Rafael Hill Fuel Reduction Project overlap the San Rafael Hill fuel reduction zone. Vegetation treatment methods used by the cumulative projects (i.e., herbicide application, manual and mechanical treatments) would be similar to the proposed project.

Detailed cumulative impacts are presented below for key resources. All other resources have no or minimal potential to result in significant cumulative impacts.

Table 2.2-20 Cumulative Vegetation Management Projects

Project	Description	Schedule
Greater Novato Shaded Fuel Break Project	The project would involve fuel reduction activities within a 60-mile-long continuous shaded fuel break and 2,123-acre area. Wildland urban interface fuel would be reduced on 1,340 acres adjacent to the fuel break. Treatment methods include manual and mechanical treatment, prescribed herbivory, herbicide application, and broadcast burning.	Ongoing
San Rafael Zone Open Space Management Project	The project would use manual and mechanical treatment methods to reduce fuel loads across 78 acres within City of San Rafael-owned open space parcels. Fuel reduction would be limited to areas up to 150 feet from structures and up to 50 feet from roadways.	Ongoing

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Project	Description	Schedule
San Rafael Zone Marinwood and Open Space Prescribed Herbivory Project	The project would use prescribed herbivory on 186.6 acres within the Marinwood community services district and City of San Rafael-owned open space parcels.	Ongoing
San Rafael Zone Evacuation Route Core Project	The project would treat vegetation on approximately 360.4 miles of roadways within the city of San Rafael. Vegetation would be reduced typically within 10 feet from road edges but could extend up to 30 feet from road edges. Project treatments would include manual and mechanical fuel reduction methods.	Ongoing
San Rafael Zone South San Rafael Hill Fuel Reduction Project	The project would use manual and mechanical treatment methods to create a fuel reduction zone within 100 feet of structures on approximately 5.4 acres of land within San Rafael Hill.	Ongoing
Treatment Method Augmentation for the San Rafael Zone Open Space Management and Evacuation Route Projects	The project would incorporate herbicide application as a potential treatment method for the San Rafael Zone Evacuation Route Core Project 2022/2023 and San Rafael Zone Open Space Management Project.	Ongoing
San Rafael Zone South San Pedro Mountain Fuel Reduction Zone Project	The project would create fuel reduction zones between open spaces and communities across approximately 19 acres of land managed by the City of San Rafael, 8 acres of land managed by State Parks, and 15 acres of private land. Fuel reduction would be limited to 150 feet from structures.	Ongoing
San Rafael Zone West San Pedro Fuel Reduction Project	The project would include eucalyptus removal and native replanting on approximately 2.5 acres of City of San Rafael owned and managed land.	Ongoing
Dominican Preserve Invasive Broom Removal and Restoration	The project would remove invasive French broom from 5 acres of oak savannah to restore wildlife habitat.	Ongoing
Caltrans Fuel Reduction Service Contract 02 – FY 2023-2025	The project would conduct fuel reduction work along U.S. 101 in Marin County.	Ongoing
City of San Rafael Landscaping Maintenance	The City of San Rafael conducts ongoing landscaping maintenance in manicured areas on City-owned properties including the Falkirk Cultural Center.	Ongoing

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Project	Description	Schedule
Mountain Park Open Space Fuel Reduction Project	The project would create a fuel reduction zone within 100 feet of structures and 50 feet of roadways on 16 acres of land within San Rafael Hill.	Ongoing

Air Quality

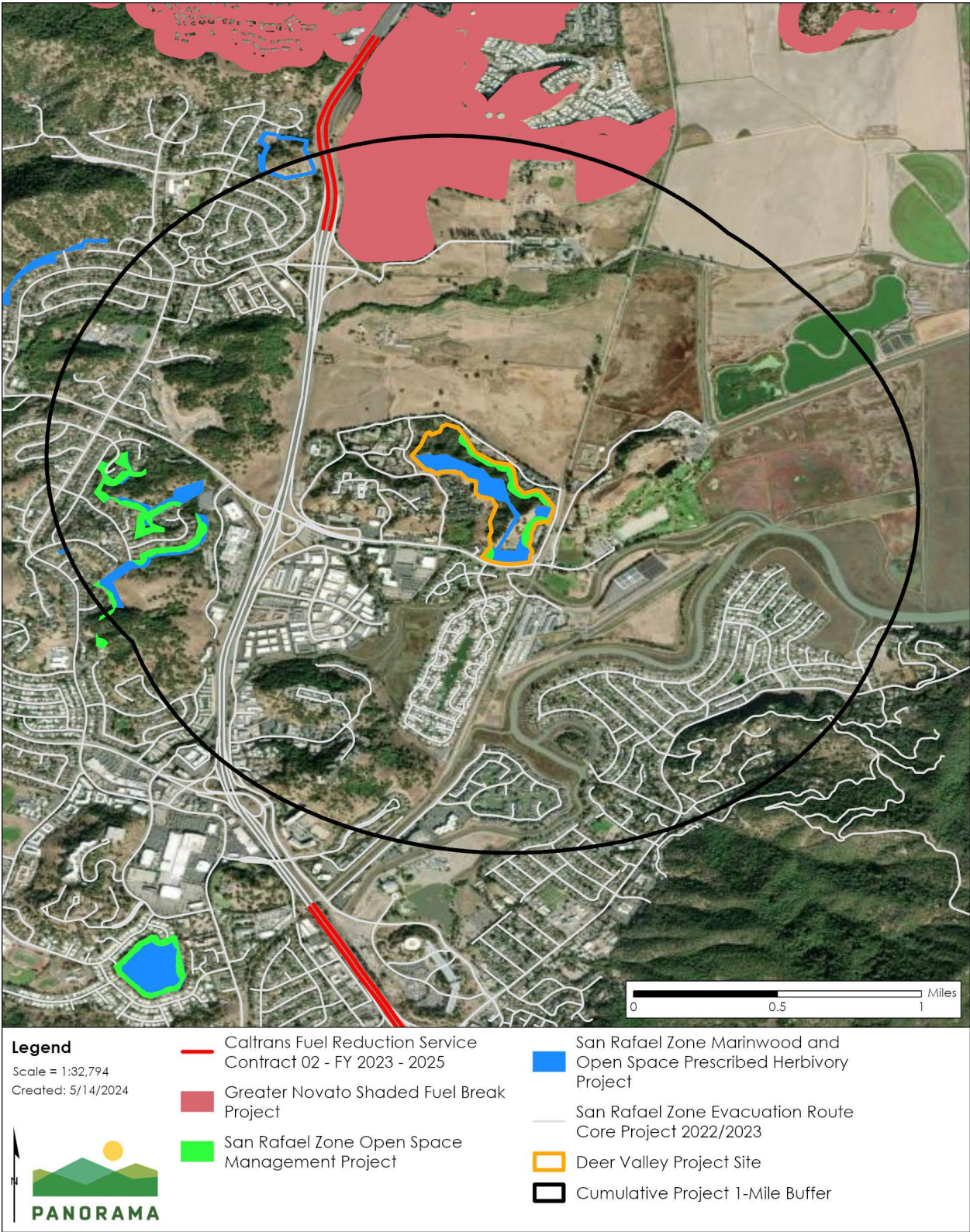
The SFBAAB is currently designated as a non-attainment area for federal and state ozone standards, the State PM₁₀ standard, and the Federal and State PM_{2.5} standards. Past and present projects in the SFBAAB have resulted in the non-attainment statuses. As discussed in Section 2.2.3, Air Quality, past, present, and future development projects contribute to the SFBAAB's adverse air quality impacts on a cumulative basis and no individual project is sufficient in size to result in nonattainment of ambient air quality standards. If a project's emissions do not exceed the numerical thresholds in the SFBAAB, the project would not considerably contribute to the cumulatively significant air quality impact.

Implementation of the proposed project would result in minor criteria pollutant emissions and would not generate emissions in excess of the SFBAAB's significance thresholds. Equipment, broadcast burning, and pile burning would emit criteria air pollutants below the thresholds of significance. Therefore, the proposed project's contribution to a significant cumulative impact would not be cumulatively considerable.

Vehicles and equipment used during implementation of the cumulative projects would generate localized diesel and fugitive dust emissions near sensitive receptors. Construction of the cumulative projects has the potential to subject sensitive receptors to elevated TAC emissions for a prolonged period. Receptors near broadcast or pile burns would be especially at risk of elevated TAC emissions. TAC emissions from the cumulative projects would be similar to the proposed project. Burns conducted as part of the cumulative projects would be required to comply with BAAQMD Regulations 5 including burn notification requirements and burn day restrictions. Localized TAC emissions from cumulative prescribed burns are not expected to accumulate. The proposed project in combination with the cumulative projects would result in a less than significant cumulative impact on sensitive receptors from air toxics.

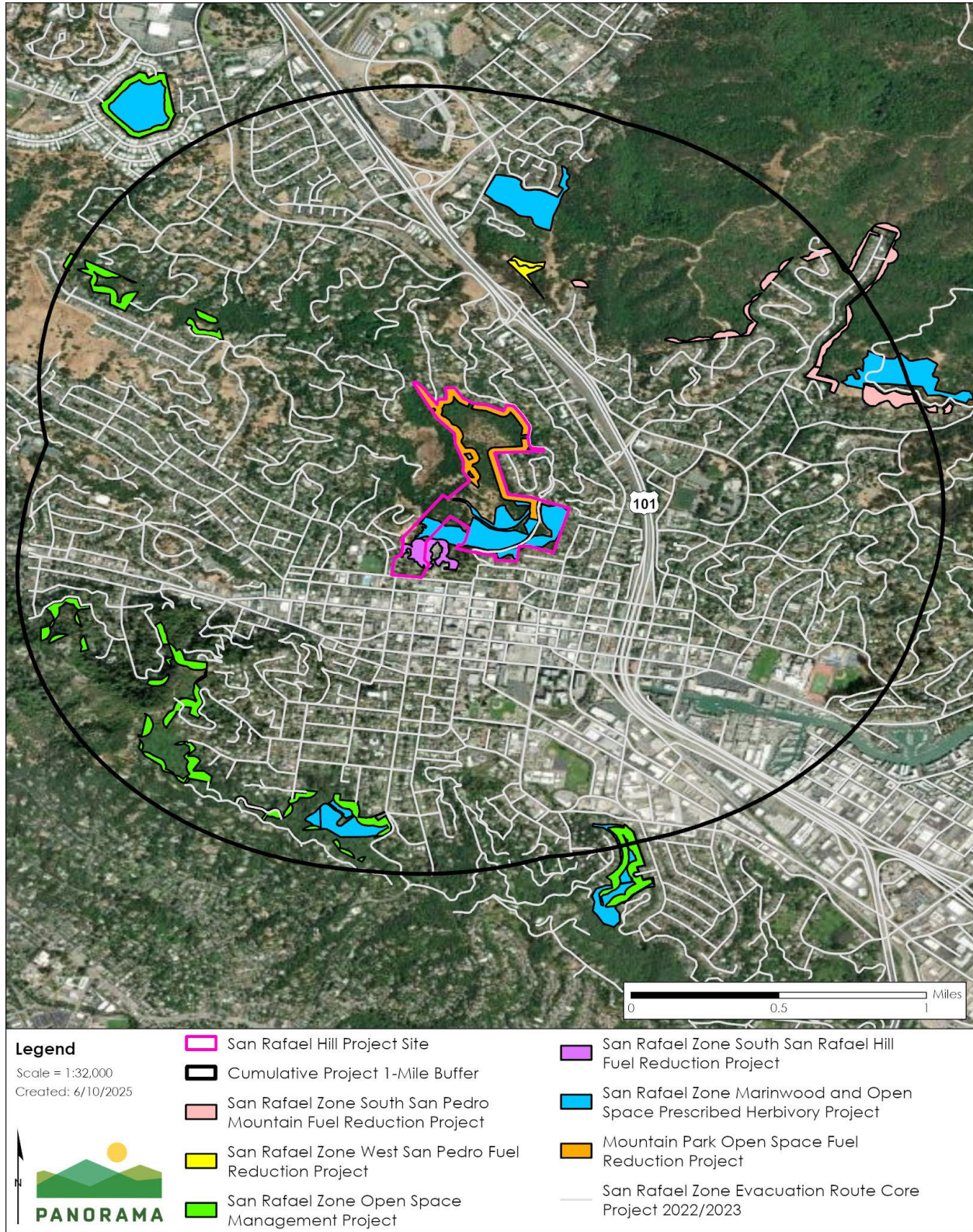
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Figure 2-3 Deer Valley Cumulative Projects



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Figure 2-4 San Rafael Hill Cumulative Projects



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Cultural and Tribal Cultural Resources

Cumulative projects that involve ground disturbance have the potential to impact recorded and previously undiscovered cultural resources and TCRs. Project activities could disturb the ground and damage or destroy archaeological or historic resources. Cumulative projects that require the use of heavy equipment or ground disturbance and occur in the vicinity of the fuel reduction zones may impact the same types of cultural resource, which could result in a significant cumulative impact, since it could result in the loss of information from the prehistoric or historic record. Cumulative impacts are potentially significant. PDIFs CUL-1 through CUL-5 and Mitigation Measure CUL-1 would require cultural resources worker training, monitoring of the known precontact resource, post-burn spot checking monitoring, and coordination with Graton Rancheria including invitations to monitor and review the DPR 523 form (refer to Sections 2.2.5, Cultural Resources, and 2.2.18, Tribal Cultural Resources for more information). Implementation of PDIFs and mitigation would minimize the proposed project's contribution to an otherwise cumulatively significant impact on known cultural and tribal cultural resources.

Hydrology and Water Quality

Portions of the Deer Valley open space and nearby areas are assumed to drain into Gallinas Creek, which is designated as impaired. While the San Rafael Hill open space does not contain any water bodies, the ephemeral streams and surface stormwater may drain into San Rafael Creek, which is designated as impaired and not meeting water quality standards. Downstream waterbodies from the cumulative project areas are also identified as not meeting several water quality standards (refer to Section 2.2.10, Hydrology and Water Quality for more information).

Ground disturbing activities associated with the cumulative projects, could further affect water quality in downstream areas, as vegetation management could all result in erosion resulting in mobilization of sediments and pollutants into downstream areas. Implementation of the cumulative projects include treatments that could cause erosion, topsoil loss, and increase flow speeds due to the removal of vegetation, heavy equipment use, and the pulling of invasive species. Herbicide application associated with several of the cumulative projects could also contribute to water quality degradation by introducing herbicide contaminants into nearby waterbodies. The impacts on downstream impaired waterways from implementation of cumulative projects could be cumulatively significant.

The proposed project would include activities that could contribute to erosion and sedimentation and involves use of herbicides for invasive species management. The proposed project would implement PDIFs GEO-1 and GEO-3 to prevent erosion and sedimentation from vegetation management activities. PDIF GEO-1 requires that soils be stabilized if a vegetation management activity leaves less than 70 percent groundcover or native mulch/organic material and requires the installation of erosion control measures and sediment control devices, where needed. PDIF GEO-3 requires that any ground disturbing treatment would not occur during any rain event, and that any area with ground disturbance would be inspected after a rain event to ensure the ground is properly stabilized to prevent any soil erosion or sedimentation. Additionally, PDIFs HAZ-4 and HAZ-5 would be implemented to reduce the potential for

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spills, as well as using herbicides labeled for use in aquatic environments when using near aquatic habitats. Therefore, the proposed project's contribution to potentially significant cumulative impacts on hydrology and water quality would be less than cumulatively considerable.

Biological Resources

The cumulative projects involve vegetation management activities primarily within open space areas in the city of San Rafael and could have impacts on special-status species, sensitive vegetation communities, and habitat. Most of the cumulative projects aim to benefit native vegetation and wildlife habitat by removing non-native, invasive vegetation and reducing the risk of wildfires. Cumulatively significant impacts on vegetation and general wildlife are not anticipated.

Special-Status Plants Species

Implementation of the cumulative projects and the proposed project have the potential to cause mortality of special-status plant species by using equipment that would damage the flowering body of plants species and driving and crushing vegetation, which could result in cumulatively significant impact if the population is adversely affected. The proposed project and several Marin Wildfire cumulative projects would implement PDIF ES-1, which requires surveys to be conducted prior to work for activities that would occur during the blooming season and could damage the flowering plant. PDIF ES-1 also requires biologists to determine a buffer around sensitive species based on the type of herbicide and application method used. Training would be conducted to identify special-status plant species and sensitive communities for avoidance (PDIF ET-1). Therefore, appropriate measures would be implemented to reduce and avoid impacts on special-status plants. The proposed project in combination with the cumulative projects would not result in a significant cumulative impact.

Special-Status Wildlife Species

Five special-status wildlife species have a moderate to high potential to occur within the fuel reduction zones. Cumulative projects in the vicinity of the fuel reduction zones could impact the same wildlife species. Impacts to special-status wildlife species from the cumulative projects would be similar to the proposed project. If these projects, as a whole, resulted in the death or injury of individuals in the populations, a significant impact could occur. Nesting birds and maternity roosting bat surveys would be conducted for all Marin Wildfire, Marin County Open Space District (MCOSD), and California State Park cumulative project activities that occur from February 1 to July 31 (PDIF NB-1, NB-2, NB-3, NB-4, RB-1, RB-2, RB-3, RB-4). Mitigation Measures BIO-1 and BIO-2 would require targeted surveys for burrowing owl and monarch butterflies under certain circumstances during proposed project implementation. Additionally, environmental training would be conducted for all special-status wildlife species with potential to occur in the fuel reduction zones and for the Marin Wildfire cumulative projects (PDIF ET-1). Therefore, the proposed project in combination with the cumulative projects would not result in a significant cumulative impact.

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Geology and Soils

Several cumulative projects overlap the proposed project fuel reduction zones where historic evidence of landslides and erosion are evident. These cumulative projects would involve ground disturbance from vegetation treatment activities that could result in soil erosion, loss of topsoil, or slope destabilization. However, it is unlikely that the cumulative projects that overlap the fuel reduction zones would occur simultaneously because the type of fuel reduction work and purpose would be similar to the proposed project.

The proposed project and several cumulative impacts that overlap in the same or similar location incorporate PDIFs GEO-1 and GEO-3. The implementation of PDIF GEO-1 requires that soils be stabilized if a vegetation management activity leaves less than 70 percent groundcover or native mulch/organic material. PDIF GEO-3 would also be implemented, which requires that any ground disturbing treatment would not occur during any rain event, and that any area with ground disturbance would be inspected after a rain event to ensure the ground is properly stabilized to prevent any soil erosion that could lead to landslide. Similar to the proposed project, the cumulative projects would be required to implement PDIFs GEO-1 and GEO-3. By minimizing erosion and slope instability risk from treatment activities, the proposed project would not combine with the cumulative projects to result in a cumulatively significant impact.

Hazards and Hazardous Materials

Construction, operation, and/or implementation of cumulative projects and implementation of the proposed project would use equipment and vehicles that could leak hazardous materials, including gasoline and diesel fuel, engine oil, coolant, lubricants, and grease. Hazardous materials, particularly fuel, may be transported to and from each site, which would increase the risk of accident and release. The hazard to the public from fuel leaks from the cumulative projects would be highly localized geographically and temporally, due to the small amount of hazardous materials that vehicles and equipment typical would use and the quick response time to clean up any spill. The cumulative projects would be required to comply with CalOSHA, DOT, and Caltrans regulations regarding the transportation of hazardous materials. The proposed project in combination with the cumulative projects would therefore not combine to result in a cumulatively significant impact due to accidental releases of hazardous materials or herbicide.

In accordance with PDIFs HAZ-4 and HAZ-5, the proposed project would require all herbicide containers be properly rinsed and disposed of accordingly, applications of herbicide would be subject to label specifications, precipitation events, and wind speeds. Additionally, implementation of PDIF HAZ-1 requires the proposed project to inspect for leaks and spills, ensure proper emergency response to spills, and train workers on hazardous materials spill procedures. Most of the cumulative projects would be required to implement Marin Wildfires PDIFs, including PDIFs HAZ-1, HAZ-4, and HAZ-5. With implementation of this measure, workers would not be exposed as part of project implementation or release contamination into the environment and, therefore, the proposed project in combination with the cumulative projects would not result in a cumulatively significant impact.

2 ENVIRONMENTAL CHECKLIST

Noise

As discussed above, several cumulative projects are located within the proposed fuel reduction zones. Noise associated with simultaneous vegetation management activities of several cumulative projects could compound with noise generated by equipment and vehicles used by the proposed project. Noise from the cumulative projects and proposed project could impact the same sensitive receptors. As discussed above, it is unlikely that the cumulative projects and proposed project would be operating simultaneously in the same location due to the similar types of treatment activities that would be conducted. The cumulative projects would also be required to comply with the City of San Rafael noise ordinance. The cumulative impact on sensitive receptors would not be significant. The proposed project would implement NOI-1 which includes measures to minimize noise disruption to sensitive receptors including noise control techniques on equipment, limits on where noise sources can be located, equipment use would be limited to daytime hours, and all equipment would be shut down while not in use. Therefore, the proposed project in combination with the cumulative project would not result in a cumulatively significant impact.

Transportation

The cumulative projects would generate vehicle trips to and from project sites on similar roadways as the proposed project. Most of the cumulative projects would require the temporary closure of trails, fire roads, lanes, and roadways during treatment activities. The cumulative projects may have similar implementation schedules as the proposed project. Therefore, overlapping schedules would increase the potential for conflict between project vehicles including large trucks and normal traffic along roadways, particularly if lanes or roads are closed. However, the proposed PDIFs or applicable regulations and impacts would not be cumulatively significant.

The proposed project would require temporary closures of lanes or roads during treatment activities at the San Rafael Hill fuel reduction zone. Other cumulative projects may require lane or road closures during treatment activities, but due to the limited duration of treatment in any one location the impact on traffic hazards and emergency access would not be cumulatively significant. The cumulative projects would be required to comply with the California MUTCD, which would reduce the potential hazards of lane and road closures. The cumulative projects would be required to comply with Marin Wildfire's PDIFs. Implementation of traffic control measures and maintaining emergency access in accordance with PDIFs TR-1 and TR-2 would reduce potentially hazardous traffic conditions from the cumulative projects. The impact would not be cumulatively significant.

2 ENVIRONMENTAL CHECKLIST

c) Would the proposed project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

In general, impacts on human beings are associated with air quality, geology and soils, hydrology and water quality, hazards and hazardous materials, and noise impacts. As detailed in the preceding sections, the proposed project would not result, either directly or indirectly, in adverse effects related to air quality, geology and soils, hazards and hazardous materials, or noise. Therefore, the proposed project would not result in substantial adverse effects, direct or indirect, on human beings.

3 Responses to Comments on the Draft IS/MND

3.1 Overview

This chapter is newly added to the document following the release of the Draft IS/MND and includes comments received during the proposed project Draft IS/MND public review period. Changes made to Chapters 1, 2, 4, and 5 of the Draft IS/MND since circulation are shown in highlighted ~~striketrough~~ (indicating removal of text) and underline (indicating addition of text). The chapter for references has also been moved to Chapter 5 in this document.

3.2 Public Review Period

The Draft IS/MND was circulated for a 30-day public review period from June 16, 2025 to July 16, 2025. Postcard notices were sent to 548 people within 300 feet of the fuel reduction zones and posters on sandwich boards were placed at road and trail entrances to the fuel reduction zones. Email notification of the public review period was distributed on June 13, 2025 to individuals who have expressed interest in Marin Wildfire-funded projects. The Notice of Intent was posted at the Marin County Clerk’s Office and on the State Clearinghouse.

3.3 Comments Received

Six comment letters on the Draft IS/MND were received from the public during the review period. The commentors are listed in Table 3.3-1.

Table 3.3-1 Comment Letters Received

Letter	Commentor	Letter Date
1	Sharon Farrell, Jean Harris, Laura Chariton, Jinesse Reynolds, Tim Walch, Abby Cunningham, Barbara Bogard, Susan Hopp, Jayne McDonagh, John Fernsell	July 1, 2025
2	Carolyn Longstreth, Fire & Environment Resilience Network (FERN)	July 13, 2025
3	Abby Cunningham	July 14, 2025
4	Charles Simonds	July 15, 2025
5	Larry Hanson, Forest Unlimited	July 14, 2025
6	Gary Graham Hughes, Biofuelwatch	July 16, 2025

3.4 Responses to Comments

The comment letters and responses are provided below. The comment letters have been numbered sequentially and each separate issue raised by the commenter, if more than one, has been assigned a number. The responses to each comment first identify the number of the comment letter, and then the number assigned to each issue (Response 1.1, for example, indicates that the response is for the first issue raised in comment Letter 1). Each comment letter is incorporated into this section. Any referenced attachment from a comment letter is available upon request but is not contained herein.

3 RESPONSES TO COMMENTS ON THE DRAFT IS/MND

3.4.1 Comment Letter 1: Multiple Commenters

July 1, 2025

To: Kate Anderson, San Rafael Open Space MND

Re: Comments on the San Rafael Hill and Deer Valley Fuel Reduction Proposal -
DRAFT INITIAL STUDY / MITIGATED NEGATIVE DECLARATION

Fuel Reduction ≠ Fire Risk Reduction

We appreciate the City of San Rafael's concern for wildfire safety near vulnerable neighborhoods. However, the current proposal to expand fuel reduction zones on open space lands near San Rafael Hill and Deer Valley does not align with the latest wildfire science or best practices. A growing body of research demonstrates that **structure ignition—not surrounding vegetation—is the dominant cause of home loss during wildfires.**

1.1

According to a 2022 meta-analysis by Dr. Alexandra Syphard (*Frontiers in Ecology and the Environment*), "vegetation clearance beyond 100 feet has little measurable impact on structural loss." Instead, **the area immediately surrounding a structure (0–5 feet) and the structure itself**—roofing, vents, siding, decks—determine whether a building ignites from embers.

A 2021 paper in *Fire Ecology* by Dr. Jack Cohen and Dr. Michael Gollner concludes:

"Wildfire disasters are structure ignition problems—not wildfire control problems."

Home Hardening: Cost-Effective and Proven

CAL FIRE, FEMA, and the Insurance Institute for Business & Home Safety (IBHS) prioritize **home hardening and defensible space within 100 feet** as the most effective strategies for protecting communities.

- According to FEMA's 2020 *Building Codes Save* report:
"Every \$1 spent on retrofitting homes saves \$4–\$7 in post-disaster costs."
- In the 2018 Paradise fire, a study by Headwaters Economics found that **90% of homes that burned had cleared vegetation nearby**, but lacked ember-resistant vents or hardened roofs. Embers traveled miles and ignited flammable materials within the 5-foot zone, bypassing vegetation treatment zones entirely.
- A 2021 *Fire* journal article (Quarles et al.) found that **Zone Zero vegetation management reduced ignition risk by over 80%**.

1.2

3 RESPONSES TO COMMENTS ON THE DRAFT IS/MND

Yet this proposal focuses funding on clearing vegetation in distant open space while offering no clear plan for:

- Retrofitting existing homes
- Vegetation clearance within 30 feet of structures or along key evacuation routes
- Community engagement, smoke-safe spaces, or early warning systems

1.2

Ecological and Social Risks of Vegetation Management

The proposal also positions invasive species removal as dual-purpose—restoring habitat and reducing fire risk. However, this often leads to **type-conversion**, where native shrublands are replaced with **highly flammable non-native grasses** (D'Antonio & Vitousek, 1992; Brooks et al., 2004). Unless managed perpetually, this approach can actually increase fire frequency.

Further concerns include:

- Disturbance of sensitive wildlife habitat
- Use of herbicides (if planned) without full public disclosure
- Risk of erosion and degraded soils
- Ongoing maintenance costs without long-term funding identified

1.3

The link between homeless encampments and fire risk must also be addressed **through housing and social services**, not open-space vegetation removal alone.

Recommendations

We recommend a shift in the project's scope and funding priorities:

1. Reallocate Funds to Where They Actually Save Lives and Property:

- **Prioritize home hardening retrofits**—including Class A roofs, ember-resistant vents, and noncombustible siding, fencing, and decks—that directly reduce structure ignition risk in wind-driven fires.
- **Target grant funding to the most effective upgrades**, such as roofing and siding, especially for homes in the Wildland Urban Interface where embers pose the greatest

1.4

3 RESPONSES TO COMMENTS ON THE DRAFT IS/MND

threat in Zone Zero. ([California plan to ban most plants within 5 feet of homes for wildfire safety overlooks some important truths about flammability](#))

- **Clear evacuation routes within 30 feet of roads** to ensure safe, passable exits during fast-moving wildfire events—especially in dense, high-risk communities.
- **Invest in smoke-resilient planning** for the most vulnerable populations, including nursing homes, apartment complexes, and schools—where evacuation may be delayed or impossible.

1.4

Legal and Policy Context

This project comes on the heels of the [May 2024 California Court of Appeal ruling in *Chaparra/Institute v. Board of Forestry*](#), which found CAL FIRE’s statewide vegetation treatment program **scientifically and legally inadequate** under CEQA. The ruling criticized the agency for:

- Relying on outdated or debunked science
- Failing to assess type-conversion and ecological harm
- Ignoring more effective strategies like structure hardening

1.5

Projects modeled on CalVTP-style vegetation clearance must now demonstrate **site-specific evidence, ecological review, and clear alternatives**—or risk legal challenge.

Conclusion

This project, as proposed, is not aligned with the most current data on wildfire mitigation. The assumption that expanding open space fuel breaks will reduce community risk is outdated and disproven under high wind and ember storm conditions—the very scenarios most destructive in California.

Reference Photos

San Rafael - San Anselmo Fuel Reduction Zone Project - these site photos are not represented on the project update. They show dry wood chips (ember fuel), other dry fuels and disruption to the entire ecosystem. The location is outside of the 100’ defensible space zone. This work started 3/24, photos taken 5/22/25.

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Mt Tam Cemetery Pilot Area



Mt Tam Cemetery Pilot Area

3 RESPONSES TO COMMENTS ON THE DRAFT IS/MND



Mt Tam Cemetery Pilot Area



Mt Tam Cemetery Pilot Area

3 RESPONSES TO COMMENTS ON THE DRAFT IS/MND

Novato - Valley Memorial Park Eucalyptus Removal & Vegetation Project No updates on MWPA site. Work started 10-22. A Novato resident has recorded the harm caused by this work from the project's beginning. The ecosystem completely disrupted from the removal of so many trees and the overuse of herbicides. The area floods every rain season since.



As taxpayers, we want our dollars spent where they actually make a difference. If San Rafael is serious about wildfire resilience, it should focus on proven strategies like home hardening (fire safe structures) in zone zero, and safe evacuation routes—not on costly vegetation clearing far from structures that won't stop wind-driven embers.

We urge the City to revise this proposal and redirect funding toward what truly protects lives, homes, and the community's long-term safety.

Respectfully,

Sharon Farrell, San Rafael
Laura Chariton, Mill Valley
Tim Walch, Corte Madera
Barbara Bogard, Mill Valley
Jayne McDonagh, San Anselmo
John Fernsell, San Anselmo

Jean Harris, Novato
Jinesse Reynolds, San Anselmo
Abby Cunningham, San Anselmo
Susan Hopp, Mill Valley

CC Anne Crealock, Mark Brown

3 RESPONSES TO COMMENTS ON THE DRAFT IS/MND

Response 1.1

The purpose of the proposed project, as described in Section 1.2, Purpose, is to reduce wildfire risk within the San Rafael Hill and Deer Valley fuel reduction zones. By reducing wildfire risk within the fuel reduction zones, in the event of an ignition, the proposed project would slow wildfire spread, reduce wildfire intensity, and provide firefighters with better access to the fire's perimeter that would reduce the potential for structure ignition in the adjacent community. The proposed project assessed in the IS/MND was developed in accordance with the latest wildfire science and vegetation management practices used throughout Marin County, as described throughout the document. The proposed project does not preclude implementation of home hardening and defensible space through other programs and projects. Marin Wildfire understands that no single tool will resolve wildfire risk in Marin County and therefore pursues supporting and funding a multi-pronged approach to wildfire resilience that incorporates large-scale home hardening and defensible space projects and programs, public education, alerts and evacuations, and other programs in addition to targeted vegetation management activities. Refer to the Marin Wildfire website for information about other types of projects and programs similar to those identified by the commenter (<https://www.marinwildfire.org/>).

Response 1.2

The items listed in the comment are outside the scope of CEQA. The comment does not raise environmental issues or issues related to the adequacy of the IS/MND. As noted above in response to comment 1.1, the proposed project does not preclude implementation of other wildfire risk reduction projects including evacuation route treatments and community education or the aforementioned home hardening and defensible space treatments. Marin Wildfire pursues supporting and funding a multi-pronged approach to addressing wildfire risk. More information about home hardening and defensible space projects and programs may be found at <https://www.marinwildfire.org>.

Response 1.3

Native Shrub Communities

Based on the fine-scale vegetation mapping, the Deer Valley fuel reduction zone has approximately 0.3 acre chaparral and the San Rafael Hill fuel reduction zone has 1.2 acres of chaparral, specifically *Baccharis pilularis* Association. All 1.2 acres of the San Rafael Hill section chaparral would occur within the proposed broadcast burn area. Section 2.2.4, Biological Resources was revised to more clearly address the concern regarding type conversion from native shrublands to non-native grasslands. Because of the risk of invasive species spread, PDIFs IP-1 through IP-4 are incorporated into the proposed project, which involve preventing the spread of invasive species and prioritizing removal of invasive and highly flammable species, as well as dead and diseased vegetation. The proposed project would not result in type conversion due to the type and intensity of treatments as well as implementation of PDIFs to avoid increases in non-native species from treatment activities.

3 RESPONSES TO COMMENTS ON THE DRAFT IS/MND

As discussed in response to comment 5.1, there is a variety of scientific literature that demonstrates that fuel treatments such as those included in the proposed project reduce wildfire risk and severity. Two comprehensive meta-analyses across the western United States found that surface fuel treatments reduce canopy volume scorch, scorch height, and flame length (Martinson and Omi 2013; Davis et al. 2024). Shaded fuel breaks specifically reduce surface and ladder fuels, improve post-burn vegetation health relative to untreated areas, and work in concert with defensible space treatments to reduce fire severity and structure loss (Bajjnath-Rodino et al. 2023; Low et al. 2023; U.S. Forest Service 2014). Refer to Section 2.2.20, Wildfire, which has been revised to discuss the literature supporting the project purpose and anticipated outcome, as well as response to comment 5.1 for additional detail.

Sensitive Wildlife Habitat

Impacts to sensitive wildlife habitat are discussed in Section 2.2.4, Biological Resources of the IS/MND.

Herbicide Application

As described in Chapter 1, Project Description, the herbicides analyzed in the IS/MND would be applied in a targeted manner and would be implemented according to all applicable regulations, including the City of San Rafael IPMP. Signs would be posted at the fuel reduction zones within or adjacent to public recreation areas, residential areas, schools, or any other public areas at least 1 day prior to herbicide application and would remain posted on-site at least 1 day following herbicide application in accordance with PDIF HAZ-4. Therefore, the public would be adequately notified of herbicide application within the fuel reduction zones.

Erosion and Soils

The risk of erosion and degraded soils is addressed in Section 2.2.7, Geology and Soils in the IS/MND.

Maintenance

The environmental effects of maintenance are included as part of the proposed project analyzed in the IS/MND. The comment regarding funding priorities and homeless encampments is noted and is outside the scope of CEQA. The comment does not raise environmental issues or issues related to the adequacy of the IS/MND.

Response 1.4

The comment regarding funding priorities is noted and is outside the scope of CEQA. The comment does not raise environmental issues or issues related to the adequacy of the IS/MND. As noted above in response to comment 1.1, the proposed project does not preclude implementation of other wildfire risk reduction projects.

3 RESPONSES TO COMMENTS ON THE DRAFT IS/MND

Response 1.5

The proposed project is not being conducted under the CalVTP PEIR and therefore this comment does not apply to the proposed project. The comment regarding the CalVTP PEIR legal challenge is noted and is outside the scope of this project and IS/MND. A footnote has been added to Chapter 1, Project Description, to clarify this distinction.

For informational purposes, the Court of Appeal ruled that the CalVTP PEIR was deficient in its analysis of whether “type conversion” resulting from projects in coastal sage scrub and chaparral could cause in higher wildfire risks in converted areas. The trial court judge still must issue a writ and judgment that will specify whether the Board of Forestry must decertify some or all of the CalVTP PEIR, and the court is also expected to decide how pending project specific analyses that rely on the CalVTP PEIR should be handled while the CalVTP PEIR is revised. The court of appeal acknowledged the trial court’s inherent discretion to fashion a narrow remedy, an indication that the writ and judgment may allow some fuel reduction work under the CalVTP PEIR to continue while the CalVTP PEIR is being revised.

The court’s decision only applies to projects being carried out under the CalVTP and relying on the CalVTP PEIR (i.e., projects in or adjacent to SRA for which a PSA, Addendum, or subsequent MND or EIR would be prepared). The effect of the ruling is not to prohibit or limit all fire fuel reduction projects that may be carried out in sage scrub or chaparral.

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3.4.2 Comment Letter 2: Carolyn Longstreth, Fire & Environment Resilience Network (FERN)



July 13, 2025

Kate Anderson
City of San Rafael Fire Department
kate.anderson@cityofsanrafael.org

Caitlin Gilleran
Panorama Environmental
SROpenSpaceMND@panoramaenv.com

C: Anne Crealock, Planning and Program Manager
Marin Wildfire
acrealock@marinwildfire.org

Re: *IS/MND re San Rafael Hill and Deer Valley Fuel Reduction Projects*

Hello Ms. Anderson and Ms. Gilleran:

I'm writing on behalf of the Fire and Environment Resilience Network, a coalition of environmental groups including Marin Audubon, Environmental Action Committee of West Marin and the Marin Chapter of the California Native Plant Society. Collectively, we represent 2700 Marin residents. FERN was formed to help the Marin Wildfire Protection Authority (MWPA) address any environmental issues that might arise in the implementation of Measure C. We remain ready to assist in formulating environmentally sound approaches to its important work.

We have reviewed the draft Mitigated Negative Declaration concerning the above-captioned vegetation removal projects. Please see our comments below.

3 RESPONSES TO COMMENTS ON THE DRAFT IS/MND

San Rafael Hill Project

- Native grassland. Page 1-3 refers to the presence of native grassland. As you may know, this is an increasingly uncommon vegetation type in the County and the MND provides no detail about it. This plant community should be mapped and described as to species, percentage of native vs. non-native cover and overall extent on the site. It will be important for SRFD to monitor the grassland's response to treatment and undertake efforts to increase the percentage of native grasses.

2.1

Additionally, there is a risk, when burning native grasses, that the fire will burn hotter than expected because of excess accumulated thatch in unmanaged grasslands (which is probably the case for this grassland). This can kill the grasses. This outcome can be avoided by raking the thatch and removing it before the burn. Non-native annual grasses are also known to burn hotter than native species. Thus, the SRFD should monitor the burned sites to determine if the seed bank survived and if not, replant with native grass seed or plugs.

Native trees and shrubs. The MND states that native shrubs and trees smaller than 12" DBH will be removed to achieve horizontal spacing. MND at 1-3. We urge you to protect native trees and shrubs to the greatest extent feasible, especially oaks. These plants are adapted to the California climate and fire regime and have evolved to retain higher moisture and develop smaller, leathery leaves that make them less likely to ignite and spread fire than non-native plants. Thus, they may be safely left at moderate densities.

2.2

Moreover, in our view, a 12" DBH rule allows the removal of oaks that are big enough to have ecological value and should be preserved. All native trees greater than 6 inches DBH should be retained. Native shrubs, such as manzanita, ceanothus, monkeyflower, coyote brush, snowberry, and others should be retained in understory patches to maintain biodiversity and provide wildlife habitat. Single, widely spaced shrubs will not provide sufficient cover for wildlife.

- Control lines. The draft IS/MND states that before broadcast burning occurs, control lines will be established, in some cases by scraping the ground to bare soil. Page 1-7. As you undoubtedly know, soil disturbances and bare soil invite rapid invasions of non-native species, particularly annual European grasses, which are known to be more flammable than native grasses. These invasive grasses ignite more readily

2.3

3 RESPONSES TO COMMENTS ON THE DRAFT IS/MND

because they dry out earlier in the season and have a higher surface area to volume ratio. Consequently, ground disturbance and scraping should be avoided as much as possible. While we are pleased to see that weed control is part of the rehabilitation phase, we are concerned that, depending on the time of year, native seed may not be present in the duff and brush to be spread over the area. We therefore suggest that any bare soil be replanted with native grass seed or plugs in the fall.	2.3
• Pile burning. This technique is problematic for animals, especially reptiles and amphibians that may inhabit the brush piles and not have enough time to escape despite practitioners' efforts. Moreover, since pile burning produces more emissions than an air curtain burner, carbonator, or kiln burner, these new techniques are preferable to pile burning. MND at 1-10.	2.4
• Snags. Snags provide numerous benefits for wildlife, including sources of food, nesting sites and shelter. The California Board of Forestry recommends 4 snags per acre; this standard should be adopted if feasible. https://bof.fire.ca.gov/media/40iivzfc/fpc-2-d-keeping-dead-wood-and-creating-wildlife-habitat-piles_-some-guidance-for-forest-owners-northwest-natural-resource-group.pdf. We recommend leaving any snags that are not hazardous, at least 4 and ideally more per acre.	2.5
• Woodrat middens. We also urge you to widen the buffers around woodrat nests to 25 feet. This is the standard used by Marin County Parks. Biodiversity and Vegetation Management Plan at Table 4.3, p. 4-28. Woodrats are considered a keystone species because their large stick nests provide homes for mice, lizards, snakes, salamanders, frogs, crickets, beetles and millipedes. And, as you know, the species is the preferred prey of the northern spotted owl. They should be afforded more protection than is contemplated in the draft MND.	2.6
• Mission Blue butterfly. Credible experts have identified the Mission blue butterfly, a federally endangered species, as occurring in the San Rafael area as posted on iNaturalist. For the sighting closest to the San Rafael Hil site, see https://www.inaturalist.org/observations/22969676. The species's food plants, <i>Lupinus variicolor</i>, <i>Lupinus formosus</i>, and <i>Lupinus albilfrons</i>, should thus be avoided if encountered.	2.7

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- The Draft MND states “Chipped debris may lead to the death of special-status plant species by reducing soil aeration and inhibiting plant growth if spread to depths over 4 inches (Klett 2020; Billeaud and Zajicek 1989).” The citations refer to weed control in horticultural situations.

2.8

We recognize that special status plants appear unlikely to occur on the San Rafael Hill site. MND at 2-23 to 24. However, woodchip mulch, spread at any depth, suppresses the germination and growth of other native California plants and should not be spread in areas that support native plant species. We urge SRFD to conduct surveys this summer when native species can best be identified.

Deer Valley

- Protections for the congested-headed hayfield tarplant. We recommend that the Deer Valley site be surveyed for this California Rare Plant Ranked 1B.1 annual species during the current season and if any are found, that they be marked and wholly avoided throughout the work period. Surveys during the growing season would also assure that burn piles are not placed on or near the rare tarplant populations.

2.9

We find the tarplant prescription set forth on page 2-31 deficient to the extent it contemplates protection of flowering parts only. Crushing any plants in flower would, of course, decrease the population for the current and future years but likewise, damage to the plants’ foliage or stems before flowering could prevent bud and flower formation later in the season, again reducing the seed bank for later years. Furthermore, mulching any populations of this species may well inhibit seed germination, even at less than 4 inches depth. Cf. MND at 2-32.

- Site history. On page 2-37, the Draft MND states: “These pre-European settlement landscapes included fewer shrubs and trees than modern landscapes.” We question this. Our professional training and experience indicate that the pre-settlement landscape was probably a mosaic of dense and sparse vegetation. The indigenous peoples probably did not treat the entire landscape.
- Treatment of forest litter. The Draft MND is somewhat ambiguous as to whether or to what extent the vegetative material on the forest floor will be removed. It is stated on page 2-37 that “Forest litter comprised of dead and downed vegetation would be

2.10

2.11

3 RESPONSES TO COMMENTS ON THE DRAFT IS/MND

removed.” To the extent that “forest litter” includes oak and other dry leaves, sticks and small vegetative materials, it would harm the habitat of some ground-dwelling organisms and disrupt mineral cycling. Dry oak leaves are probably less flammable than the non-native annual grasses that would colonize the understory if the ground is to be left bare. We suggest that you leave patches of undisturbed litter (along with understory herbs and shrubs) to provide habitat for the remaining organisms.

2.11

- Monarch butterfly mitigation. BIO-2 requires that only those milkweed plants harboring eggs, larvae or chrysalis be avoided. MND at 2-40. We find this mitigation to be insufficient in that any narrow-leaved (or other) milkweed species should be protected from damage or destruction so that they may support Monarch reproduction at a later time.

2.12

Furthermore, BIO-2 calls for surveys to be done for milkweed plants, only if treatments occur from February and April. Surveys should also be done if treatments occur after April because milkweed plants can support immature monarch stages until late summer and possibly autumn.

We are of course available to discuss these concerns at your convenience. Thank you for your attention.

Carolyn Longstreth, on behalf of FERN



Response 2.1

No native grassland communities are present on the San Rafael Hill or Deer Valley fuel reduction zones. Section 1.4.1 was revised to remove language indicating the presence of native grasslands. Section 2.2.4, Biological Resources was revised to clarify that vegetation treatments in shrub and woodland communities would encourage the growth of any native grasses that may be present on the sites.

Response 2.2

As described in Chapter 1, Project Description, the proposed project would remove live trees less than 12 inches DBH. This language has been revised to indicate that this would be only where appropriate. The proposed project would prioritize the removal of non-native, invasive trees and shrubs (PDIF IP-4). Hazardous and dead standing native and non-native trees would be removed as deemed appropriate by an arborist or qualified fire professional. Typically, non-

3 RESPONSES TO COMMENTS ON THE DRAFT IS/MND

hazardous healthy, mature, native trees would not be removed and healthy, native trees and shrubs would be retained as stated in Section 1.4.1 of the IS/MND. Detailed analysis of effects to wildlife species, plant species, and sensitive vegetation communities is included in Section 2.2.4, Biological Resources. As discussed in response to comment 1.3, Section 2.2.4 of the document has been revised to include additional detail about effects to native plants and communities such as chaparral.

Response 2.3

As described in Section 1.4.2, Treatment Methods, new control lines for broadcast burning may be installed through mowing, mastication, blacklining, wetting, or scraping. Existing roads and trails would be used as control lines to the extent possible. As stated in Section 1.4.2, scraping for control line installation would only be used if necessary to establish a hard control line. Section 1.4.2, Treatment Methods was updated to include options for replanting the fuel reduction zones with native seeding or plugs following control line installation, broadcast burning, or pile burning.

Response 2.4

As described throughout the IS/MND, if piles are burned on a different day than when the day they were piled, the piles would be moved prior to burning to ensure wildlife, such as by re-piling or a qualified biologist would inspect the pile prior to burning (PDIF SH-3). In accordance with PDIF SH-3, if moving or inspection of piles is not feasible, the piles would be lit from one side and allowed to burn slowly to the other side, allowing wildlife to relocate. With implementation of PDIF SH-3, pile burning would not have significant impacts to wildlife.

Response 2.5

While snag retention is not required, Marin Wildfire-funded core projects, including this project, typically retain at least one snag per acre for habitat for wildlife, as described in Section 1.4.1, Treatment Types of the IS/MND. Retaining at least one snag per acre would provide adequate habitat for nesting birds and roosting bats.

Response 2.6

As discussed in Section 2.2.4, Biological Resources, the reconnaissance survey did not observe any woodrat middens in the fuel reduction zones. If any woodrat middens were found during the work, PDIF NSO-4 requires avoidance of woodrat nests and a 3-foot buffer to the extent feasible. Crews would receive training on woodrat nest identification and avoidance in accordance with PDIF ET-1. Additionally, research has shown that woodrat populations are not necessarily negatively impacted by treatments and may even benefit from the types of treatment proposed under this proposed project, as referenced in Section 2.2.4, Biological Resources. One study that assessed understory vegetation's effect on small mammal composition found that "a structurally and compositionally diverse understory provides food and cover for many small mammal species" (Kalies and Chambers 2010). In this study, woodrat and other small mammal abundance was observed to decrease with increased understory vegetative cover; which may be due to the species' reliance on fungi, pine trees, and nuts for food. Another study found that woodrat abundance is promoted by growth of understory

3 RESPONSES TO COMMENTS ON THE DRAFT IS/MND

vegetation but declines as the forest stand matures, which may be due to the change in the understory reducing available food, limiting suitable nest sites, and increasing predator vulnerability (Hamm and Diller 2009). As assessed, while woodrats may be affected on an individual basis, no landscape-level change would occur due to the proposed project that could significantly alter woodrat populations to the degree that northern spotted owl may be affected.

Response 2.7

The iNaturalist website identifies several mission blue butterfly observations within or in close proximity to the San Rafael Hill fuel reduction zone. However, the locational accuracy of these observations may be limited. Per the iNaturalist webpage, the locations of these observations have been obscured because it is a special-status species. Since there are no further notes indicating the location where these observations were made, it is unclear whether these observations are accurate. Mission blue butterfly occurrences were not observed in either the California Natural Diversity Database (CNDDDB) or the USFWS Information for Planning and Consultation (IPaC) database for the project sites. The CNDDDB database provides more information regarding geographic accuracy, reliability of the observation, and detail on the species. The USFWS depicts the range of mission blue butterfly in Marin County as being located in southern Marin County, southern San Francisco, and San Mateo County (USFWS 2022). Furthermore, the Golden Gate National Parks Conservancy identifies the range of mission blue butterflies in Marin County to be concentrated near the Marin headlands, which is outside the project sites (Golden Gate National Parks Conservancy 2018). The reconnaissance survey also did not identify any mission blue butterflies and due to the lack of observations from reputable sources as well as known range of this species, there was no potential for occurrence at either project site.

Response 2.8

The citations included in Section 2.2.4, Biological Resources in the IS/MND regarding impacts of chipped debris on plant growth referring to weed control in horticultural situations were updated to reflect studies on the impacts of chipped debris from fuel reduction on plant growth, which indicate that chipped debris may lead to the death of special-status plant species if spread to depths over 4 inches (Battaglia et al. 2010; E. M. Miller and Seastedt 2009; Colorado Forest Restoration Institute 2020; Greenly and Rakow 1995). As described in Section 2.2.4, Biological Resources, PDIF GEO-4 would be implemented which limits mulching to a depth of 2 to 4 inches.

Response 2.9

The biological reconnaissance survey conducted for the fuel reduction zones in early March 2024 did not identify any special-status plant species, although the survey occurred outside the blooming period for the congested-headed hayfield tarplant, which ranges from April to November. As described in Section 2.2.4, Biological Resources, broadcast burning, pile burning, heavy equipment use, and manual and mechanical equipment could damage the flowering body or seeds of the congested-headed hayfield tarplant. Implementation of PDIF ES-1 requires surveys to be conducted prior to any activity that has the potential to damage perennial plants or is proposed to occur during the flowering season for the specific annual plant species that

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has the potential to damage the flowering body and seeds of these plant species. As elaborated in PDIF ES-1 activities under the proposed project that have the potential to damage the flowering body may include but may not be limited to mowing, weed whacking, off-road vehicle and heavy equipment use, and prescribed burning. Pile burning could occur, and if it does occur in areas of suitable habitat during the blooming season for congested-headed hayfield tarplant, a pre-treatment survey by a qualified biologist of any individuals would be conducted and individuals avoided. In addition, as discussed in response to comment 2.8, chipped debris may lead to the death of special-status plant species if spread to depths over 4 inches but PDIF GEO-4 would be implemented which limits mulching to a depth of 2 to 4 inches. Refer to Section 2.2.4, Biological Resources for more analysis, which found that significant species-level impacts to the congested-headed hayfield tarplant would not occur.

Response 2.10

Section 2.2.4, Biological Resources of the IS/MND was revised to discuss that forests over the past 50-100 years in California have become denser, have fewer large trees and more small trees, and have increased in size (McIntyre et al. 2015; Startin 2022). The section was also revised to indicate that shrub and forestland in Marin County has decreased as forests have expanded and herbaceous plant communities and shrublands have decreased (Startin 2022; Fertel et al. 2023).

Response 2.11

Section 2.2.4, Biological Resources was revised to clarify that larger forest litter, such as dead shrubs and large downed limbs, would be removed as appropriate. Small vegetative materials, including leaves, smaller downed limbs, and other smaller vegetative materials would remain at the fuel reduction zones as generally forest litter is not a wildfire risk.

Response 2.12

Mitigation Measure BIO-2 was revised to discuss the germination and blooming period of narrowleaf milkweed and showy milkweed which extends from February through September. The section now also includes a discussion of the monarch butterfly metamorphosis period, which typically starts in March and April with the laying of eggs and typically takes 60 days to complete metamorphosis from larva to adult. Therefore, pre-treatment surveys would be required if any treatments occur from February through September that have a potential to damage milkweed species important as host plants to monarch butterflies and known to occur in Marin County, specifically pile burning, off-road equipment use, and string trimming. This timing is used to account for early plant growth in February and any delayed butterfly metamorphosis that could occur through September. Mitigation Measure BIO-2 was also updated to clarify that if substantial populations of unoccupied milkweed are observed at the Deer Valley fuel reduction zone, treatment activities would be staggered, to ensure that not all the milkweed individuals are impacted simultaneously, in accordance with Natural Resources Conservation Service Conservation Practices (Borders et al. 2012). Additionally, species life stages and how to recognize milkweed would be included in environmental training to ensure avoidance (PDIF ET-1). Section 2.2.4, Biological Resources was also revised to discuss potential benefits to milkweed from burning activities on milkweed growth.

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3.4.3 Comment Letter 3: Abby Cunningham

Marin Wildfire and Prevention Authority
1600 Los Gamos
San Rafael, CA 94903

July 14, 2025

Dear Marin Wildfire Prevention Authority:

I am writing today to oppose the San Rafael Hill and Deer Valley Fuel Reduction Project. I do not believe this project will achieve its primary purpose, and could in fact increase the likelihood of a wind-driven fire event occurring in the adjacent neighborhood. The proposal does *not* reduce [human-caused ignition risk](#), (the [primary cause](#) of fires in the Wildland-Urban Interface), and will unnecessarily subject local residents to noise, disruption, potentially [toxic dust](#) and air pollution.

3.1

The project's Draft Initial Study/Mitigated Negative Declaration (MND) states that "...the primary purpose of the proposed project is to reduce wildfire hazards for the adjacent community and increase wildfire resiliency."

Yet the MND appears to ignore the best available science, which indicates that home hardening and defensible space within 100 feet of the home or structure is the [most effective way to protect the community](#) against wildfire danger. Furthermore, it ignores the potentially significant air pollution that might result from the production of biochar – a valuable industrial product that would be allowed under this proposal.

Although the MND claims that using air curtain burners, kilns and/or carbonators in this proposal will reduce air pollution compared to pile burning, it does not specify the *amount* of material that would be processed close to schools and homes, nor the carbon cost of removing the mature trees in the first place. This could result in a scenario where whole live trees *that currently sequester CO2* are logged and incinerated for various industrial applications or monetized for carbon offsets. All of these should be disclosed in the MND.

3.2

Air curtain burners are not appropriate in close proximity to schools and homes, and the following example is case in point. The City of New York rescinded the use of Air Curtain burners to clean up debris after Hurricane Sandy at Floyd Bennett Field because of [unacceptable air pollution levels](#). An analysis conducted later found that "...the [monitoring data](#) was not adequate to determine actual impact of air curtain incinerators." We should perform a [similarly rigorous analysis](#), which appears to be missing from the MND.

3.3

As you know, the Bay Area Air Quality Management District (BAAQMD) has regulatory authority over the use of air-curtain burners through Rule 5 – an issue raised by Board

3.4

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Member Barbara Coler at the [November 2023 Executive Board Meeting](#). This likely applies to carbonators, kilns and other systems that produce biochar. Rule 5 establishes requirements for permitting new sources of toxic emissions from new facilities and operations, and includes [a variety of requirements](#). The MND is vague to silent about how it will address these. It also doesn't disclose the potential [toxicity of biochar](#). 3.4

The MND indicates that biochar might be used offsite, but doesn't not specify *how*. In fact biochar can also be used as an energy source for biomass energy production, something [the Sierra Club opposes](#). The MND should disclose whether or not biochar production would benefit business interests in San Rafael or elsewhere. 3.5

I believe that the Marin Wildfire and Prevention Authority should revisit this proposal and instead focus on home hardening, defensible space and safe evacuation routes. Any debris produced through responsible defensible-space pruning should be composted instead, not fed into industrial incinerators to possibly produce biochar. Even as a soil amendment, biochar does not mimic natural fire regimes, and could instead [increase heavy metals](#) in our soils. 3.6

The attached documentation provides links and resources to the best available science regarding forest health and fire prevention. Also included is a comment letter about another proposed project in Marin County that provides valuable context that is also relevant for the San Rafael Hill and Deer Valley Fuel Reduction Project. I encourage the Marin Wildfire and Prevention Authority to review the attached literature, update its science and research resources, and use our tax dollars on what the science suggests is most effective.

Respectfully Submitted,

Abby Cunningham
San Anselmo

Response 3.1

Please refer to response to comment 1.1 regarding human-caused structure ignition. As discussed throughout the IS/MND and in response to comment 5.1, fuel reduction in open space areas are effective methods for reducing fire intensity and rate of spread, which increases the likelihood of structure survival, and creates more time for residents to evacuate. Scientific literature indicates that surface fuels treatments can substantially reduce wildfire risk and severity, by as much as 60 percent (Martinson and Omi 2013; J. Moghaddas et al. 2018; Davis et al. 2024; U.S. Forest Service 2014); refer to response to comment 5.1 and Section 2.2.20, Wildfire for additional detail regarding the effectiveness of fuel treatments to reduce wildfire risk. By reducing ladder fuels while retaining the canopy and mature trees, the proposed project would reduce the likelihood of a fire becoming severe, and also improve ecological outcomes by

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removing invasive, fire hazardous vegetation. The proposed project does not preclude implementation of home hardening and defensible space through other programs and projects.

Please refer to response to comment 3.4 regarding biochar and concerns regarding toxicity and response to comment 5.1 regarding wind-driven fire events.

Response 3.2

As described in Section 1.4.1, Treatment Types, the proposed project would consist of fuel reduction activities, which may include removal of small diameter live trees less than 12 inches DBH, where appropriate. Logging of trees would not occur under this proposed project.

Sections 2.2.3, Air Quality and 2.2.8, Greenhouse Gas Emissions model emissions from proposed project activities. The air quality and GHG modeling assumed 100 piles (4 feet wide by 4 feet tall half spheres; estimated as 1.9 tons of biomass) would be burned in the first year of treatment activities. As discussed in detail in Section 2.2.3, Air Quality, air curtain burning, kiln burning, and/or carbonators would result in substantially less ROG, NO_x, and PM_{2.5} than pile burning. The IS/MND acknowledges that the biomass technologies would release similar quantities of CO₂ emissions to pile burning, which is approximately 3.8 metric tons CO₂e. Air curtain burning, kiln burning, and/or carbonators are options for biomass disposal for the proposed project. These biomass technologies would likely be used in combination with chipping and broadcasting, chipping and hauling, and pile burning. Section 2.2.8, Greenhouse Gas Emissions has been updated to discuss literature that indicates although there may be small diameter live trees removed during thinning treatments, this can result in greater sequestration rates by reducing competition with larger, more resilient trees that can sequester more carbon (Forest Climate Action Team 2018).

Response 3.3

The comment letter references an article that found PM_{2.5} from air curtain burning of vegetative debris following Hurricane Sandy at Floyd Bennett Field exceeded air quality thresholds. Approximately 200,000 cubic yards of vegetative debris were incinerated on Floyd Bennett Field. The quantity of vegetative debris generated by the proposed project would be substantially less than the vegetative debris generated from a major hurricane. In addition, as described in Section 2.2.9, Hazards and Hazardous Materials, there are no schools within 0.25 mile of the fuel reduction zones. Residences are located adjacent to the San Rafael Hill and Deer Valley fuel reduction zones but emissions from the proposed project would not exceed annual air quality thresholds. A Smoke Management Plan would be prepared and implemented for pile burns in accordance with and including all the information and restrictions required by the BAAQMD Regulation 5. For burn events, exposure to emissions would be minimized by ensuring smoke does not drift or blow towards areas with sensitive receptors, in accordance with the Smoke Management Plan and burn authorization procedure. The use of an air curtain burner, carbonator, or kiln burner would result in lower air quality impacts than from pile burning for biomass processing.

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Overall, implementation of the proposed project would result in minor criteria pollutant emissions generated per year but would not result in a cumulatively considerable net increase of any criteria pollutant under an applicable federal or state ambient air quality standard. Refer to Sections 2.2.3, Air Quality and 2.2.8, Greenhouse Gas Emissions for additional detail. The proposed project would result in a less than significant impact associated with exposure of sensitive receptors to substantial pollution.

Response 3.4

The proposed project would not be subject to BAAQMD Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants. Air curtain burning, kiln burning, carbonators, and other forms of incineration are regulated under BAAQMD Regulation 5, which requires the preparation of a Smoke Management Plan (BAAQMD 2019). Similar to pile burning and broadcast burning, a Smoke Management Plan would be submitted to the BAAQMD at least 30 days in advance of an air curtain burning, kiln burning, or carbonator use in accordance with BAAQMD Regulation 5 for open burning.

The commentor references a study that conducted a literature review of biochar-related dust emissions and potentially toxic properties in an agricultural setting (Gelardi et al. 2019). Section 2.2.3, Air Quality has been revised to discuss that while some research indicates that biochar can contain toxic chemicals, the presence and release of these chemicals is unlikely because woody biomass tends to contain very low levels of these pollutants. In addition, unlike the agricultural settings in which the referenced literature occurs where soils were continuously tilled, post-treatment dust (i.e., dust that could occur from ground-disturbing activities or wind events after application of biochar as a soil amendment) is unlikely to occur because the quantity of biochar produced at any one time and used as a soil amendment could cover a relatively small area that could be affected by wind events. There would be minimal vehicular or equipment activity in any area where biochar may be spread immediately following treatment.

Response 3.5

Section 1.4.3, Biomass Disposal Methods was revised to clarify that biochar may be used on site or at other City of San Rafael open space parcels. The biochar would be used as a soil amendment and would not be used for biomass energy production. The benefit of biochar to business interests in the City of San Rafael is outside the scope of CEQA and is not discussed further.

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Response 3.6

The commenter referenced a scientific article about the application of biochar in heavy metal contaminated soil. Although a variety of research indicates that biochar can be effectively used as a way to reduce the bioavailability and toxicity of heavy metals in soil (Ibrahim et al. 2022; Soudek et al. 2017; Nkoh et al. 2022), biochar is not proposed to be used for that purpose for this project because there are no known soil issues related to high heavy metal concentrations in the fuel reduction zones. In addition, and as discussed in responses to comments 3.4 and 6.1, the use of biochar as a soil amendment is not expected to have any adverse effects on the spread or presence of heavy metals in the fuel reduction zones soils and may have a marginal but beneficial effect on carbon sequestration and soil health in the areas that it is used in.

3.4.4 Comment Letter 4: Charles Simonds

Vegetation removal on San Rafael hill

1 message

Charles Simonds <chazmosf@yahoo.com>
To: SROpenSpaceMND@panoramaenv.com

Tue, Jul 15, 2025 at 9:53 AM

Hi,
I am in favor of vegetation removal on San Rafael Hill. I live at 28 Curtis Avenue and my property back to open space. There are many eucalyptus trees behind my property.
I just had a gigantic eucalyptus tree removed near my back fence. I spent a lot of money for this, with help from my neighbors on either side. We are concerned about the remaining trees in the open space behind our properties.
I feel like I have done my part in wildfire mitigation, and now it is the city/counties turn to do the same.
Thank you for your attention to this matter.
I can be reached if you have any questions for me at 415 458-2429
Chaz. Simonds

4.1

Response 4.1

As described in Chapter 1, Project Description, non-native trees, including eucalyptus trees in the San Rafael Hill open space parcels, would be removed, where deemed appropriate, in coordination with an arborist or qualified fire professional.

3.4.5 Comment Letter 5: Larry Hanson, Forest Unlimited



PO Box 506 • Forestville, CA 95436 • 707.664.7060

July 14, 2025

Dear Marin Wildfire Prevention Authority:

We oppose the general methods used for the San Rafael Hill and Deer Valley Fuel Reduction Project because the potential harm it will cause over-rides the benefits that are purportedly claimed. What are the potential harms? The main potential harm is actually increasing the risk of wind-blown high severity fires (catastrophic).

Has the procedure of “thinning” worked comprehensively for areas in the past? Statewide analysis of fire maps shows that, in fact, rather than high severity fire reduction, the intended purpose, the opposite occurs. Why isn’t the simplistic solution to thin for “over-crowded” forests working when temperatures are warming, a factor of global warming or climate change?

It is because factors are left out of the equation causing catastrophic wildfires. These are factors like moisture of the forest floor, the diversity of plant and animal species, and primarily wind. With thinning operations, you not only can get openings to wind induced fires can move through the area and increase their velocity but also damage to the forest floor reducing the humidity factor and new openings in the canopy allowing the drying effects of the sun.

I have included some analyses done on what happens when comprehensive “thinning” takes place without assessing factors left out of the equation. As in the medical practice applied to public safety measures, Do No Harm--a practice that should be taken very seriously.

Larry Hanson, Board President
Forest Unlimited
www.forestunlimited.org
contact@forestunlimited.org
larryjhanson@comcast.net

Evers, C., et al. 2022. *Extreme Winds Alter Influence of Fuels and Topography on Megafire Burn Severity in Seasonal Temperate Rainforests under Record Fuel Aridity.* Fire 5: Article 41.

5.1

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The authors found that dense, mature/old forests with high biomass and canopy cover tended to have lower fire severity, while more open forests with lower canopy cover and less biomass burned more severely.

Lesmeister, D.B., et al. (co-authored by U.S. Forest Service). 2019. Mixed-severity wildfire and habitat of an old-forest obligate. *Ecosphere*10: Article e02696.
Denser, older forests with high canopy cover had lower fire severity and —buffer the negative effects of climate change regarding wildfires.

Thinned forests have more open conditions, which are associated with higher temperatures, lower relative humidity, higher wind speeds, and increasing fire intensity. Furthermore, live and dead fuels in young forest or thinned stands with dense saplings or shrub understory will be drier, making ignition and high heat more likely, and the rate of spread higher because of the relative lack of wind breaks provided by closed canopies with large trees.
Lesmeister, D.B., et al. (co-authored by U.S. Forest Service). 2021. Northern spotted owl nesting forests as fire refugia: a 30-year synthesis of large wildfires. *Fire Ecology* 17: Article 32.

More open forests with lower biomass had higher fire severity, because the type of open, lower-biomass forests resulting from thinning and other logging activities have —hotter, drier, and windier microclimates, and those conditions decrease dramatically over relatively short distances into the interior of older forests with multi-layer canopies and high tree density

Thinning reduced canopy cover, increasing growth of combustible grasses; associated pile burning caused a huge wildfire, spreading rapidly through thinned areas, burning many homes

—We found forests with higher levels of protection [from tree removal] had lower severity values even though they are generally identified as having the highest overall levels of biomass and fuel loading. Our results suggest a need to reconsider current overly simplistic assumptions about the relationship between forest protection and fire severity in fire management and policy.

“Thinned forests have more open conditions, which are associated with higher temperatures, lower relative humidity, higher wind speeds, and increasing fire intensity. Furthermore, live and dead fuels in young forest or thinned stands with dense saplings or shrub understory will be drier, making ignition and high heat more likely, and the rate of spread higher because of the relative lack of wind breaks provided by closed canopies with large trees.”

"Bark discussed [during the scoping process] the studies that have found that fuel reduction may actually exacerbate fire severity in some cases as such projects leave behind combustible slash, open the forest canopy to create more ground-level biomass, and increase solar radiation which dries out the understory[.] [t]he EA did not discuss this information."

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Response 5.1

The commenter cites several studies on canopy cover and fire severity, which were reviewed for their relevance to the proposed project. One of the referenced studies, Evers et al. (2022), found that early successional vegetation with less than 40 percent canopy cover burned more severely than closed-canopy forests. The study also found that the probability of high-severity burns was higher for low-stature forests compared to mature forest stands. However, this study was conducted in seasonal temperate rainforests, which consisted of primarily hemlock-Douglas fir forests. The vegetation and topography evaluated in the study are drastically different than those found within the proposed fuel reduction zones, which includes oak and mixed woodlands, non-native grasslands, and non-native forests. The proposed project would not target healthy, mature, native trees and would aim to retain the existing native tree canopy.

Several studies cited by the commenter have shown that thinned forests have more open conditions, which are associated with higher temperatures, lower relative humidity, higher wind speeds, and increasing fire intensity (Lesmeister et al. 2019; 2021). However, the application of these studies to the proposed project is limited because they largely reference commercial thinning operations and conflate the practice with fuel reduction projects. Commercial operations can include single tree selection or clearcutting for profit. The proposed project would retain the native, mature tree canopy and focus on the removal of invasive species, dead and down vegetative debris, and ladder fuels to reduce wildfire risks for a public benefit. Additionally, research indicates that understory-only thinning operations do not influence wind speeds above the understory, and wind speeds above the canopy are generally predictive of wildfire rate of spread (Russell et al. 2018; Cruz and Alexander 2019). Commercial operations, which are not proposed, maximize available surface fuels, create stronger winds, and reduce shade to dry fuels out faster. This is inconsistent with the purpose and treatment methods outlined in the IS/MND for the proposed project, as discussed above.

As discussed in Section 1.4.1, Treatment Types, the proposed project would treat surface fuels by removing fire-hazardous, invasive species and dead vegetation, including pruning of tree branches, removal of large dead/downed vegetation and branches, the removal of small diameter (less than 12 inches diameter) at breast height live trees where appropriate, and prescribed fire as well as pile burning. The conclusion that these treatments would reduce wildfire risk and severity is supported by a substantial amount of research. Section 2.2.20, Wildfire, has been updated to discuss additional research that confirms the proposed project would reduce wildfire risk in the project site. Two comprehensive meta-analyses across the western United States, one in 2013 and one in 2024, identify that surface fuel treatments (i.e., thinning and removal of surface fuels via prescribed burning, pile burning, or manual/mechanical removal) have a large and substantial effect on fire behavior, including reductions in canopy volume scorch, scorch height, and reductions in flame length (Martinson and Omi 2013; Davis et al. 2024). Davis et al., which included review of 220 publications, specifically found that reducing surface fuels reduced wildfire severity within treated areas by over 60 percent on average. Research specific to California has found that shaded fuel breaks specifically reduce surface and ladder fuels, improve post-burn vegetation health relative to

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untreated areas, and work in concert with defensible space treatments to reduce fire severity and structure loss (Baijnath-Rodino et al. 2023; Low et al. 2023; U.S. Forest Service 2014). Furthermore, under both modeled conditions and in analysis of real wildfires in California, the treatments proposed as part of the project (reducing surface fuels followed by prescribed fire and/or pile burning) have been shown to reduce flame lengths and burn severity (J. Moghaddas et al. 2018). Fuel treatments in chaparral reduce potential wildfire intensity by reducing dead woody vegetation, shrub height, and vegetation continuity, thereby reducing flame heights and heat during a wildfire. Studies have found that hand thinning or removal of chaparral was effective at reducing shrub height and dead vegetation (Martorano et al. 2020). Therefore, the proposed project would not increase wind-driven high severity fires.

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3.4.6 Comment Letter 6: Gary Graham Hughes, Biofuelwatch



July 16, 2025

Kate Anderson
Wildfire Prevention Program Manager, SRFD
1400 Fifth Avenue
San Rafael, CA 94901

Submitted electronically via email to SROpenSpaceMND@panoramaenv.com

Re: Assumptions and Unverified Claims About Climate and Environmental Benefits of Biochar as Described in San Rafael Hill and Deer Valley Fuel Reduction Project

To responsible officials:

Our organization Biofuelwatch appreciates the opportunity to submit this brief letter comment on the San Rafael Hill and Deer Valley Fuel Reduction Project¹ (the Project). Biofuelwatch² is an international organization that works to increase public understanding and civic engagement on the land-use implications of climate policy. We have a particular focus on the environmental harms and social inequities of large-scale industrial bioenergy projects, and we work extensively on addressing the negative ecological and social outcomes of policy and actions that are justified as being beneficial to the global climate, yet carry with them risks and threats to public health, economic stability and natural resources.

We have worked extensively around issues of ‘biochar’ over the years, and we are alarmed at the lack of scientific evaluation of biochar as presented in the Project documentation. In concern of this lack of adequate information we are providing a simple letter that will include links to some of our studies over more than a decade demystifying ‘biochar’ and opening up the discussion in a manner that offers a more critical take on the assumptions that biochar has climate and environmental benefits.

6.1

In 2011, Biofuelwatch published a comprehensive report, “[Biochar: a critical review of science and policy](#)”³. In 2020, we provided an [update to that report](#) (Biochar: A Critical Perspective. What Does the Science Tell Us About Whether Biochar Reliably Stores Carbon and Boosts Soil

¹ At this link https://cdn.prod.website-files.com/6107823cbe8db485b50aa8f8/684b5873f9de61a599693e59_2025-06-16_SanRafael_DRAFT-IS-MND%20-%20Digital.pdf

² <http://www.biofuelwatch.org.uk/>

³ See the report at <https://www.biofuelwatch.org.uk/wp-content/uploads/Biochar-Report3.pdf>

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Fertility⁴). Given the proliferation of initiatives to develop commercial-scale biochar and burgeoning policy and financial support, we felt compelled to provide this more recent update.

Over the years the published literature has dramatically expanded, reflecting great interest and an influx of funding to soil science research. Additionally, there has in recent years been a widening of the scope of proclaimed ‘uses’ for biochar – no longer just for carbon sequestration or soil and crop improvement, but also for remediation of toxins, as a feed supplement for livestock to reduce methane emissions, for treatment of waste water and more. This abundance of unverified beneficial uses is resulting in an erroneous promotion of biochar as a climate and environmental solution, despite the absence of evidence of such benefits.

The overarching problem remains as results from biochar studies continue to be highly inconsistent, depending on what feedstock is used, how it is produced, the type of soil to which it is applied, the environmental conditions, what crop is grown, the study duration, and what kinds of measurements are made.

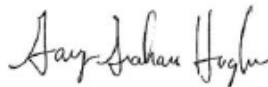
Understanding of biochar is far from what would be required to enable reliable control over its influence on the environment. Given the risks discussed further below, it is highly premature to promote biochar as deserving subsidies and other incentives.

Yet those policy support measures for biochar as a ‘carbon negative technology’ are being put in place. We are not alone in urging precaution, many in the scientific research community express similar reservations. For example: in [“Rethinking biochar: black gold or not?”](#) (Tan et al 2023) the authors conclude: *“To date there is no conclusive evidence demonstrating environmental friendliness or long-term cost effectiveness of large scale biochar implementation in soil and climate agro-economic systems, let alone in water purification and energy storage and conversion.”*

[Xiang et al \(2021\)](#) warn: *“Considering the harmful components, structure and particle size of biochar, the negative effects of biochar application on the environment should not be ignored.”*

The available project documentation fails to address these concerns. We highly recommend that project proponents perform adequate due diligence and reexamine the assumptions about biochar as being a product with environmental and climate benefits.

Thank you for your attention to these very brief comments.



Gary Graham Hughes / Americas Program Coordinator / Biofuelwatch
Email: garyhughes.bfw@gmail.com / Phone: +1-707-223-5434

⁴ See the fully referenced report at this link <https://www.biofuelwatch.org.uk/wp-content/uploads/Biochar-briefing-2024.pdf>

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Response 6.1

The comment letter references a variety of self-published and scientific literature to review regarding biochar. This literature as well as additional recently-published literature surrounding biochar and carbon emissions has been reviewed and Section 2.2.8, Greenhouse Gas Emissions has been revised to clarify the analysis and support the impact conclusion. In general, the specific amount of net carbon emitted or sequestered during biochar operations is highly complex and dependent on a variety of factor, such as: agricultural versus forestry applications of biochar; concurrent application of fertilizer or not; efficiency of biochar processing; and soil types (Campbell et al. 2018; He et al. 2017; Fidel et al. 2019; Siddiqui 2025; Bo et al. 2023). Some analyses indicate that the application of biochar can have a negligible effect on soil carbon emissions (Piash et al. 2018) while others indicate that biochar application can actually increase greenhouse gas emission fluctuations in the soil (He et al. 2017). Based on the findings of several studies, the use of biochar is considered a carbon-negative process because evidence suggests it sequesters more carbon than would be released if a similar amount of biomass was burned in a wildfire (Rockwood et al. 2020; Rodriguez Franco et al. 2024; Kabir et al. 2023). The use of biochar as a soil amendment would not substantially change net emissions of the overall project or sequestration ability of the soil based on the studies available and because only a portion of vegetative biomass produced by treatment activities would likely be disposed of in this way.

In addition to the influence of biochar on carbon emissions and sequestration, biochar also influences soil quality. A variety of literature exists about the potential benefits of using biochar as a soil amendment to enhance soil health, mitigate environmental pollution, and improve soil organic matter as well as crop yields (Kabir et al. 2023; Siddiqui 2025; Das and Ghosh 2024). This literature also acknowledges the variation in benefits or lack of benefits that may occur from the use of biochar depending on factors such as soil types and textures, type of biochar, and location (Jeffery et al. 2017; Das and Ghosh 2024; Siddiqui 2025). Overall, the use of biochar as a soil amendment is expected to result in beneficial effects on soil quality in the project sites but the scale of this effect would be minor because of the expected small application rate of biochar relative to the size of the fuel reduction zones.

4 List of Preparers

This section lists those individuals who either prepared or participated in the preparation of this IS/MND. Panorama Environmental, Inc. prepared this IS/MND under contract to the Marin Wildfire. Persons involved in data gathering analysis, project management, and quality control are listed below.

Marin Wildfire

Anne Crealock, Planning and Program Manager

San Rafael Fire Department

Calvin Schrader, Vegetation Management Specialist

Kate Anderson, Wildfire Prevention Program Manager

Panorama Environmental, Inc.

Emily Capello, Project Director

Kate Thompson, Environmental Planner

Caitlin Gilleran, Project Manager

Charlotte Hummer, Environmental Planner

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5 References

- Ager, Alan A., Mark A. Finney, Becky K. Kerns, and Helen Maffei. 2007. "Modeling Wildfire Risk to Northern Spotted Owl (*Strix Occidentalis* Caurina) Habitat in Central Oregon, USA." *Forest Ecology and Management, Biodiversity Management in Pacific Northwest Forests: Strategies and Opportunities.*, vol. 246 (1): 45–56.
<https://doi.org/10.1016/j.foreco.2007.03.070>.
- Anderson, M Kat, and Michael J Moratto. 1996. "Native American Land-Use Practices and Ecological Impacts." In *Native American Land-Use Practices and Ecological Impacts, Sierra Nevada Ecosystem Project: final report to Congress, Volume II: Assessment of scientific basis for management options*. University of California, Davis, Centers for Water and Wildland Resources. https://pubs.usgs.gov/dds/dds-43/VOL_II/VII_C09.PDF.
- Ascent Environmental. 2022. *Evaluation of Air Quality and Climate Change Impacts from Specialized Biomass Processing Technologies under the California Vegetation Treatment Program*.
https://bof.fire.ca.gov/media/cbfggsgi/biomass-specialized-processing-technologies-technical-paper_ada.pdf.
- Ascent Environmental. 2022. "Evaluation of Air Quality and Climate Change Impacts from Specialized Biomass Processing Technologies under the California Vegetation Treatment Program."
- Atwood, Abra, Madeline Hille, Marin Kristen Clark, et al. 2023. "Importance of Subsurface Water for Hydrological Response during Storms in a Post-Wildfire Bedrock Landscape." *Nature Communications* 14 (1): 3814. <https://doi.org/10.1038/s41467-023-39095-z>.
- Aurell, J, B Gullett, D Tabor, and N Yonker. 2016. "Emissions from Prescribed Burning of Timber Slash Piles in Oregon." <https://sci-hub.st/10.1016/j.atmosenv.2016.11.034>.
- BAAQMD. 2014. "Improving Air Quality & Health in Bay Area Communities."
- BAAQMD. 2017. "Final 2017 Clean Air Plan." https://www.baaqmd.gov/~media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf?rev=8c588738a4fb455b9cabb27360409529&sc_lang=en.
- BAAQMD. 2019. "Compliance & Enforcement Policy & Procedures Open Burning Regulation 5." May 6.
- BAAQMD. 2022a. "CEQA Thresholds and Guidelines Update."
<https://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines>.
- BAAQMD. 2022b. "SCREENING FOR CRITERIA AIR POLLUTANTS AND PRECURSORS."
https://www.baaqmd.gov/~media/files/planning-and-research/ceqa/ceqa-guidelines-2022/ceqa-guidelines-chapter-4-screening_final-pdf.pdf?rev=ac551d35a52d479dad475e7d4c57afa6.
- BAAQMD. 2022c. "Thresholds of Significance."
<https://www.baaqmd.gov/~media/files/planning-and-research/ceqa/ceqa-guidelines->

5 REFERENCES

- 2022/ceqa-guidelines-chapter-3-thresholds_final_v2-pdf.pdf?rev=a976830cce0c4a6bb624b020f72d25b3&sc_lang=en.
- Bajinath-Rodino, Janine A., Alexandre Martinez, Robert A. York, Efi Foufoula-Georgiou, Amir AghaKouchak, and Tirtha Banerjee. 2023. "Quantifying the Effectiveness of Shaded Fuel Breaks from Ground-Based, Aerial, and Spaceborne Observations." *Forest Ecology and Management* 543 (September): 121142. <https://doi.org/10.1016/j.foreco.2023.121142>.
- Balanay, J.A., G.D. Kearney, and A.J. Mannarion. 2016. "Assessment of Occupational Noise Exposure among Groundskeepers in North Carolina Public Universities." <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4909058/>.
- Battaglia, Mike A., Monique E. Rocca, Charles C. Rhoades, and Michael G. Ryan. 2010. "Surface Fuel Loadings within Mulching Treatments in Colorado Coniferous Forests." *Forest Ecology and Management*. 260: 1557-1566. 260: 1557-66.
- Baum, Kristen A., and Wyatt V. Sharber. 2012. "Fire Creates Host Plant Patches for Monarch Butterflies." *Biology Letters* 8 (6): 968-71. <https://doi.org/10.1098/rsbl.2012.0550>.
- Bêche, Leah A., Scott L. Stephens, and Vincent H. Resh. 2005. "Effects of Prescribed Fire on a Sierra Nevada (California, USA) Stream and Its Riparian Zone." *Forest Ecology and Management* 218 (1): 37-59. <https://doi.org/10.1016/j.foreco.2005.06.010>.
- Bero, D, O Anfinson, and L Raymond. 2020. "New Insights on Franciscan Complex Geology, Architecture, Depositional Age, and Provenance for the Western Mt. Tamalpais Area, Marin County, California." <https://www.tandfonline.com/doi/full/10.1080/00206814.2020.1785338>.
- Beyene, Mussie T., Scott G. Leibowitz, Christopher J. Dunn, and Kevin D. Bladon. 2023. "To Burn or Not to Burn: An Empirical Assessment of the Impacts of Wildfires and Prescribed Fires on Trace Element Concentrations in Western US Streams." *Science of The Total Environment* 863 (March): 160731. <https://doi.org/10.1016/j.scitotenv.2022.160731>.
- Beyond Chemical. 2016. "ChemicalWatch Factsheet Glufosinate Ammonium." <https://www.beyondpesticides.org/assets/media/documents/GlufosinateChemWatch.pdf>.
- Biofuelwatch. 2011. *Biochar: A Critical Review of Science and Policy*. <https://www.biofuelwatch.org.uk/wp-content/uploads/Biochar-Report3.pdf>.
- Bo, Xiaomeng, Zhiwei Zhang, Jinyang Wang, et al. 2023. "Benefits and Limitations of Biochar for Climate-Smart Agriculture: A Review and Case Study from China." *Biochar* 5 (1): 77. <https://doi.org/10.1007/s42773-023-00279-x>.
- Board of Forestry and Fire Protection. n.d. "Answers to Frequently Asked Questions Relating to the Program EIR for the California Vegetation Treatment Program."
- Borders, Brianna, Eric Mader, Eric Eldredge, and Casey Burns. 2012. *Great Basin Pollinator Plants Native Milkweeds (Asclepias Spp.)*. NVPMT Technical Note No. 56. The Xerces Society for Invertebrate Conservation, Portland OR, in collaboration with USDA-NRCS Great Basin Plant Materials Center, Fallon NV.
- Branum, D., R. Chen, M. Petersen, and C. Wills. 2016. "Earthquake Shaking Potential for California." https://www.conservation.ca.gov/cgs/Documents/Publications/Map-Sheets/MS_048.pdf.

5 REFERENCES

- Bravo, Benjamin. 2016. "Habitat Characterization and House Usage of the Dusky-Footed Woodrat at Jasper Ridge." Stanford University.
- Brueck, L. 2008. *Noise Emissions and Exposure from Mobile Woodchippers*. Derbyshire: HSE Books.
- Bureau of Land Management (BLM). 2007. "Vegetation Treatments Using Herbicides Final Programmatic EIS."
- CAL FIRE. 2016. "Vegetation Treatment Program Environmental Impact Report." Sacramento.
- CAL FIRE. 2018a. "California Forest Carbon Plan." California Department of Forestry and Fire Protection, California Natural Resources Agency, and California EPA.
- CAL FIRE. 2018b. "Wildfire Activity Statistics 2018."
- CAL FIRE. 2024. "Fire Hazard Severity Zones." <https://osfm.fire.ca.gov/what-we-do/community-wildfire-preparedness-and-mitigation/fire-hazard-severity-zones#:~:text=%E2%80%9CHazard%E2%80%9D%20is%20based%20on%20the,wildfire%2C%20or%20fuel%20reduction%20efforts>.
- California Air Pollution Control Officers Association. 2022. "California Emissions Estimator Model User Guide Version 2022.1." April. <https://www.caleemod.com/user-guide>.
- California Air Resources Board. 2017. "Technical Documentation for California's 2001-2010 Forest and Other Natural Lands Carbon and Emission Inventory."
- California Air Resources Board. 2020. "California Wildfire Burn Acreage and Preliminary Emissions Estimates."
- California Air Resources Board. 2022a. "2022 Scoping Plan for Achieving Carbon Neutrality." <https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf>.
- California Air Resources Board. 2022b. "Maps of State and Federal Area Designations." <https://ww2.arb.ca.gov/resources/documents/maps-state-and-federal-area-designations>.
- California Air Resources Board. 2022c. "2022 Scoping Plan for Achieving Carbon Neutrality." December. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/<https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf>.
- California Air Resources Board. n.d.-a. "Advanced Clean Cars II | California Air Resources Board." Accessed April 30, 2024. <https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/advanced-clean-cars-ii>.
- California Air Resources Board. n.d.-b. "Advanced Clean Cars Program | California Air Resources Board." Accessed April 30, 2024. <https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/about>.
- California Air Resources Board. n.d.-c. "Low Carbon Fuel Standard | California Air Resources Board." Accessed April 30, 2024. <https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard/about>.
- California Department of Conservation. 2015. "Fault Activity Map of California: California Geological Survey." <https://maps.conservation.ca.gov/cgs/fam/>.
- California Department of Conservation. n.d.-a. "DLRP Important Farmland Finder." Accessed April 8, 2024. <https://maps.conservation.ca.gov/DLRP/CIFF/>.
- California Department of Conservation. n.d.-b. "DLRP Important Farmland Finder - Williamson Act." Accessed April 8, 2024. <https://maps.conservation.ca.gov/dlrp/WilliamsonAct/>.

5 REFERENCES

- California Department of Fish and Game. 2003. "List of California Terrestrial Natural Communities."
- California Department of Fish and Wildlife. 2024. "California Natural Diversity Database (CNDDB) Rarefind Program."
- California Department of Forestry and Fire Protection (CAL FIRE). 2023. "Fire Hazard Severity Zones in State Responsibility Area." Webmap. September 29. <https://calfire-forestry.maps.arcgis.com/apps/webappviewer/index.html?id=988d431a42b242b29d89597ab693d008>.
- California Department of Toxic Substances. 2024. "Envirostor. Search Criteria: San Rafael." https://www.envirostor.dtsc.ca.gov/public/search.asp?cmd=search&ocieerp=&business_name=&main_street_number=&main_street_name=&city=SAN+RAFAEL&zip=&county=&branch=&site_type=&cleanup_type=&npl=&funding=&reporttype=&reporttitle=PROJECT+SEARCH+RESULTS&feder.
- California Department of Transportation. 2009. "Technical Noise Supplement."
- California Department of Transportation. 2013. "Technical Noise Supplement to the Traffic Noise Analysis Protocol." <https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tens-sep2013-a11y.pdf>.
- California Department of Transportation. 2021. "Chapter 12-Noise." <https://dot.ca.gov/programs/environmental-analysis/standard-environmental-reference-ser/volume-1-guidance-for-compliance/ch-12-noise>.
- California Department of Transportation. n.d. "Marin County - California State Scenic Highway System Map." Accessed April 16, 2024. <https://caltrans.maps.arcgis.com/apps/webappviewer/index.html?id=465dfd3d807c46cc8e8057116f1aaca>.
- California Department of Water Resources. n.d. "SGMA Basin Prioritization Dashboard." <https://gis.water.ca.gov/app/bp-dashboard/final/>.
- California Geological Survey. 2013. "Factors Affecting Landslides in Forested Terrain." <https://www.conservation.ca.gov/cgs/Documents/Publications/CGS-Notes/CGS-Note-50.pdf>.
- California Native Plant Society. 2024. "Electronic Inventory of Rare and Endangered Vascular Plants of California, Database Search for Marin County and Surrounding Quadrangles."
- California Natural Resources Agency. 2018. "California's Fourth Climate Change Assessment. Statewide Summary Report."
- California Office of Environmental Health Hazard Assessment. 2015. "Air Toxics Hot Spots Program: Guidance Manual for Preparation of Health Risk Assessment." <https://oehha.ca.gov/media/downloads/crn/2015guidancemanual.pdf>.
- CalRecycle. n.d. "SWIS Facility/Site Activity Details - West Marin Compost Project- Drop Off (21-AA-0067)." Accessed March 25, 2024. <https://www2.calrecycle.ca.gov/SolidWaste/SiteActivity/Details/4957?siteID=5192>.
- Cameron Macdonald. 2023. "San Rafael Hill Fire Burns Quarter-Acre." *Marin Independent Journal*, November 2. <https://www.marinij.com/2023/11/02/san-rafael-hill-fire-burns-quarter-acre/>.

5 REFERENCES

- Campbell, John L., John Sessions, David Smith, and Kristin Trippe. 2018. "Potential Carbon Storage in Biochar Made from Logging Residue: Basic Principles and Southern Oregon Case Studies." *PLOS ONE* 13 (9): e0203475. <https://doi.org/10.1371/journal.pone.0203475>.
- CARB. 2000. "Agricultural Burning Emission Factors." August 17.
- Carlson, C.H., S.Z. Dovrowski, and H.D. Safford. 2012. "Variation in Tree Mortality and Regeneration Affect Forest Carbon Recovery Following Fuel Treatments and Wildfire in the Lake Tahoe Basin, California, USA." Carbon balance and management.
- Cawson, J. G., G. J. Sheridan, H. G. Smith, and P. N. J. Lane. 2012. "Surface Runoff and Erosion after Prescribed Burning and the Effect of Different Fire Regimes in Forests and Shrublands: A Review." *International Journal of Wildland Fire* 21 (7): 857–72. <https://doi.org/10.1071/WF11160>.
- CHC. n.d. "Common Noise Levels - How Loud Is Too Loud?" <http://chchearing.org/noise/common-environmental-noise-levels/>.
- Chih-Fang Fang, D.L. 2003. *Investigation of the Noise Reduction Provided by Tree Belts*.
- City of San Rafael. 2016. "Boyd Memorial Park Playground." October 5. <https://www.cityofsanrafael.org/locations/boyd-park/>.
- City of San Rafael. 2017. "Integrated Pest Management Policy Update." <https://www.cityofsanrafael.org/documents/integrated-pest-management-policy/>.
- City of San Rafael. 2018. "Integrated Pest Management Policy." <https://www.cityofsanrafael.org/documents/integrated-pest-management-policy/>.
- City of San Rafael. 2019. "CLIMATE CHANGE ACTION PLAN 2030." <https://storage.googleapis.com/proudcity/sanrafaelca/uploads/2019/06/Att-D-CCAP-2030-Final-Draft-4-23-19.pdf>.
- City of San Rafael. 2020. "Wildfire Prevention and Protection Action Plan." August. <https://www.cityofsanrafael.org/wildfire-action-plan/#:~:text=What%20is%20it%3F,changes%20to%20mitigate%20wildfire%20risk>.
- City of San Rafael. 2021. "San Rafael General Plan 2040 & Downtown Precise Plan Draft EIR." January 7. <https://www.cityofsanrafael.org/general-plan-ceqa/>.
- City of San Rafael. 2023. "Emergency Operations Plan (EOP)."
- City of San Rafael. n.d.-a. "Falkirk Cultural Center." San Rafael. Accessed April 10, 2024. <https://www.cityofsanrafael.org/falkirk/>.
- City of San Rafael. n.d.-b. "Fire Department - City of San Rafael." San Rafael. Accessed April 23, 2024. <https://www.cityofsanrafael.org/about-the-fire-department/>.
- City of San Rafael. n.d.-c. "San Rafael Code of Ordinances - 19.10.060 - Open Space Regulations." https://library.municode.com/ca/san_rafael/codes/code_of_ordinances?nodeId=TIT19PU_PAPROPSP_CH19.10LAWAAR_19.10.060OPSPRE.
- City of San Rafael. n.d.-d. "San Rafael Code of Ordinances - Definition of Open Space." https://library.municode.com/ca/san_rafael/codes/code_of_ordinances?nodeId=TIT19PU_PAPROPSP_CH19.10LAWAAR_19.10.020DEOPSP.
- City of San Rafael. n.d.-e. "San Rafael Police Department." Accessed April 23, 2024. <https://www.srpd.org/>.

5 REFERENCES

- Clark, Kenneth L., Nicholas Skowronski, Heidi Renninger, and Robert Scheller. 2014. "Climate Change and Fire Management in the Mid-Atlantic Region." *Forest Ecology and Management*. 327: 306-315. 327: 306-15. <https://doi.org/10.1016/j.foreco.2013.09.049>.
- Clark, Laurie A., Gary J. Roloff, Vickie L. Tatum, and Larry L. Irwin. 2009. "Forest Herbicide Effects on Pacific Northwest Systems: A Literature Review." National Council for Air and Stream Improvement, December.
- CNPS. n.d. "CNPS Alliance: Quercus Agrifolia." <https://vegetation.cnps.org/alliance/78>.
- CNPS. n.d. "CNPS Alliance: Baccharis Pilularis." Accessed July 22, 2025. <https://vegetation.cnps.org/alliance/151>.
- Coastal Country. n.d. "10 Burn Pile Basics." 10 Pile Burn Basics. Accessed May 2, 2024. <https://www.coastalcountry.com/resource/blog-posts/home--garden/10-burn-pile-basics>.
- Colorado Forest Restoration Institute. 2020. "Mulching: A Knowledge Summary and Guidelines for Best Practices on Colorado's Front Range." January.
- Connolly, Damon, and Don Dickenson. 2016. "Silveira Ranch - Settlement with the Silveiras Resolves Legal Uncertainty and Advances Conservation." Marin IJ, July 2. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/<https://www.marincounty.org/~media/files/departments/bs/district-1/2017/summer.pdf?la=en>.
- Cormier, R. L., M.M. Brown, D.L. Humple, W.W. Merkle, D.T. Press, and K.E. Dybala. 2024. "Vulnerability Assessment and Conservation Recommendations for the Northern Spotted Owl in Marin County, California." National Park Service, Fort Collins, Colorado.
- Corteva Agrosience. 2020. "Safety Data Sheet: GARLON™ 4 Ultra Herbicide." https://www.sce.com/sites/default/files/custom-files/Web%20files/Garlon_4_Ultra2i_MSDS.pdf.
- Cruz, Miguel G., and Martin E. Alexander. 2019. "The 10% Wind Speed Rule of Thumb for Estimating a Wildfire's Forward Rate of Spread in Forests and Shrublands." *Annals of Forest Science* 76 (2): 2. <https://doi.org/10.1007/s13595-019-0829-8>.
- Dadmun, Jacob. 2025. "Memorandum Regarding Native Grasses Present on San Rafael – San Anselmo Fuel Reduction Zone Project Site." Marin Wildfire Prevention Authority, April 1.
- Das, Shaon Kumar, and Goutam Kumar Ghosh. 2024. "Soil Hydro-Physical Properties Affected by Biomass-Derived Biochar and Organic Manure: A Low-Cost Technology for Managing Acidic Mountain Sandy Soils of North Eastern Region of India." *Biomass Conversion and Biorefinery* 14 (5): 6621-35. <https://doi.org/10.1007/s13399-022-03107-7>.
- Davis, Kimberley T., Jamie Peeler, Joseph Fargione, et al. 2024. "Tamm Review: A Meta-Analysis of Thinning, Prescribed Fire, and Wildfire Effects on Subsequent Wildfire Severity in Conifer Dominated Forests of the Western US." *Forest Ecology and Management* 561 (June): 121885. <https://doi.org/10.1016/j.foreco.2024.121885>.
- DeLuca, T. H.; Aplet, G. H. 2008. "Charcoal and carbon storage in forest soils of the Rock Mountain West." *Frontiers in Ecology and Environment*, 18-24.

5 REFERENCES

- Department of Water Resources. 2004. "California's Groundwater Bulletin 118: Novato Valley Basin." https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/2003-Basin-Descriptions/2_030_NovatoValley.pdf.
- Division of Mine Reclamation, California Department of Conservation. n.d. "Mines Online." <https://maps.conservacion.ca.gov/mol/index.html>.
- Dow AgroSciences. 2009. "Material Safety Data Sheet: TURFLON Ester Herbicide." <https://ehslegacy.unr.edu/msdsfiles/30877.pdf>.
- Evers, Cody, Andrés Holz, Sebastian Busby, and Max Nielsen-Pincus. 2022. "Extreme Winds Alter Influence of Fuels and Topography on Megafire Burn Severity in Seasonal Temperate Rainforests under Record Fuel Aridity." *Fire* 5 (2): 2. <https://doi.org/10.3390/fire5020041>.
- Far Western. 2024a. *Completion of Archaeological Survey for the Marin Wildfire Prevention Authority San Rafael Open Space Fuel Reduction Project, Marin County, California*.
- Far Western. 2024b. "Cultural Resources Desktop Review for the Marin Wildfire Prevention Authority San Rafael Open Space Fuel Reduction Project, Marin County, California." May 13.
- Federal Highway Administration. 2017. "Construction Equipment Noise Levels and Ranges-Handbook." <https://www.nrc.gov/docs/ML1805/ML18059A141.pdf>.
- Federal Transit Administration. 2018. "Transit Noise and Vibration Impact Assessment Manual." https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf.
- Fertel, Hannah M., Brandon M. Collins, Jamie M. Lydersen, and Scott L. Stephens. 2023. "Vegetation Type Change in California's Northern Bay Area: A Comparison of Contemporary and Historical Aerial Imagery." *Forest Ecology and Management* 542 (August): 121102. <https://doi.org/10.1016/j.foreco.2023.121102>.
- Fidel, Rivka B., David A. Laird, and Timothy B. Parkin. 2019. "Effect of Biochar on Soil Greenhouse Gas Emissions at the Laboratory and Field Scales." *Soil Systems* 3 (1): 1. <https://doi.org/10.3390/soilsystems3010008>.
- Fire and Environmental Research Applications Team. 2014. "Piled Fuels Biomass and Emissions Calculator." <https://depts.washington.edu/nwfire/piles/>.
- Forest Climate Action Team. 2018. "California Forest Carbon Plan: Managing Our Forest Landscapes in a Changing Climate." Sacramento. <https://ww2.arb.ca.gov/sites/default/files/2019-01/California-Forest-Carbon-Plan-Final-Draft-for-Public-Release-May-2018.pdf>.
- Flores, A, and C Gilleran. 2020. Interview.
- Garza, Nick, and Charles Taylor. 2007. "How to Build Cost-Effective Sprayers for Prescribed Burning."
- Gelardi, Danielle L., Chongyang Li, and Sanjai J. Parikh. 2019. "An Emerging Environmental Concern: Biochar-Induced Dust Emissions and Their Potentially Toxic Properties." *Science of The Total Environment* 678 (August): 813–20. <https://doi.org/10.1016/j.scitotenv.2019.05.007>.

5 REFERENCES

- Golden Gate National Parks Conservancy. 2018. "Mission Blue Butterfly." Golden Gate National Parks Conservancy, June 5.
<https://www.parksconservancy.org/conservation/mission-blue-butterfly>.
- GoogleEarth. 2024. Released. <https://earth.google.com/web>.
- Greenly, Katrina M., and Donald A. Rakow. 1995. "The Effect of Wood Mulch Type and Depth on Weed and Tree Growth and Certain Soil Parameters." *Articles. Arboriculture & Urban Forestry (AUF)* 21 (5): 225–32. <https://doi.org/10.48044/jauf.1995.036>.
- Gruppenhoff, Ashley R., and Hugh D. Safford. 2024. "High Fire Frequency in California Chaparral Reduces Postfire Shrub Regeneration and Native Plant Diversity." *Ecosphere* 15 (12): e70128. <https://doi.org/10.1002/ecs2.70128>.
- Hamm, K.A., and Diller. n.d. "Forest Management Effects on Abundance of Woodrats in Northern California." *Northwestern Naturalist*, no. 90(2): 97–106.
- Hamm, Keith A., and Lowell V. Diller. 2009. "Forest Management Effects on Abundance of Woodrats in Northern California." *Northwestern Naturalist* 90 (2): 97–106.
<https://doi.org/10.1898/NWN06-13.1>.
- Hankins, Don L. 2022. "Restoring Indigenous Prescribed Fires to California Oak Woodlands." *Gen. Tech. Rep. PSW-GTR-251*. Berkeley, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station: 123-129, March 24.
<https://research.fs.usda.gov/treearch/49977>.
- Harvey, A. E.; Larsen, M. J.; Jurgensen, M. F. 1979. "Comparative Distribution of Ectomycorrhizae in Soils of Three Western Montana Forest Habitat Types." *Forest Science*, 350–58.
- He, Yanghui, Xuhui Zhou, Liling Jiang, et al. 2017. "Effects of Biochar Application on Soil Greenhouse Gas Fluxes: A Meta-Analysis." *GCB Bioenergy* 9 (4): 743–55.
<https://doi.org/10.1111/gcbb.12376>.
- Herrington, L, and C Brock. 1977. *Propagation of Noise over and through a Forest Stand*. Proceedings of the Conference on Metropolitan Physical Environment. Upper Darby, Pennsylvania: Department of Agriculture, U.S. Forest Service, Northeastern Forest Experiment Station.
- Hickman, J. 1993. "The Jepson Manual Higher Plants of California."
- Hinds, A, M Rodriguez, F Vogler, D Dawson, K Drumm, and D Allee. 2005. "Marin Countywide Plan Hydrology and Water Quality Technical Background Report."
https://www.marincounty.org/-/media/files/departments/cd/planning/currentplanning/publications/county-wide-plan/background-reports/hydrology_and_water_quality.pdf.
- Hurteau, M D, and M.L. Brooks. 2011. "Short- and Long-Term Effects of Fire on Carbon in US Dry Temperate Forest Systems."
<https://chooser.crossref.org/?doi=10.1525%2Fbio.2011.61.2.9>.
- Hurteau, M D, G.W. Koch, and B.A. Hungate. 2008. "Carbon Protection and Fire Risk Reduction: Toward a Full Accounting of Forest Carbon Offsets." In *Frontiers in Ecology and the Environment*.
- Husqvarna. n.d. "Products."

5 REFERENCES

- Ibrahim, Ehab A., Mohamed A. A. El-Sherbini, and El-Metwally M. Selim. 2022. "Effects of Biochar on Soil Properties, Heavy Metal Availability and Uptake, and Growth of Summer Squash Grown in Metal-Contaminated Soil." *Scientia Horticulturae* 301 (July): 111097. <https://doi.org/10.1016/j.scienta.2022.111097>.
- Ingle, Snehal R., Bhimrao M. Kamble, and Vijaykumar S. Patil. 2024. "Biochar: A Comprehensive Review of Production, Properties and Applications." *International Journal of Advanced Biochemistry Research* 8 (1S): 21–29. <https://doi.org/10.33545/26174693.2024.v8.i1Sa.282>.
- Intergovernmental Panel on Climate Change. 2023. "Climate Change 2023 Synthesis Report." https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_LongerReport.pdf.
- Jaffe, Daniel A., Susan M. O'Neill, Narasimhan K. Larkin, et al. 2020. "Wildfire and Prescribed Burning Impacts on Air Quality in the United States." *Journal of the Air & Waste Management Association* (1995) 70 (6): 583–615. <https://doi.org/10.1080/10962247.2020.1749731>.
- Jeffery, Simon, Diego Abalos, Marija Prodana, et al. 2017. "Biochar Boosts Tropical but Not Temperate Crop Yields." *Environmental Research Letters* 12 (5): 053001. <https://doi.org/10.1088/1748-9326/aa67bd>.
- Jones, Abigail M., Jeffrey M. Kane, Eamon A. Engber, Caroline A. Martorano, and Jennifer Gibson. 2023. "Extreme Wildfire Supersedes Long-Term Fuel Treatment Influences on Fuel and Vegetation in Chaparral Ecosystems of Northern California, USA." *Fire Ecology* 19 (1): 28. <https://doi.org/10.1186/s42408-023-00186-3>.
- Kabir, Ehsanul, Ki-Hyun Kim, and Eilhann E. Kwon. 2023. "Biochar as a Tool for the Improvement of Soil and Environment." *Frontiers in Environmental Science* 11 (December). <https://doi.org/10.3389/fenvs.2023.1324533>.
- Kalies, Dr. Elizabeth L., and Dr. Carol L. Chambers. 2010. "Guidelines for Managing Small Mammals in Restored Ponderosa Pine Forests in Northern Arizona. Ecological Restoration Institute Working Paper No. 23."
- Keeley, Jon E., and Teresa J. Brennan. 2012. "Fire-Driven Alien Invasion in a Fire-Adapted Ecosystem." *Oecologia* 169 (4): 1043–52. <https://doi.org/10.1007/s00442-012-2253-8>.
- Kidder, Allison. 2015. *On Baccharis Pilularis DC. (Coyote Brush, Asteraceae) Water Relations During Succession Into Coastal Grasslands in a Changing Climate*. A Dissertation Submitted in Partial Satisfaction of the Requirements for the Degree of Doctor of Philosophy in Environmental Science, Policy, and Management in the Graduate Division of University of California, Berkeley. University of California, Berkeley. https://escholarship.org/content/qt8cj0k6v1/qt8cj0k6v1_noSplash_3dcab389de0de2ed01c38d312aacc45f.pdf.
- Kiely, Laura, Soroush E. Neyestani, Samiha Binte-Shahid, Robert A. York, William C. Porter, and Kelley C. Barsanti. 2024. "California Case Study of Wildfires and Prescribed Burns: PM2.5 Emissions, Concentrations, and Implications for Human Health." *Environmental Science & Technology* 58 (12): 5210–19. <https://doi.org/10.1021/acs.est.3c06421>.

5 REFERENCES

- Klett, J.E. 2020. "Mulches for Home Grounds." Extension. December 2020. <https://extension.colostate.edu/topic-areas/yard-garden/mulches-for-home-grounds-7-214/>.
- Klip, J. Mario K., Molly R. Caldwell, Debra R. Ayres, and Virginia Meyer. 2020. "Effects of a Firebreak on Plants and Wildlife at Pine Hill, a Biodiversity Hotspot, El Dorado County, California." *California Fish and Wildlife Journal* 106 (Fire Special Issue). <https://doi.org/10.51492/cfwj.firesi.4>.
- Kramer, Anu, Gavin M. Jones, Sheila A. Whitmore, et al. 2021. "California Spotted Owl Habitat Selection in a Fire-Managed Landscape Suggests Conservation Benefit of Restoring Historical Fire Regimes." *Forest Ecology and Management* 479 (January): 118576. <https://doi.org/10.1016/j.foreco.2020.118576>.
- Lang, Des, and Warren McDonald. 2005. "Maintaining Groundcover to Reduce Erosion and Sustain Production." NSW Department of Primary Industries, January 14. https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0018/162306/groundcover-for-pastures.pdf.
- Lee, Derek E. 2018. "Spotted Owls and Forest Fire: A Systematic Review and Meta-Analysis of the Evidence." *Ecosphere* 9 (7): e02354. <https://doi.org/10.1002/ecs2.2354>.
- Lesmeister, Damon B., Raymond J. Davis, Stan G. Sovern, and Zhiqiang Yang. 2021. "Northern Spotted Owl Nesting Forests as Fire Refugia: A 30-Year Synthesis of Large Wildfires." *Fire Ecology* 17 (1): 32. <https://doi.org/10.1186/s42408-021-00118-z>.
- Lesmeister, Damon B., Stan G. Sovern, Raymond J. Davis, David M. Bell, Matthew J. Gregory, and Jody C. Vogeler. 2019. "Mixed-Severity Wildfire and Habitat of an Old-Forest Obligate." *Ecosphere* 10 (4): e02696. <https://doi.org/10.1002/ecs2.2696>.
- Lesmeister, D.B., R.J. Davis, P.H. Singleton, and J.D. Wiens. 2018. *Chapter 4: Northern Spotted Owl Habitat and Populations: Status and Threats*. General Technical Report PNW-GTR-966.
- Li, Chongyang, Daniel A. Bair, and Sanjai J. Parikh. 2018. "Estimating Potential Dust Emissions from Biochar Amended Soils under Simulated Tillage." *Science of The Total Environment* 625 (June): 1093–101. <https://doi.org/10.1016/j.scitotenv.2017.12.249>.
- Liu, Xiaoxi, L. Gregory Huey, Robert J. Yokelson, et al. 2017. "Airborne Measurements of Western U.S. Wildfire Emissions: Comparison with Prescribed Burning and Air Quality Implications." *Journal of Geophysical Research: Atmospheres* 122 (11): 6108–29. <https://doi.org/10.1002/2016JD026315>.
- Low, Kathryn E., John J. Battles, Ryan E. Tompkins, Colin P. Dillingham, Scott L. Stephens, and Brandon M. Collins. 2023. "Shaded Fuel Breaks Create Wildfire-Resilient Forest Stands: Lessons from a Long-Term Study in the Sierra Nevada." *Fire Ecology* 19 (1): 29. <https://doi.org/10.1186/s42408-023-00187-2>.
- Lucas, Timothy A., Reanna A. Doña, Wancen Jiang, et al. 2017. "An Individual-Based Model of Chaparral Vegetation Response to Frequent Wildfires." *Theoretical Ecology* 10 (2): 217–33. <https://doi.org/10.1007/s12080-016-0324-x>.
- Marin Climate & Energy Partnership, and City of San Rafael. 2021. "COMMUNITY GREENHOUSE GAS EMISSIONS INVENTORY FOR THE YEAR 2019." https://storage.googleapis.com/proudcity/sanrafaelca/uploads/2021/05/San-Rafael-2019-GHG-Inventory-Report_final.pdf.

5 REFERENCES

- Marin County. 2007. "Marin Countywide Plan." https://www.marincounty.org/-/media/files/departments/cd/planning/currentplanning/publications/county-wide-plan/cwp_2015_update_r.pdf?la=en.
- Marin County. 2018. "Marin Fine Scale Vegetation Map." <https://vegmap.marincounty.org/pages/vegetation-and-land-cover-map-products>.
- Marin County. 2023. "Expansive Soil." <https://gisopendata.marincounty.gov/search?tags=soils>.
- Marin County. n.d.-a. "Marin County GIS Open Data - Deer Valley." Accessed May 2, 2024. <https://gisopendata.marincounty.gov/datasets/a1a0f2e318cf4b7a860699a5fb46c1dd/explore?location=38.022749,-122.530178,16.43>.
- Marin County. n.d.-b. "Marin County GIS Open Data - San Rafael Hill." Accessed May 2, 2024. <https://gisopendata.marincounty.gov/datasets/a1a0f2e318cf4b7a860699a5fb46c1dd/explore?location=38.022749,-122.530178,16.43>.
- Marin County. n.d.-c. "Marin Map Viewer." Accessed April 10, 2024. <https://www.marinmap.org/Html5Viewer/Index.html?viewer=smmdataviewer>.
- Marin County Community Development Agency. 2007. "Marin Countywide Plan." November 6. https://www.marincounty.org/-/media/files/departments/cd/planning/currentplanning/publications/county-wide-plan/cwp_2015_update_r.pdf?la=en.
- Marin LAFCo. n.d. "Marin Municipal Water District." Marin County LAFCo. Accessed April 23, 2024. <https://www.marinlafco.org/marin-municipal-water-district>.
- Marin Wildfire Prevention Authority. n.d. "Goals and Objectives." <https://www.marinwildfire.org/about-mwpa/goals-and-objectives#goal-1>.
- MarinMap. 2024. "MarinMap Map Viewer." <https://www.marinmap.org/Html5Viewer/Index.html?viewer=smmdataviewer>.
- Martinson, Erik J., and Philip N. Omi. 2013. *Fuel Treatments and Fire Severity: A Meta-Analysis*. RMRS-RP-103. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. <https://doi.org/10.2737/RMRS-RP-103>.
- Martorano, Caroline A., Jeffrey M. Kane, Eamon A. Engber, and Jennifer Gibson. 2020. "Long-Term Fuel and Understorey Vegetation Response to Fuel Treatments in Oak and Chaparral Stands of Northern California." *Applied Vegetation Science* 24 (1): e12551. <https://doi.org/10.1111/avsc.12551>.
- Matovic, Darko. 2011. "Biochar as a Viable Carbon Sequestration Option: Global and Canadian Perspective." *Energy*, 5th Dubrovnik Conference on Sustainable Development of Energy, Water & Environment Systems, vol. 36 (4): 2011–16. <https://doi.org/10.1016/j.energy.2010.09.031>.
- McIntyre, Patrick J., James H. Thorne, Christopher R. Dolanc, et al. 2015. "Twentieth-Century Shifts in Forest Structure in California: Denser Forests, Smaller Trees, and Increased Dominance of Oaks." *Proceedings of the National Academy of Sciences* 112 (5): 1458–63. <https://doi.org/10.1073/pnas.1410186112>.
- Miller Creek Elementary School District. n.d. "Who We Are - Miller Creek Elementary School District." Accessed April 30, 2024. <https://www.millercreeksd.org/about/who-we-are>.
- Miller, Elisa M., and T. R. Seastedt. 2009. "Impacts of Woodchip Amendments and Soil Nutrient Availability on Understory Vegetation Establishment Following Thinning of a

5 REFERENCES

- Ponderosa Pine Forest.” *Forest Ecology and Management* 258 (3): 263–72.
<https://doi.org/10.1016/j.foreco.2009.04.011>.
- Miller, Russell V., and Lawrence L. Busch. 2013. *Updated Mineral Land Classification Map for Portland Cement Grade Aggregate in the North San Francisco Bay Production Consumption Region, Marin, Napa, Sonoma, and Southwestern Solano Counties, California*. California Geological Survey.
- Minnesota Department of Agriculture. n.d. “Glufosinate Herbicide.”
<https://www.mda.state.mn.us/glufosinate-herbicide#:~:text=Glufosinate%20is%20very%20toxic%20to,especially%20if%20larger%20in%20size>.
- Moghaddas, Jason, Gary Roller, Jonathan Long, et al. 2018. *Fuel Treatment for Forest Resilience and Climate Mitigation: A Critical Review for Coniferous Forests of California*. Nos. CCCA4-CNRA-2018-017. A Report for: California’s Fourth Climate Change Assessment. California Natural Resources Agency.
https://www.energy.ca.gov/sites/default/files/2019-12/Forests_CCCA4-CNRA-2018-017_ada.pdf.
- Moghaddas, J.J., G. Roller, G.B. Long, et al. 2018. “Fuel Treatment for Forest Resilient and Climate Mitigation: A Critical Review for Coniferous Forests of California.” California Natural Resources Agency.
- National Center for Biotechnology Information. n.d. “PubChem Compound Summary for CID 4794, Glufosinate.” <https://pubchem.ncbi.nlm.nih.gov/compound/Glufosinate>.
- Natural Resources Conservation Service. 2024. “Web Soil Survey.”
<https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>.
- Nkoh, Jackson Nkoh, Fidelis Odedishemi Ajibade, Edidiong Okokon Atakpa, et al. 2022. “Reduction of Heavy Metal Uptake from Polluted Soils and Associated Health Risks through Biochar Amendment: A Critical Synthesis.” *Journal of Hazardous Materials Advances* 6 (May): 100086. <https://doi.org/10.1016/j.hazadv.2022.100086>.
- NPS. n.d. “Wildland Fire in Oak Woodlands and Savannas of the Midwestern United States (U.S. National Park Service).” <https://www.nps.gov/articles/wildland-fire-oak-and-savanna-midwestern-united-states.htm>.
- Ohlenbusch, Paul, James W. Kunkel, and Steve L. Watson. 1993. “Prescribed Burning Equipment.” Kansas State University Agricultural Experiment Station and Cooperative Extension Service, March.
- Pacific Gas & Electric Company. 2014. “Electric Service Area Maps.” December. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.pge.com/tariffs/assets/pdf/tariffbook/ELEC_MAPS_Service%20Area%20Map.pdf.
- Page, G, and J Zygmunt. 2013. “The Science behind Wildfire Effects on Water Quality, Erosion.” https://www.uwyo.edu/barnbackyard/_files/documents/resources/wildfire2013/waterqualityerosion2013wywildfire.pdf.
- Page-Dumroese, Deborah S., Joanne M. Tirocke, Nathaniel M. Anderson, et al. 2024. “Continuous In-Woods Production of Biochar Using a Trailer-Mounted Air Curtain Burner.” *Journal of Visualized Experiments*, no. 206 (April). <https://doi.org/10.3791/66716>.

5 REFERENCES

- Peery, M Zachariah, Gavin M Jones, RJ Gutiérrez, et al. 2019. "The Conundrum of Agenda-driven Science in Conservation." *Frontiers in Ecology and the Environment* 17 (2): 80–82. <https://doi.org/10.1002/fee.2006>.
- Piash, Mahmudul Islam, Md Faruque Hossain, Ihuoma N. Anyanwu, Shamim Al Mamun, and Zakia Parveen. 2018. "Effect of Biochar Application on Soil Carbon Fluxes from Sequential Dry and Wet Cultivation Systems." *American Journal of Climate Change* 7 (1): 1. <https://doi.org/10.4236/ajcc.2018.71005>.
- Potts, Jennifer B., and Scott L. Stephens. 2009. "Invasive and Native Plant Responses to Shrubland Fuel Reduction: Comparing Prescribed Fire, Mastication, and Treatment Season." *Biological Conservation*. 142(8): 1657-1664 142: 1657–64. <https://doi.org/10.1016/j.biocon.2009.03.001>.
- Prunicki, Mary, Rodd Kelsey, Justin Lee, et al. 2019. "The Impact of Prescribed Fire versus Wildfire on the Immune and Cardiovascular Systems of Children." *Allergy* 74 (10): 1989–91. <https://doi.org/10.1111/all.13825>.
- Ravi, Sujith, Brenton S. Sharratt, Junran Li, Stuart Olshevski, Zhongju Meng, and Jianguo Zhang. 2016. "Particulate Matter Emissions from Biochar-Amended Soils as a Potential Tradeoff to the Negative Emission Potential." *Scientific Reports* 6 (1). <https://doi.org/10.1038/srep35984>.
- Ravi, Vikram, Joseph K. Vaughan, Michael P. Wolcott, and Brian K. Lamb. 2019. "Impacts of Prescribed Fires and Benefits from Their Reduction for Air Quality, Health, and Visibility in the Pacific Northwest of the United States." *Journal of the Air & Waste Management Association* 69 (3): 289–304. <https://doi.org/10.1080/10962247.2018.1526721>.
- Ray, E.F. 2013. "Industrial Noise Series Part I: Fundamental of Environmental Sound."
- Reinhardt, Timothy E., Roger D. Ottmar, and Andrew J. S. Hanneman. 2022. "Smoke Exposure among Firefighters at Prescribed Burns in the Pacific Northwest." *Res. Pap. PNW-RP-526*. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 45 p, ahead of print, March 24. <https://doi.org/10.2737/PNW-RP-526>.
- Rockwood, Donald, Ruliang Liu, Martin F. Ellis, et al. 2020. "Forest Trees for Biochar and Carbon Sequestration: Production and Benefits." In *Applications of Biochar for Environmental Safety*, edited by Ahmed A. Abdelhafez and Mohamed Abbas. IntechOpen. <https://doi.org/10.5772/intechopen.92377>.
- Rodriguez Franco, Carlos, Deborah S. Page-Dumroese, Derek Pierson, and Timothy Nicosia. 2024. "Biochar Utilization as a Forestry Climate-Smart Tool." *Sustainability* 16 (5): 1714. <https://doi.org/10.3390/su16051714>.
- Root, Kyle S., Catherine Schwenker, Daniel Autenrieth, Delvin R. Sandfort, Tiffany Lipsey, and William J. Brazile. 2013. "Firefighter Noise Exposure during Training Activities and General Equipment Use." *Journal of Occupational and Environmental Hygiene* 10 (3): 116–21. <https://doi.org/10.1080/15459624.2012.753023>.
- Russell, Eric S., Heping Liu, Harold Thistle, Brian Strom, Mike Greer, and Brian Lamb. 2018. "Effects of Thinning a Forest Stand on Sub-Canopy Turbulence." *Agricultural and Forest Meteorology* 248 (January): 295–305. <https://doi.org/10.1016/j.agrformet.2017.10.019>.
- Ryan, M.G, M.E Harmon, R. A. Birdsey, et al. 2010. *A Synthesis of the Science on Forests and Carbon for U.S. Forests*. Ecological Society of America.

5 REFERENCES

- Salomons, Erik M. 2001. *Computational Atmospheric Acoustics*. Kluwer Academic Publishers.
- San Rafael Police Department. n.d. "San Rafael Police Careers." SRPD Careers. Accessed April 23, 2024. <https://srpdcareers.com/>.
- San Rafael City Schools. n.d. "San Rafael City Schools." Accessed April 23, 2024. <https://www.srscs.org/>.
- Scharlemann, J.P., E.V. Tanner, R Hiederer, and V Kapos. 2014. "Global Soil Carbon: Understanding and Managing the Largest Terrestrial Carbon Pool." In *Carbon Management*.
- Second, Anne L., Andrew Major, Kathleen Patnode, and Daniel W. Sparks. 2015. "Evaluation of the Potential Role of Environmental Contaminants in Significant Bat Mortality in Conjunction with White-Nose Syndrome (WNS) in the Northeastern United States." USFWS, August.
- Shaw, R, L Pendleton, D Cameron, et al. 2009. *The Impact of Climate Change on California's Ecosystem Services*. California Climate Change Center.
- Siddiqui, Szada. 2025. "Unlocking the Environmental Potential of Biochar: Production, Applications, and Limitations." *Frontiers in Sustainable Food Systems* 9 (June). <https://doi.org/10.3389/fsufs.2025.1569941>.
- Sonoma Technology. 2020. "Marin Community Wildfire Protection Plan." December. <https://www.marinwildfire.org/about-mwpa/goals-and-objectives#goal-1>.
- Soudek, P., I.M. Rodriguez Valseca, Š. Petrová, J. Song, and T. Vaněk. 2017. "Characteristics of Different Types of Biochar and Effects on the Toxicity of Heavy Metals to Germinating Sorghum Seeds." *Journal of Geochemical Exploration* 182 (November): 157–65. <https://doi.org/10.1016/j.gexplo.2016.12.013>.
- Springsteen, Bruce, Georgine G Yorgey, Geoffrey Glass, and Christos Christoforou. 2021. "Air Pollutant Emissions and Air Emissions Permitting for Biochar Production Systems." In *Biomass to Biochar*, Chapter 12. <https://wpcdn.web.wsu.edu/cahnrs/uploads/sites/44/Biomass2Biochar-Chapter12.pdf>.
- Standiford, Richard. 1994. "The Role of Fire in California's Oak Woodlands." UC Oaks, September. <https://oaks.cnr.berkeley.edu/the-role-of-fire-in-californias-oak-woodlands-2/>.
- Startin, Charlotte Rebecca. 2022. "Assessing Woody Plant Encroachment in Marin County, California, 1952-2018." University of Southern California. <https://spatial.usc.edu/wp-content/uploads/formidable/12/Charlotte-Startin-thesis.pdf>.
- State Water Resources Control Board. 2010. "Impaired Water Bodies: 2010 Integrated Report (Clean Water Act Section 303(d) List / 305(b) Report) StateWide." https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml?tab=map.
- Stebbins, R.C. 2003. *A Field Guide to Western Reptiles and Amphibians*. Third edition. Houghton Mifflin Company.
- Story, Mark, and Thomas Dzomba. 2005. "Smoke NEPA Guidance Describing Air Resources Impacts from Prescribed Fire on National Forests & Grasslands of Montana, Idaho, North Dakota, & South Dakota in Regions 1 & 4." United States Department of Agriculture; Forest Service, November.

5 REFERENCES

- Strid, A, W Hanson, A Cross, and J Jenkins. 2018. "Triclopyr General Fact Sheet." National Pesticide Information Center: Oregon State University.
npic.orst.edu/factsheets/triclopyr/gen.html.
- Sturdevant, Jay T., Rod Skalsky, Cody L. Wienk, and Brennan Dolan. 2009. "Experimental Study of Local Fire Conditions and Effects on Surface or Near-Surface Archeological Resources at National Park Service Units – Midwest Region." *JFSP Research Projects Reports*.
- Syphard, Alexandra D., Teresa J. Brennan, Heather Rustigian-Romsos, and Jon E. Keeley. 2022. "Fire-Driven Vegetation Type Conversion in Southern California." *Ecological Applications* 32 (6): e2626. <https://doi.org/10.1002/eap.2626>.
- The Nature Conservancy. 2001. "Weed Control Methods Handbook: Tools and Techniques for Use in Natural Areas."
- Thomas, Peter A., and Robert S. McAlpine, eds. 2010. "How a Fire Burns." In *Fire in the Forest*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511780189.004>.
- Topographic-Map.com. n.d. "San Rafael Topographic Map, Elevation, Terrain." <https://en-ca.topographic-map.com/map-121nm2/San-Rafael/?center=38.01828%2C-122.52938&zoom=14>.
- Truax, B. 1999. *Handbook for Acoustic Ecology*.
- UC Santa Barbara. 1931. "Flight C 1595, Frame 29." Aerial Imagery.
https://mil.library.ucsb.edu/apcatalog/report/report.php?filed_by=C-1595.
- United States Census Bureau. 2022a. "U.S. Census Bureau QuickFacts: Marin County, California." July 1.
<https://www.census.gov/quickfacts/fact/table/marincountycalifornia/PST045222>.
- United States Census Bureau. 2022b. "U.S. Census Bureau QuickFacts: San Rafael City, California." July 1.
<https://www.census.gov/quickfacts/fact/table/sanrafaelcitycalifornia/PST045222>.
- Urbanski, S. 2014. "Wildland Fire Emissions, Carbon and Climate: Emission Factors." In *Forest Ecology and Management*.
- U.S. Department of Agriculture. 2013. "Scientists Study the Effects of Pile Burning in the Lake Tahoe Basin." <https://www.fs.usda.gov/research/news/highlights/scientists-study-effects-pile-burning-lake-tahoe-basin>.
- U.S. Department of Agriculture. 2020. "Gridded National Soil Survey Geographic (gNATSGO) Database for the Conterminous United States." December 1.
- U.S. Department of Transportation. 1995. "Highway Traffic Noise Analysis and Abatement Policy and Guidance."
- U.S. Department of Transportation. 2008. *Federal Highway Administration's Roadway Construction Noise Model*. V. Software Version 1.1. Released.
- U.S. Environmental Protection Agency. 1998a. "EPA R.E.D. FACTS TRICLOPYR."
https://www3.epa.gov/pesticides/chem_search/reg_actions/reregistration/fs_G-82_1-Oct-98.pdf.
- U.S. Environmental Protection Agency. 1998b. "EPA R.E.D. Facts Triclopyr." October.
- U.S. Environmental Protection Agency. 2005. *National Management Measures to Control Nonpoint Source Pollution from Forestry*.
- U.S. Environmental Protection Agency. 2008. "Garlon 4 Ultra Herbicide." November 13.

5 REFERENCES

- U.S. Environmental Protection Agency. 2022. "Glufosinate; Pesticide Tolerances." <https://www.federalregister.gov/documents/2022/09/21/2022-20438/glufosinate-pesticide-tolerances#:~:text=A%2028%2Dday%20inhalation%20toxicity,irritant%2C%20nor%20a%20dermal%20sensitizer.>
- U.S. Environmental Protection Agency. 2024a. "Learn About Impacts of Diesel Exhaust and the Diesel Emissions Reduction Act (DERA)." <https://www.epa.gov/dera/learn-about-impacts-diesel-exhaust-and-diesel-emissions-reduction-act-dera.>
- U.S. Environmental Protection Agency. 2024b. "Understanding Global Warming Potentials." <https://www.epa.gov/ghgemissions/understanding-global-warming-potentials.>
- U.S. Environmental Protection Agency. n.d.-a. "GHG Emission Factors Hub." Accessed May 10, 2024. <https://www.epa.gov/climateleadership/ghg-emission-factors-hub.>
- U.S. Environmental Protection Agency. n.d.-b. "NEP Assist." Accessed February 6, 2024. <https://nepassisttool.epa.gov/nepassist/nepamap.aspx.>
- U.S. Forest Service. 2006. "Transmittal of Guidance: Estimating the Effects of Auditory and Visual Disturbance to NSO and MM in Northwestern California."
- U.S. Forest Service. 2014. 2013 Mountain Fire Fuel Treatment Effectiveness Summary. Pacific Southwest Region, San Bernardino National Forest. https://www.fs.usda.gov/adaptivemanagement/reports/fbat/MountainFireFTE_110714_newFinal.pdf.
- U.S. Forest Service. 2017. "Considering Forest and Grassland Carbon in Land Management."
- U.S. Forest Service. 2020. "First Order Fire Effects Model User Guide." February 3. <https://research.fs.usda.gov/rmrs/understory/first-order-fire-effects-model-fofem-user-guide.>
- U.S. Forest Service. n.d.-a. "Pesticide Management & Coordination." Pesticide-Use Risk Assessments and Worksheets. <https://www.fs.usda.gov/foresthealth/protecting-forest/integrated-pest-management/pesticide-management/pesticide-risk-assessments.shtml.>
- U.S. Forest Service. n.d.-b. "Pile Burning." Accessed May 9, 2024. https://www.fs.usda.gov/detail/arp/landmanagement/resourcemanagement/?cid=fsm91_058291.
- U.S. Forest Service. n.d.-c. "Smoke 101 and Differences Between Wildfire and Prescribed Fire Smoke in the Western U.S." Rocky Mountain Research Station.
- U.S. Forest Service. n.d.-d. "Species: Baccharis Pilularis." Fire Effects Information System. Accessed July 28, 2025. <https://www.fs.usda.gov/database/feis/plants/shrub/bacpil/all.html#FIRE%20EFFECTS.>
- U.S. Geological Survey. n.d. "Areas of Land Subsidence in California." https://ca.water.usgs.gov/land_subsidence/california-subsidence-areas.html.
- U.S. Geological Survey. n.d. "U.S. Landslide Inventory." <https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=ae120962f459434b8c904b456c82669d.>

5 REFERENCES

- U.S. Nuclear Regulatory Commission. 2012. "Construction Noise Impact Assessment." Advanced Training Manual Version. <https://www.nrc.gov/docs/ML1225/ML12250A723.pdf>.
- USFWS. 2022. "Mission Blue Butterfly (*Icaricia Icaroides Missionensis*) | U.S. Fish & Wildlife Service." August 31. <https://www.fws.gov/species/mission-blue-butterfly-icaricia-icarioides-missionensis>.
- Van de Water, Kip M., and Hugh D. Safford. 2011. "A Summary of Fire Frequency Estimates for California Vegetation before Euro-American Settlement." *Fire Ecology* 7 (3): 3. <https://doi.org/10.4996/fireecology.0703026>.
- Volkova, Liubov, Stephen H. Roxburgh, and Christopher J. Weston. 2021. "Effects of Prescribed Fire Frequency on Wildfire Emissions and Carbon Sequestration in a Fire Adapted Ecosystem Using a Comprehensive Carbon Model." *Journal of Environmental Management* 290 (July): 112673. <https://doi.org/10.1016/j.jenvman.2021.112673>.
- Wayburn, L.A, J.F Franklin, J.C. Gordon, C.S. Binkley, D.J Mladenoff, and N.L. Jr. 2007. *Forest Carbon in the United States: Opportunities and Options for Private Lands*. Pacific Forest Trust, Inc.
- Wiedinmyer, Christine, and Matthew D. Hurteau. 2010. "Prescribed Fire as a Means of Reducing Forest Carbon Emissions in the Western United States." *Environmental Science and Technology* 44 (6): 1926–32. <https://doi.org/10.1021/es902455e>.
- Wilkin, Katherine M., Lauren C. Ponisio, Danny L. Fry, Carmen L. Tubbesing, Jennifer B. Potts, and Scott L. Stephens. 2017. "Decade-Long Plant Community Responses to Shrubland Fuel Hazard Reduction." *Fire Ecology* 13 (2): 105–36. <https://doi.org/10.4996/fireecology.130210513>.
- WM Intellectual Property Holdings, LLC. n.d. "About Us | Redwood Landfill | Waste Management." Accessed March 25, 2024. <https://redwoodlandfill.wm.com/about-us/index.jsp>.
- Xerces Society. n.d. "Milkweed FAQs." Accessed July 24, 2025. <https://www.xerces.org/milkweed-faq>.
- Yin, Jianxiang, Ling Zhao, Xiaoyun Xu, Deping Li, Hao Qiu, and Xinde Cao. 2022. "Evaluation of Long-Term Carbon Sequestration of Biochar in Soil with Biogeochemical Field Model." *The Science of the Total Environment* 822 (May): 153576. <https://doi.org/10.1016/j.scitotenv.2022.153576>.
- Zahn, S.M. 2005. "The Use of Air Curtain Destructors for Fuel Reduction and Disposal." USDA Forest Service. https://www.fs.usda.gov/t-d/pubs/pdf/hi_res/05511303hi.pdf.

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Appendix A: Marin Wildfire Project Design and Implementation Features Applicable to the Proposed Project

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Introduction

The Marin Wildfire Prevention Authority (Marin Wildfire) has developed specific design and implementation features adapted from several source documents referenced in footnotes after each name. These are incorporated into nearly all of the projects funded by Marin Wildfire, as applicable. The following project design and implementation features (PDIFs) are incorporated into the proposed project.

CUL-1 Training¹¹

For all activities with the potential for ground disturbance (excluding prescribed herbivory, vegetation and tree trimming, and hand pulling smaller vegetation) all contractors and crew will receive training prepared by and/or conducted by a qualified archaeologist (who meets the U.S. Secretary of Interior's professional standards set forth in 48 FR Parts 44738-44739 and Appendix A to 36 CFR Part 61) prior to beginning work. The Tribal Heritage Preservation Officer(s) (THPO) from a local tribe (Federated Indians of Graton Rancheria [Graton Rancheria]) will be notified of the opportunity to attend and/or train crews. The training will address the potential for encountering subsurface cultural resources, recognizing basic signs of a potential resource, understanding required procedures if a potential resource is identified including reporting the resource to a qualified archaeologist and/or THPO, as appropriate, and understanding all procedures required under Health and Safety Code § 7050.5 and PRC §§ 5097.94, 5097.98, and 5097.99 for the discovery of human remains.

CUL-2 Unanticipated Discovery¹²

In the event that a previously unidentified cultural resource is discovered during implementation of an activity all work within a minimum of 150 feet of the discovery will be halted. The resource will be located, identified, and recorded in the MWPA cultural resources GIS database.

The boundaries around the buffered resource will be temporarily marked, such as with fencing or flagging. A qualified archaeologist will inspect the discovery and determine whether further investigation is required. Data regarding archaeological resources will be kept confidential per law. As appropriate, the qualified archaeologist will inform Graton Rancheria's THPO of the discovery. If the discovery can be avoided and no further impacts will occur, the resource will be documented on California State Department of Parks and Recreation cultural resource record forms and no further effort will be required. If the project proponent wishes to continue work in the area, only work performed using hand tools or powered hand tools is allowed, work cannot

¹¹ Adapted from measures in the Marin Municipal Water District, Final Program Environmental Impact Report for the Biodiversity, Fire, and Fuels Integrated Plan (BFFIP EIR), October 2019.

¹² Adapted from measures in the Midpeninsula Regional Open Space District, Wildland Fire Resiliency Program Final Environmental Impact Report (WFRP EIR), May 2021.

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include ground disturbance and the work area can only be accessed on foot as determined acceptable by the qualified cultural resource specialist/archaeologist.

Alternatively, the qualified archaeologist and/or THPO or tribal monitor will evaluate the resource and determine whether it is:

- Eligible for the CRHR (and a historical resource for purposes of CEQA),
- A unique archaeological resource as defined by CEQA, and/or
- A potential tribal cultural resource (all archaeological resources could be a tribal cultural resource).

If the resource is determined to be neither a unique archaeological, an historical resource, nor a potential tribal cultural resource, work may commence in the area.

If the resource meets the criteria for either a historical resource, unique archaeological resource, and/or tribal cultural resource, work will remain halted in the buffered area around the resource. No work will occur within the buffered area except those methods previously discussed as determined acceptable by the qualified archaeologist and/or THPO or tribal monitor. After work is completed, all cultural resource delineators (e.g., flags or fencing) will be removed in order to avoid potential vandalism, unauthorized excavation(s), etc.

CUL-3 Cultural Resource Investigation¹³

Prior to implementation of vegetation management activities that have potential for intensive ground disturbance below the ground surface, significant heat from a burn, or use of heavy equipment off established roads and trails, a qualified archaeologist will conduct a records search and/or site-specific survey of the project areas where such disturbances could occur. Monitoring may also be identified by the qualified archaeologist as an appropriate measure to avoid damage or destruction of previously documented or potential resources (e.g., areas with a high sensitivity for buried resources) if conducting activities in the vicinity. Outreach with Graton Rancheria will be conducted as early as feasible to obtain information regarding culturally sensitive areas and/or the location of tribal cultural resources within the project areas. Graton Rancheria will be notified of the opportunity to attend any surveys or monitoring, if there is the known or potential presence for precontact resources. Any information provided by Graton Rancheria and/or tribal monitor(s) is confidential and exempt from public disclosure in accordance with statutory and regulatory requirements (Cal. Gov. Code § 6254(r), 6254.10; PRC § 5097.98(c); Cal. Code Regs. § 15120(d); 40 CFR § 1516.9; PRC § 21082.3 (c)(1)). Records searches, field survey results, and monitoring results will be shared with Graton Rancheria, as appropriate. Resources found during the records search, tribal outreach, survey, and/or monitoring will be flagged for avoidance with an appropriate buffer identified by the qualified archaeologist, or the qualified archaeologist may identify modifications to the prescriptions using only hand tools or powered hand tools and access by foot with no ground disturbance,

¹³ Adapted from measures in the Midpeninsula Regional Open Space District, Wildland Fire Resiliency Program Final Environmental Impact Report (WFRP EIR), May 2021

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provided it would avoid all impacts to the resources. Any resource found during the site survey will be documented on California State Department of Parks and Recreation cultural resource record forms and a survey report will be completed for every cultural resource survey completed. The specific requirements will comply with the applicable state or local agency procedures.

CUL-4 Native American Project Notification

For core projects subject to a CEQA determination or compliance and requiring Marin Wildfire Board of Directors' approval, Graton Rancheria will be notified and project maps and/or spatial data provided for projects that will potentially entail ground disturbance. Any input from Graton Rancheria regarding specific resources that could be affected will be considered during project implementation through the methods of avoidance as described in CUL-3.

CUL-5 Cultural Resources Monitoring

Based on the results of CUL-3 and -4, cultural resources monitoring may be conducted in order to avoid impacts to known resources. In addition to flagging the resource for avoidance (as described in CUL-3) if monitoring is conducted, a qualified archaeologist will be present during ground disturbance work to ensure the known resources are avoided and protected during project implementation, and if the resource is identified to be pre-contact archaeological and/or a tribal cultural resource, a tribal monitor will be invited to attend during the ground disturbance work.

ET-1 Environmental Training for Biological Resources^{14,15}

All crew members and contractors will receive training from a qualified registered professional forester (RPF) or biologist prior to beginning a treatment project where sensitive biological resources could occur in the work areas. The training will describe the appropriate work practices necessary to effectively implement the appropriate project design and implementation features and to comply with the applicable environmental laws and regulations. The training will include the identification, relevant life history information, and avoidance of potentially present special-status species with potential to occur; identification and avoidance of sensitive natural communities and habitats with the potential to occur in the treatment area; best management practices; and reporting requirements. As appropriate, the training will include protocols for work, such as specific trimming methods, where applicable. The training will instruct workers when it is appropriate to stop work and allow wildlife encountered during treatment activities to leave the area unharmed and when it is necessary to report encounters to a qualified RPF or biologist. The qualified RPF or biologist will immediately contact the

¹⁴ Adapted from measures in the California Board of Forestry and Fire Protection California Vegetation Treatment Program Final Environmental Impact Report (CalVTP EIR), November 2019.

¹⁵ Adapted from the measures in the East Bay Municipal Utility District (EBMUD) Practices and Procedures Monitoring and Reporting Plan Section 01 35 44 Environmental Requirements, August 2018

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California Department of Fish and Wildlife (CDFW) or United States Fish and Wildlife Service (USFWS), as appropriate, if any wildlife protected by the CE Species Act (CESA) or Federal Endangered Species Act (ESA) is encountered and cannot leave the site on its own (without being handled).

ES-1 Environmental Surveys for Rare Plants

Within areas where rare and special-status plants have a moderate to high potential to occur, based on desktop data of habitat types, known site-specific information, and the professional judgment of qualified biologists, surveys will be conducted prior to any activity that has the potential to damage perennial plants or is proposed to occur during the flowering season for the specific annual plant species that has the potential to damage the flowering body and seeds of these plant species. Activities that have the potential to damage the flowering body may include but may not be limited to mowing, weed whacking, off-road vehicle and heavy equipment use, discing, and prescribed burning.

Surveys for rare plants will occur for these species across the entire project footprint. Surveys will occur during the blooming period, if feasible, and will occur prior to work for the specified special-status plant. If blooming period surveys are not feasible and the sensitive plant in question can be keyed to genus outside of the blooming period, surveys will be conducted for all members of the genus. Individuals will be flagged for avoidance or modified methods. Physical avoidance will include flagging, fencing, stakes, or clear, existing landscape demarcations (e.g., edge of a roadway) to delineate the boundary of the avoidance area around the suitable habitat and removal after completion. For physical avoidance, a buffer may be implemented as determined necessary by the biologist. Sensitive species damage or loss avoidance may include implementation of appropriate species-specific no-activity buffers around sensitive resources. Temporary fencing will also be implemented, as and where determined necessary based on the species tolerance, if grazing is prescribed in the area of flagged individuals for avoidance or modified methods (WILD-1).

IP-1 Clean Equipment^{16,17}

All crew members, surveyors, and other personnel on site related to project activities will clean clothing, footwear, and equipment used during treatments of soil, seeds, vegetative matter, other debris or seed-bearing material, or water (e.g., rivers, streams, creeks, lakes) before entering the treatment area or when leaving an area with infestations of invasive plants, noxious weeds, known plant pathogens, or invasive wildlife.

¹⁶ Adapted from measures in the draft Ecologically Sound Practices Partnership, Ecologically Sound Practices for Vegetation Management (ESP) report, May 2021.

¹⁷ Adapted from measures in the California Board of Forestry and Fire Protection California Vegetation Treatment Program Final Environmental Impact Report (CalVTP EIR), November 2019.

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IP-2 Prevent the Spread of Invasive Species and Plant Pathogens^{18,19}

Segregate and treat soils and vegetation contaminated with invasive plant seeds and propagules. Treat, as appropriate, to prevent the spread of invasive plants. Treatment may include disposal on site within already infested areas, chipping or pile burning and mulching to eliminate viable seeds, or disposal at an approved cogeneration plant or green waste facility.

Minimize soil disturbance to the greatest extent possible to reduce the potential for introducing or spreading invasive plants or plant pathogens, to protect topsoil resources, and to reduce available habitat for the establishment of new invasive plants.

IP-3 Treat Invasive Plants Prior to Seeding^{20,21}

Schedule activities to maximize the effectiveness of control efforts and minimize introduction and spread of invasive plants as feasible, with consideration for project objectives and location (e.g., install and maintain fuel breaks, disc lines, and other work before non-native plants set seeds).

IP-4 Retain Native Plants^{22,23}

When removing vegetation, focus first on removing invasive and highly flammable species, and dead or diseased vegetation. Retain beneficial, low-fire risk, healthy native plant species whenever possible, except where the historic disturbance regime for the vegetation community has not been maintained or the vegetation poses a hazard to the public.

GEO-1 Erosion and Soils Loss Stabilization Measures²⁴

Soils will be stabilized if a vegetation management activity may leave less than 70 percent groundcover or native mulch/organic material.

¹⁸ Adapted from measures in the California Board of Forestry and Fire Protection California Vegetation Treatment Program Final Environmental Impact Report (CalVTP EIR), November 2019.

¹⁹ Adapted from measures in the draft Ecologically Sound Practices Partnership, Ecologically Sound Practices for Vegetation Management (ESP) report, May 2021.

²⁰ Adapted from measures in the California Board of Forestry and Fire Protection California Vegetation Treatment Program Final Environmental Impact Report (CalVTP EIR), November 2019.

²¹ Adapted from measures in the draft Ecologically Sound Practices Partnership, Ecologically Sound Practices for Vegetation Management (ESP) report, May 2021.

²² Adapted from measures in the California Board of Forestry and Fire Protection California Vegetation Treatment Program Final Environmental Impact Report (CalVTP EIR), November 2019

²³ Adapted from measures in the draft Ecologically Sound Practices Partnership, Ecologically Sound Practices for Vegetation Management (ESP) report, May 2021.

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For areas between 50 percent and 70 percent ground cover left:

- Sow native grasses and other suitable native vegetation on denuded areas where natural colonization or other replanting will not occur rapidly; use slash or chips to prevent erosion on such areas.
- Use surface mounds, depressions, logs, rocks, trees and stumps, slash and brush, the litter layer, and native herbaceous vegetation downslope of denuded areas to reduce sedimentation and erosion, as necessary to prevent erosion or slope destabilization.
- Install approved, biodegradable erosion-control measures and non-filament-based geotextiles (e.g., coir, jute) when:
- Conducting substantial ground-disturbing work (e.g., use of heavy equipment, pulling large vegetation) within 100 feet and upslope of currently flowing or wet wetlands, streams, lakes, and riparian areas;
- Causing soil disturbance on moderate to steep (10 percent slope and greater) slopes; and
- Removing invasive plants from stream banks to prevent sediment movement into watercourses and to protect bank stability.
- Sediment-control devices, if installed, will be certified weed-free, as appropriate. Sediment control devices will be inspected daily during active work to ensure that they are repaired and working as needed to prevent sediment transport into the waterbodies.

For areas with less than 50 percent ground cover:

- Any of the above measures
- Stabilize with mulch or equivalent immediately after project activities, to the maximum extent practicable.
- If project activities could result in substantial sediment discharge from soil disturbance, as determined by the qualified personnel (e.g., RPF), organic material from mastication or mulch will be incorporated onto at least 75 percent of the disturbed soil surface where the soil erosion hazard is moderate or high, and 50 percent of the disturbed soil surface where soil erosion hazard is low to help prevent erosion.
- Where slash mulch is used, it will be packed into the ground surface such as with heavy equipment so that it is sufficiently in contact with the soil surface.

Once work is completed, the areas will be inspected at least annually if accessible, until groundcover exceeds 70 percent or slopes have stabilized, as determined by a qualified professional. At that time, erosion-control and slope-stability devices may be removed.

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GEO-3 Soil Saturation and Rain Event Measures^{25,26,27}

The following measures will be implemented to prevent soil loss and erosion during rain events and following rain events:

- Shut down use of off-road heavy equipment, skidding, and truck traffic when soils become saturated (from rain event) and unable to support the machines. Saturated soil means that soil and/or surface material pore spaces are filled with water to such an extent that runoff is likely to occur.
- Off-road heavy equipment work will be suspended if the National Weather Service forecast is a “chance” (30 percent or more) of rain within the next 24 hours
- Ground disturbing work (e.g., use of heavy equipment, pulling large vegetation) will not occur during rain events (i.e., 0.5 inch of rain within a 48-hour or greater period ≥ 1.5 inches in 24 hours) and may resume when precipitation stops and soils are no longer saturated. Indicators of saturated soil conditions may include, but are not limited to: (1) areas of ponded water, (2) pumping of fines from the soil or road surfacing, (3) loss of bearing strength resulting in the deflection of soil or road surfaces under a load, such as the creation of wheel ruts, (4) spinning or churning of wheels or tracks that produces a wet slurry, or (5) inadequate traction without blading wet soil or surfacing materials.
- For activities that involve ground disturbing work and have not been stabilized, inspect for evidence of erosion after the first rain event (i.e., 0.5 inch of rain within a 48-hour or greater period) as soon as is feasible after the event. Any area of erosion that will result in substantial sediment discharge will be remediated within 48 hours.
- For activities that involve ground disturbing work, inspect project areas for the proper implementation of erosion control, as necessary and determined by the qualified personnel (e.g., RPF), prior to the rainy season. If erosion control measures are not properly implemented, the measures will be remediated prior to the first rainfall event.

GEO-4 Mulch Application

When applying mulch, limit the depth of the chips to 2 to 4 inches to the extent feasible to minimize risk of increasing smoldering in the event of a wildfire. Chips should not be piled up around the base of trees.

²⁵ Adapted from measures in the Marin Municipal Water District, Final Program Environmental Impact Report for the Biodiversity, Fire, and Fuels Integrated Plan (BFFIP EIR), October 2019.

²⁶ Adapted from measures in the Midpeninsula Regional Open Space District, Wildland Fire Resiliency Program Final Environmental Impact Report (WFRP EIR), May 2021.

²⁷ Adapted from measures in the California Board of Forestry and Fire Protection California Vegetation Treatment Program Final Environmental Impact Report (CalVTP EIR), November 2019

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HAZ-1 Leak Prevention and Spill Cleanup^{28,29}

The project proponent will, at a minimum, implement measures that address the following procedures related to the use of hazardous materials during work:

- Proper disposal or management of contaminated soils and materials (i.e., clean up materials)
- Daily inspection of vehicles and equipment for leaks and spill containment procedures
- Emergency response and reporting procedures to address hazardous material releases
- Emergency spill supplies and equipment will be available to respond in a timely manner if an incident should occur
- Response materials such as oil-absorbent material, tarps, and storage drums will be available in the plan area at all times during management activities and will be used as needed to contain and control any minor releases
- The absorbent material will be removed promptly and disposed of properly
- Use of secondary containment and spill rags when fueling
- Discourage “topping-off” fuel tanks
- Workers using fuels or other hazardous materials must be knowledgeable of the specific procedures necessary for hazardous materials cleanup and emergency response
- All diesel and gasoline powered equipment will be maintained per manufacturer's specification, and in compliance with all state and federal emission requirements

HAZ-2 Wildfire Risk Reduction^{30,31,32}

The following measures will be implemented during activities that involve the use of equipment that can generate sparks or heat:

- Maintain fire suppression equipment (e.g., shovel, extinguisher) in work vehicles and ensure workers are trained in use
- Closely monitor for ignited vegetation from equipment and tool use
- Train workers to properly handle and store flammable materials to minimize potential ignition sources

²⁸ Adapted from measures in the Marin Municipal Water District, Final Program Environmental Impact Report for the Biodiversity, Fire, and Fuels Integrated Plan (BFFIP EIR), October 2019.

²⁹ Adapted from measures in the California Board of Forestry and Fire Protection California Vegetation Treatment Program Final Environmental Impact Report (CalVTP EIR), November 2019.

³⁰ Adapted from measures in the Marin Municipal Water District, Final Program Environmental Impact Report for the Biodiversity, Fire, and Fuels Integrated Plan (BFFIP EIR), October 2019.

³¹ Adapted from the measures in the East Bay Municipal Utility District (EBMUD) Practices and Procedures Monitoring and Reporting Plan Section 01 35 44 Environmental Requirements, August 2018.

³² Adapted from measures in the California Board of Forestry and Fire Protection California Vegetation Treatment Program Final Environmental Impact Report (CalVTP EIR), November 2019.

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- Prohibit smoking in vegetated areas
- Avoid use of spark- and/or heat-generating equipment during high fire danger days (e.g., Red Flag Days and Fire Weather Watch)
- Outfit off-road diesel vehicles and equipment with spark arrestors
- Avoid metal string or blade weed trimmers
- Maintain one fire extinguisher for each chainsaw

HAZ-3 Pile Burning³³

The following measures will be implemented to reduce hazards associated with pile burning:

- Pile burning will only be allowed on days when fire is less likely to spread (e.g., wind speeds are less than 15 mph).
- Piles will only be constructed in areas where burning can be safely controlled, for example, on the flattest area possible. Bottoms of steep, vegetated hills will be avoided.
- Piles should be constructed with 10 feet of clearance around them.
- Piles will be set back from public roads and trails at a distance to minimize risk to the public or cordoned off from the public.
- All requirements of CAL FIRE, the local fire department, and/or the BAAQMD will be met, including any permit, notification, burn bans, and reporting requirements.
- Have fire suppression crews on-site during the fire season determined by CAL FIRE or the local fire department (typically mid-May to mid-November) during curtain and pile burns.
- Pile burning will adhere to BAAQMD criteria pollutant thresholds and Regulation 5 for open burning.

HAZ-4 Application of Herbicides³⁴

Projects will comply with all herbicide application regulations and ecologically sound integrated pest management principles.

- Herbicide containers will be triple rinsed with clean water at an approved site, and rinsate will be disposed of by placing it in the batch tank for application.
- Herbicide drift to public areas or sensitive areas will be minimized through the following measures:
- Application will cease when weather parameters exceed label specifications or when sustained winds at the site of application exceeds 7 miles per hour (whichever is more conservative).
- No herbicide will be applied during precipitation events or if precipitation is forecast 24 hours before or after project activities.

³³ Adapted from the measures in the East Bay Municipal Utility District (EBMUD) Practices and Procedures Monitoring and Reporting Plan Section 01 35 44 Environmental Requirements, August 2018.

³⁴ Adapted from measures in the California Board of Forestry and Fire Protection California Vegetation Treatment Program Final Environmental Impact Report (CalVTP EIR), November 2019.

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- Spray nozzles will be configured to produce the largest appropriate droplet size to minimize drift.
- Low nozzle pressures will be utilized.
- Spray nozzles will be kept within 24 inches of vegetation, if spraying.
- For herbicide applications occurring within or adjacent to public recreation areas, residential areas, schools, or any other public areas within 500 feet, signs will be posted at each end of herbicide application areas and any intersecting trails notifying the public of the use of herbicides at a minimum 1 day before and 1 day after herbicide use.

HAZ-5 Protect Vegetation and Special-Status Species from Herbicides³⁵

The project proponent will implement their approved integrated pest management (IPM) procedures when utilizing herbicides, or the following measures if no IPM is in place that addresses herbicide use in sensitive areas:

- Locate herbicide mixing sites in areas devoid of vegetation and where there is no potential of a spill reaching non-target vegetation or a waterway.
- Use only herbicides labeled for use in aquatic environments when working in riparian habitats or other areas where there is a possibility the herbicide could come into direct contact with water. Only hand application of herbicides will be allowed in riparian habitats and only during low-flow periods or when seasonal streams are dry.
- No terrestrial or aquatic herbicides will be applied within Watercourse and Lake Protection Zones (WLPZs) of Class I and II watercourses, if feasible. If this is not feasible, hand application of herbicides labeled for use in aquatic environments may be used within the WLPZ.
- No herbicides will be applied through any method within a 50-foot buffer of federal Endangered Species Act (ESA) or California ESA listed plant species or within 50 feet of dry vernal pools other than painted or sponged on applications to invasive and/or non-native species cut stumps.
- For spray applications in and adjacent to habitats suitable for special-status species, use herbicides containing dye (registered for aquatic use by California Department of Pesticide Regulation, if warranted) to prevent overspray.

³⁵ Adapted from measures in the California Board of Forestry and Fire Protection California Vegetation Treatment Program Final Environmental Impact Report (CalVTP EIR), November 2019.

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HAZ-5 Protect Vegetation and Special-Status Species from Herbicides³⁶

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- Use only herbicides labeled for use in aquatic environments when working in riparian habitats or other areas where there is a possibility the herbicide could come into direct contact with water. Only hand application of herbicides will be allowed in riparian habitats and only during low-flow periods or when seasonal streams are dry.
- No terrestrial or aquatic herbicides will be applied within Watercourse and Lake Protection Zones (WLPZs) of Class I and II watercourses, if feasible. If this is not feasible, hand application of herbicides labeled for use in aquatic environments may be used within the WLPZ.
- No herbicides will be applied through any method within a 50-foot buffer of federal Endangered Species Act (ESA) or California ESA listed plant species or within 50 feet of dry vernal pools other than painted or sponged on applications to invasive and/or non-native species cut stumps.
- For spray applications in and adjacent to habitats suitable for special-status species, use herbicides containing dye (registered for aquatic use by California Department of Pesticide Regulation, if warranted) to prevent overspray.

NOI-1 Minimization of Noise Disruption to Nearby Neighbors and Sensitive Receptors^{37,38}

All projects will comply with applicable local noise ordinances. All powered equipment and power tools will be used and maintained according to manufacturer specifications. All diesel- and gasoline-powered treatment equipment will be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers' recommendations.

Measures to minimize noise disruption to nearby neighbors and sensitive receptors will be implemented as needed. These measures may include but are not limited to:

- Using noise control technologies on equipment (e.g., mufflers, ducts, and acoustically attenuating shields)

³⁶ Adapted from measures in the California Board of Forestry and Fire Protection California Vegetation Treatment Program Final Environmental Impact Report (CalVTP EIR), November 2019.

³⁷ Adapted from San Francisco Public Utilities Commission (SFPUC), Standard Construction Measures, July 2015.

³⁸ Adapted from measures in the California Board of Forestry and Fire Protection California Vegetation Treatment Program Final Environmental Impact Report (CalVTP EIR), November 2019.

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- Locating stationary noise sources (e.g., pumps and generators) away from sensitive receptors
- Closing engine shrouds during equipment operations
- Shutting down equipment when not in use. Equipment will not be idled unnecessarily
- Operating heavy equipment during daytime hours if such noise would be audible to receptors (e.g., residential land uses, schools, hospitals, places of worship)
- Locating project activities, equipment, and equipment staging areas away from nearby noise-sensitive land uses (e.g., residential land uses, schools, hospitals, places of worship), to the extent feasible

NSO-4 Retain Dusky-footed Woodrat Nests^{39,40}

Dusky-footed woodrats are important prey for northern spotted owls. Wherever feasible, project activities will leave dusky-footed wood rat nests intact. If possible, maintain a 3-foot buffer of vegetation around dusky-footed woodrat middens.

NB-1 Nesting Bird Season Avoidance^{41,42,43,44}

Whenever possible, schedule work outside of the bird nesting season, which is generally from February 1 through July 31st. Not all species nest between the regulatory season, and active nests that are encountered year-round are protected.

³⁹ Adapted from measures in the Marin Municipal Water District, Final Program Environmental Impact Report for the Biodiversity, Fire, and Fuels Integrated Plan (BFFIP EIR), October 2019.

⁴⁰ Adapted from measures in the draft Ecologically Sound Practices Partnership, Ecologically Sound Practices for Vegetation Management (ESP) report, May 2021.

⁴¹ Adapted from measures in the Marin Municipal Water District, Final Program Environmental Impact Report for the Biodiversity, Fire, and Fuels Integrated Plan (BFFIP EIR), October 2019.

⁴² Adapted from measures in the California Board of Forestry and Fire Protection California Vegetation Treatment Program Final Environmental Impact Report (CalVTP EIR), November 2019.

⁴³ Adapted from measures in the draft Ecologically Sound Practices Partnership, Ecologically Sound Practices for Vegetation Management (ESP) report, May 2021.

⁴⁴ Adapted from Marin County Parks (MCP), Bird Nesting Survey Training Manual, 2017.

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NB-2 Nesting Bird Surveys^{45,46,47}

If work that has the potential to impact nesting birds commences between February 1 and July 31 (during the nesting season), a qualified biologist (whose qualifications have been approved by the MWPA or lead public agency) will conduct a pre-activity survey for nesting birds.

Nesting bird surveys are recommended during the nesting season for work involving mowing with heavy equipment, other vegetation (including tree) removal or limbing and trimming activities, and prescribed (broadcast and pile) burning. Low-impact activities including goat grazing, hand-pulling weeds, and herbicide application do not generally require nesting bird surveys. Determination of need for surveys for low-impact activities should be evaluated on a case-by-case basis in consultation with a qualified biologist or RPF.

Nesting bird surveys will occur within no more than 7 days prior to work to ensure that no nests will be disturbed during vegetation management work. If work pauses for more than 7 days, a follow-up survey will be conducted prior to the restarting of work. Appropriate survey areas will be determined by the qualified biologist depending on the project footprint, type of activity proposed, and suitable habitat for nesting birds. Surveys will be conducted during periods of high bird activity (i.e., 1-3 hours after sunrise and 1-3 hours before sunset). If the qualified biologist determines that visibility is significantly obstructed due to on-site conditions (such as access issues, rain, fog, smoke, or sound disturbance [including high wind]), surveys will be deferred until conditions are suitable for nest detection.

NB-3 Nesting Birds: Active Nest Avoidance^{48,49,50,51}

If active nests (i.e., presence of eggs and/or chicks) are observed in areas that could be directly or indirectly disturbed (including noise disturbance), a temporary, species-appropriate no-

⁴⁵ Adapted from measures in the Marin Municipal Water District, Final Program Environmental Impact Report for the Biodiversity, Fire, and Fuels Integrated Plan (BFFIP EIR), October 2019.

⁴⁶ Adapted from measures in the California Board of Forestry and Fire Protection California Vegetation Treatment Program Final Environmental Impact Report (CalVTP EIR), November 2019.

⁴⁷ Adapted from measures in the draft Ecologically Sound Practices Partnership, Ecologically Sound Practices for Vegetation Management (ESP) report, May 2021.

⁴⁸ Adapted from measures in the Marin Municipal Water District, Final Program Environmental Impact Report for the Biodiversity, Fire, and Fuels Integrated Plan (BFFIP EIR), October 2019.

⁴⁹ Adapted from measures in the California Board of Forestry and Fire Protection California Vegetation Treatment Program Final Environmental Impact Report (CalVTP EIR), November 2019.

⁵⁰ Adapted from measures in the draft Ecologically Sound Practices Partnership, Ecologically Sound Practices for Vegetation Management (ESP) report, May 2021.

⁵¹ A Class II watercourse has fish always or seasonally present offsite within 100 feet downstream, and or aquatic habitat for nonfish aquatic species. Class II watercourses excludes Class III waters that are tributaries to Class I waters

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disturbance buffer zone will be created around the nest sufficient to reasonably expect that breeding would not be disrupted. No work will occur inside the buffer zone.

The size of the buffer zone will be determined by the biologist, by taking into account factors including but not limited to the following:

- Noise and human disturbance levels at the site at the time of the survey and the noise and disturbance expected during the work;
- Distance and amount of vegetation or other screening between the site and the nest; and
- Sensitivity of individual nesting species and behaviors of the nesting birds, taking into account factors such as topography, visibility to source of disturbance, noise/vibration, nesting phase, and other case-by-case specifics.

Buffer sizes may be altered during the course of work at the recommendation of the biologist. Raptor nests are subject to additional protections, including during the “branching” phase, when fledglings begin to fly but do not fully leave the nest. Buffers will be maintained until young fledge or the nest becomes inactive, as determined by the qualified biologist.

If work must occur within the buffer, proceed to NB-4.

NB-4 Nesting Birds: Active Nest Monitoring^{52,53,54,55}

If an avoidance buffer is not achievable, a qualified biologist may monitor the nest(s) during work activities within the recommended nest buffer to document that no take of the nest (nest failure) has occurred related to work activities. If it is determined that work activity is resulting in nest disturbance, work should cease immediately.

⁵² Adapted from measures in the Marin Municipal Water District, Final Program Environmental Impact Report for the Biodiversity, Fire, and Fuels Integrated Plan (BFFIP EIR), October 2019.

⁵³ Adapted from measures in the California Board of Forestry and Fire Protection California Vegetation Treatment Program Final Environmental Impact Report (CalVTP EIR), November 2019.

⁵⁴ Adapted from measures in the draft Ecologically Sound Practices Partnership, Ecologically Sound Practices for Vegetation Management (ESP) report, May 2021.

⁵⁵ A Class II watercourse has fish always or seasonally present offsite within 100 feet downstream, and or aquatic habitat for nonfish aquatic species. Class II watercourses excludes Class III waters that are tributaries to Class I waters

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RB-1 Pework Survey^{56,57}

If vegetation management activities would (1) occur in trees with potential for roosting bat species (e.g., trees with a diameter at breast height of 10 inches or greater), (2) would include removal of trees where a bat could be roosting and (3) the work would commence between March 1 and July 31, during the bat maternity period, a pre-activity survey will be conducted for roosting bats within 2 weeks prior to work to ensure that no maternity roosting bats will be disturbed during work. This survey can be conducted concurrent with other surveys for other sensitive species. Potentially suitable bat roosting habitat within the work footprint that have been determined to be unoccupied by roosting bats, or that are located outside the avoidance buffer for active roosting sites may be removed. Roosting initiated during work is presumed to be unaffected, and no buffer would be necessary.

RB-2 Avoidance of Maternity Roosts and Day Roosts⁵⁸

If active maternity roosts or day roosts are found within the project site, or in areas subject to disturbance from work activities, avoidance buffers will be implemented. The buffer size will be determined in consultation with the qualified biologist or RPF.

RB-3 Bat Roosting Tree Removal – Seasonal Restrictions⁵⁹

If it is determined that a colonial maternity roost is potentially present, the roost will be avoided and will not be removed during the breeding season (March 1 through July 31) unless removal is necessary to address an imminent safety hazard.

Operation of mechanical equipment producing high noise levels (e.g., chainsaws, heavy equipment) in proximity to buildings/structures supporting or potentially supporting a colonial bat roost will be restricted to periods of seasonal bat activity (as defined above), when possible.

RB-4 Bat Roosting Tree Removal – Emergency Removals⁶⁰

Potential non-colonial roosts that must be removed in order to address a safety hazard, can be removed after consultation with a biologist. Removal will occur on warm days in late morning to afternoon when any bats present are likely to be warm and able to fly. Appropriate methods

⁵⁶ Adapted from the measures in the East Bay Municipal Utility District (EBMUD) Practices and Procedures Monitoring and Reporting Plan Section 01 35 44 Environmental Requirements, August 2018.

⁵⁷ Adapted from measures in the California Board of Forestry and Fire Protection California Vegetation Treatment Program Final Environmental Impact Report (CalVTP EIR), November 2019.

⁵⁸ Adapted from the measures in the East Bay Municipal Utility District (EBMUD) Practices and Procedures Monitoring and Reporting Plan Section 01 35 44 Environmental Requirements, August 2018.

⁵⁹ Adapted from the measures in the East Bay Municipal Utility District (EBMUD) Practices and Procedures Monitoring and Reporting Plan Section 01 35 44 Environmental Requirements, August 2018.

⁶⁰ Adapted from the measures in the East Bay Municipal Utility District (EBMUD) Practices and Procedures Monitoring and Reporting Plan Section 01 35 44 Environmental Requirements, August 2018.

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will be used to minimize the potential of harm to bats during tree removal. Such methods may include using a two-step tree removal process. This method is conducted over two consecutive days, and works by creating noise and vibration by cutting non-habitat branches and limbs from habitat trees using chainsaws only (no excavators or other heavy machinery) on Day 1. The noise and vibration disturbance, together with the visible alteration of the tree, is very effective in causing bats that emerge nightly to feed, to not return to the roost that night. The remainder of the tree is removed on Day 2.

SH-1 Riparian Resources – Project Design^{61, 62}

In riparian areas, treatments will be limited to removal of uncharacteristic fuel loads (e.g., removing dead or dying vegetation), trimming/limbing of woody species as necessary to reduce ladder fuels, and select thinning of vegetation to restore densities that are representative of healthy stands of the riparian vegetation types that are characteristic of the region. Allowable activities include hand removal (or mechanized removal where topography allows) of dead or dying riparian trees and shrubs, invasive plant removal, selective thinning, and removal of encroaching upland species. Mature, healthy trees will not be removed from a riparian corridor. Any activities conducted within a riparian corridor will be conducted so as to avoid alteration to a bed, channel, or bank of a waterway and all debris, including sawdust, chips, or other vegetative material, will be prevented from entering the bed, channel, or bank of a waterway, unless a permit from the California Department of Fish and Game under Section 1600 is obtained.

SH-3 Minimization of Pile Burning Disturbance^{63 64}

Pile burning will not be performed in sensitive habitats, such as serpentine-associated communities, wetlands, or riparian areas. If piles are burned on a different day than piled, the piles should be moved prior to burning to ensure wildlife is not present, such as by re-piling by hand, or a qualified biologist will inspect the pile prior to burning to ensure wildlife are not present. If moving or inspection of the piles is not feasible, the pile will be lit from one side and allowed to burn slowly to the other side, in order to allow any wildlife to relocate, rather than lighting the entire pile at once.

⁶¹ Adapted from measures in the California Board of Forestry and Fire Protection California Vegetation Treatment Program Final Environmental Impact Report (CalVTP EIR), November 2019.

⁶² Adapted from measures in the draft Ecologically Sound Practices Partnership, Ecologically Sound Practices for Vegetation Management (ESP) report, May 2021.

⁶³ Adapted from MCOSED. (2015, April). Vegetation and Biodiversity Management Plan. *Best Management Practices*.

⁶⁴ Adapted from California Department of Fish and Wildlife (CDFW). (2011). California Endangered Species Act Incidental Take Permit No. 2081-2011-046-03. *Wildfire Hazard Reduction and Resource Management Plan*. East Bay Regional Parks District

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TR-1 Emergency Access to Project Areas^{65 66}

The following measures will be implemented to maintain emergency access:

- At least one week prior to temporary lane or full closure of a public road for vegetation management-related work, the appropriate emergency response agency/agencies will be contacted with jurisdiction to ensure that each agency is notified of the closure and any temporary detours in advance and obtain all required encroachment permits
- In the event of any emergency, roads blocked or obstructed for maintenance activities will be cleared to allow the vehicles to pass.
- During temporary lane or road closures on public roads, flaggers equipped with two-way radios will be utilized where needed to control traffic. During an emergency, flaggers will radio to the crew to cease operations and reopen the public road to emergency vehicles.
- All authorized vehicles at the treatment site will be parked to not block roads when no operator is present to move the vehicle.

TR-2 Traffic Control Measures⁶⁷

Traffic control measures will be implemented to maintain traffic and pedestrian circulation on streets affected by project activities. The following measures may include:

- All traffic control devices will conform to the latest edition of the MUTCD, and as amended by the latest edition of the MUTCD California supplement.
- Any work that disturbs normal traffic signal operations and ensure proper temporary traffic control (lane shifts, lane closures, detours etc.) will be coordinated with the agency having jurisdiction, at least 72 hours prior to commencing worker.
- Flaggers and/or warning signage of work ahead.
- A minimum of twelve (12) foot travel lanes on public roads must be maintained unless otherwise approved.
- Maintaining access to driveways and private roads at all times unless other arrangements have been made.
- Traffic control devices will be removed from view or covered when not in use.
- Sidewalks for pedestrians will remain open if safe for pedestrians. Alternate routes and signing will be provided if pedestrian routes are to be closed.
- Scheduling truck trips during non-peak hours to the extent feasible

⁶⁵ Adapted from measures in the Marin Municipal Water District, Final Program Environmental Impact Report for the Biodiversity, Fire, and Fuels Integrated Plan (BFFIP EIR), October 2019.

⁶⁶ Adapted from measures in the Midpeninsula Regional Open Space District, Wildland Fire Resiliency Program Final Environmental Impact Report (WFRP EIR), May 2021.

⁶⁷ Adapted from the measures in the East Bay Municipal Utility District (EBMUD) Practices and Procedures Monitoring and Reporting Plan Section 01 35 44 Environmental Requirements, August 2018.

Appendix B: Mitigation, Monitoring, and Reporting Program

B.1 Introduction

This document is the Mitigation, Monitoring, and Reporting Program (MMRP) for the City of San Rafael Fire Department's San Rafael Hill and Deer Valley Fuel Reduction Project. This MMRP has been prepared pursuant to Section 21081.6 of the California Public Resources Code, which requires public agencies to "adopt a reporting and monitoring program for the changes made to the project or conditions of project approval, adopted in order to mitigate or avoid significant effects on the environment." An MMRP is required for the proposed project because the Initial Study (IS)/Mitigated Negative Declaration (MND) identified significant adverse impacts and mitigation measures have been identified to address these impacts. All revisions to mitigation measures that were necessary based on agency and public feedback have been incorporated into this MMRP.

B.2 Purpose of Mitigation Monitoring and Reporting Program

This MMRP has been prepared to monitor the implementation of mitigation measures (MM). The attached tables present the text of each MM, the timing of its planned implementation, the implementing entity, and the entity with monitoring responsibility. The numbering of the individual MMs follows the numbering sequence as found in the IS/MND.

B.3 Roles and Responsibilities

Unless otherwise specified herein, the lead agency, San Rafael Fire Department (SRFD), is responsible for verifying and monitoring implementation of the mitigation measures within its jurisdiction according to the specifications provided for each measure and for demonstrating that the action has been successfully completed, pursuant to Section 15097 of the State CEQA Guidelines. Implementation of the vegetation treatment project will also be managed by the SRFD.

The lead agency is responsible for overall administration of the project-specific MMRP and for verifying that staff members, associated fire agencies, or contractors have completed the necessary actions for each measure (i.e., appropriate amendments to the proposed ordinance).

B.4 Reporting

The lead agency will document and describe the compliance of the proposed project with the mitigation measures either by adapting the project-specific MMRP table or preparing a separate post-project implementation report.

B.5 Mitigation Monitoring and Reporting Program Table

The categories identified in Table 1 are identified below.

Applicable. The MMs listed below in Table 1 are applicable to the initial treatment and/or maintenance of the proposed project. A yes/no (Y/N) is placed next to the initial treatment and treatment maintenance to indicate if it is applicable to that stage of treatment. MMs not applicable to initial or maintenance treatments for the proposed project were removed from the tables.

Timing. This column identifies the time frame in which the MM will be implemented (e.g., prior to treatment, during treatment, etc.).

Implementing Entity. The implementing entity is the agency or organization responsible for carrying out the requirement. SRFD, Contractor, or SRFD & Contractor is indicated in this column to identify which entity will be the responsible party. In the future Marin Wildfire Prevention Authority (Marin Wildfire) may manage implementation of portions of the proposed project, but at this time it is assumed that the SRFD is managing implementation.

Verifying/Monitoring Entity. The verifying/monitoring entity is the agency or organization responsible for ensuring that the requirement is implemented. The verifying/monitoring entity may be different from the implementing entity.

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Table 1 Mitigation Measures Applicable to the San Rafael Hill and Deer Valley Fuel Reduction Project

CalVTP PEIR Mitigation Measures	Applicable? (Y/N)	Timing	Implementing Entity	Verifying/Monitoring Entity
Biological Resources				
Mitigation Measure BIO-1: Burrowing Owl Survey and Avoidance				
A burrowing owl survey will occur where off-road equipment use or pile burning is planned to occur in areas of suitable grassland habitat at the Deer Valley fuel reduction zone, as follows:				
<u>Pre-Treatment Survey</u>				
One pretreatment survey for active burrowing owl burrows will be performed within 7 days prior to the start of treatment activities that have the potential to crush or destroy burrows, for treatments that will occur outside of the nesting season (September 1 through January 31). If none are found, no additional pretreatment surveys are needed for activities outside of the nesting season.				
In accordance with project design and implementation feature (PDIF) NB-2, a pretreatment survey will be performed within 7 days prior to the start of noise-generating or other high disturbance activities during the nesting season (February 1 and August 31). The nesting surveys, which include specific searches for active burrows, will occur as often as needed. If during ongoing maintenance, it becomes clear that burrowing owls are not using the Deer Valley site outside of nesting season, no additional surveys would be required.				
A report detailing the pretreatment survey(s) will be submitted to Marin Wildfire and SRFD prior to treatments commencing.				
<u>Avoidance Measures</u>				
If any actively used burrows are encountered during surveys outside the nesting season (September 1 through January 31), a 50-foot buffer around active burrows would be delineated. A 250-foot buffer around actively nesting or suspected to be actively nesting burrows would be delineated between February 1 and August 31. The biologist will have the				
	Initial Treatment: Y	Prior to and during treatments	SRFD & Contractor	SRFD; Marin Wildfire
	Treatment Maintenance: Y			

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CalVTP PEIR Mitigation Measures	Applicable? (Y/N)	Timing	Implementing Entity	Verifying/Monitoring Entity
authority to establish larger buffers around active nests and to stop work if owls are showing signs of distress. Visible markers or flagging will be placed around the boundaries of the buffer and near active burrows to ensure that equipment and treatment activities do not collapse burrows.				
Mitigation Measure BIO-2: Monarch Survey and Avoidance Two species of milkweed are most likely to occur in the project site based on their identified range and field surveys: narrowleaf milkweed (<i>Asclepias fascicularis</i>) and showy milkweed (<i>Asclepias speciosa</i>). These plants begin to germinate as early as February and bloom through September. This mitigation measure is included to protect milkweed plants during their above-ground lifecycle, and particularly during the monarch butterfly metamorphosis time period (March through June). If any treatments occur from February through September that have a potential to damage milkweed species important as host plants to monarch butterflies and known to occur in Marin County (i.e., <i>Asclepias fascicularis</i>, <i>Asclepias speciosa</i>)—specifically pile burning, off-road equipment use, and string trimming in areas where native plants may be present at the Deer Valley fuel reduction zone—a pretreatment survey for milkweed with identifiable monarch butterfly eggs, caterpillars, or chrysalis will be conducted. If milkweed plants are observed or suspected to be occupied by immature monarch butterflies, the plants will be flagged for avoidance. During the milkweed growing and blooming period, if substantial populations of unoccupied milkweed are observed at the Deer Valley fuel reduction zone, treatment activities will be staggered to ensure that not all milkweed individuals present are impacted simultaneously, in accordance with Natural Resources Conservation Service Conservation Practices (Borders et al. 2012). If it becomes evident that there is no milkweed in the Deer Valley site, no additional surveys will be required.	Initial Treatment: Y Treatment Maintenance: Y	Prior to and during treatments	SRFD & Contractor	SRFD; Marin Wildfire
Cultural Resources				

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CalVTP PEIR Mitigation Measures	Applicable? (Y/N)	Timing	Implementing Entity	Verifying/Monitoring Entity
Mitigation Measure CUL-1: Review of Draft California State Department of Parks and Recreation Cultural Resource Record Form All California State Department of Parks and Recreation (DPR 523) cultural resource record forms drafted per PDIF CUL-2 for any precontact resources or Tribal Cultural Resources encountered during project activities will be provided to Graton Rancheria THPO for review and feedback. Graton Rancheria will provide any feedback on the draft DPR forms within 20 workdays or request an extension for review for another 20 workdays. After this review period, the final DPR 523 form will be submitted to the Northwest Information Center (NWIC) and to Graton Rancheria for their records.	Initial Treatment: Y Treatment Maintenance: Y	Prior to and during treatments	SRFD	SRFD; Marin Wildfire

Appendix C: Marin Wildfire & San Rafael Fire Department Findings Regarding the San Rafael Hill and Deer Valley Fuel Reduction Project

C.1 Introduction and Adoption of Mitigated Negative Declaration

The San Rafael Fire Department (SRFD), a department of the City of San Rafael, as the lead agency pursuant to the California Environmental Quality Act, Public Resources Code Section 21000 et seq. (CEQA) and the CEQA Guidelines (California Code of Regulations, Title 14, Chapter 3, Section 15000 et seq), has prepared a Mitigated Negative Declaration (MND) for the San Rafael Hill and Deer Valley Fuel Reduction Project (referred to as the Project). Because the SRFD is the lead agency and the Marin Wildfire Prevention Authority (Marin Wildfire) is the responsible agency, this document discusses the findings of both agencies.

Pursuant to CEQA Guidelines Section 15074, the SRFD and Marin Wildfire Board of Directors (Board), hereby find that the Project Mitigated Negative Declaration (including the Project Initial Study, hereinafter collectively referred to as the IS/MND) has been completed in compliance with CEQA. The SRFD and Marin Wildfire Board have reviewed and considered the information contained in the IS/MND and the comments received during the public review process, prior to approving the Project. Both agencies hereby find that the IS/MND reflects the independent judgment and analysis of the agencies, adopt these Findings, and concurrently adopt the IS/MND and approve the project.

As approved by the SRFD and Marin Wildfire Board, the project includes conducting vegetation management activities within Boyd Memorial Park, also known colloquially as San Rafael Hill, and within the Deer Valley open space area in the city of San Rafael. The following Findings are hereby adopted by both agencies pursuant to CEQA Guidelines Section 15074, in conjunction with the approval of the Project, which is set forth in Section C.7, below.

To the extent the Findings presented here summarize the IS/MND, the summary is intended to be consistent with, and is not intended to conflict with or change any aspect of the complete text of the analysis and mitigation measures discussed in the IS/MND. The findings presented here also summarize the mitigation measures (MMs) set forth in the Final IS/MND and agreed to by the SRFD and Marin Wildfire Board and incorporated into the Project. The MMs are summarized for convenience, but the summary is not intended to change any aspects of the complete text of the mitigation measures described in the Final IS/MND and adopted by the SRFD and Marin Wildfire Board.

C.2 CEQA Requirements Regarding Considering and Adopting a Mitigated Negative Declaration

Regarding adoption of an MND, CEQA Guidelines, Title 14, California Code of Regulations (CEQA Guidelines), Section 15074, state the following:

- a. Any advisory body of a public agency making a recommendation to the decision-making body shall consider the proposed negative declaration or mitigated negative declaration before making its recommendation.
- b. Prior to approving a project, the decision-making body of the lead agency shall consider the proposed negative declaration or mitigated negative declaration together with any comments received during the public review process. The decision-making body shall adopt the proposed negative declaration or mitigated negative declaration only if it finds on the basis of the whole record before it (including the initial study and any comments received), that there is no substantial evidence that the project will have a significant effect on the environment and that the negative declaration or mitigated negative declaration reflects the lead agency's independent judgment and analysis.
- c. When adopting a negative declaration or mitigated negative declaration, the lead agency shall specify the location and custodian of the documents or other material which constitute the record of proceedings upon which its decision is based.
- d. When adopting a mitigated negative declaration, the lead agency shall also adopt a program for reporting on or monitoring the changes which it has either required in the project or made a condition of approval to mitigate or avoid significant environmental effects.
- e. A lead agency shall not adopt a negative declaration or mitigated negative declaration for a project within the boundaries of a comprehensive airport land use plan or, if a comprehensive airport land use plan has not been adopted, for a project within two nautical miles of a public airport or public use airport, without first considering whether the project will result in a safety hazard or noise problem for persons using the airport or for persons residing or working in the project area.
- f. When a non-elected official or decision-making body of a local lead agency adopts a negative declaration or mitigated negative declaration, that adoption may be appealed to the agency's elected decision-making body, if one exists. For example, adoption of a negative declaration for a project by a city's planning commission may be appealed to the city council. A local lead agency may establish procedures governing such appeals.

C.3 Findings Regarding Independent Review and Judgment

Pursuant to CEQA Guidelines Section 15063, the SRFD and Marin Wildfire Board prepared an IS/MND to consider the potential environmental effects of the Project. The IS/MND describes the Project, analyzes the environmental impacts of the Project (including all phases of Project planning, implementation, and operation), and discusses MMs.

The Draft IS/MND was submitted to the Office of Planning and Research's State Clearinghouse and circulated for a 30-day public review period beginning on June 16, 2025 and ending on July 16, 2025 (SCH No 2025060794). During that time, the document was reviewed by various state and local agencies, as well as by interested individuals and organizations. Six comment letters were received during the public review period. As documented in Chapter 5 of the IS/MND, the agencies have considered and responded to all public comments raised during the comment period. Both agencies conclude that no new significant environmental concerns regarding the project were raised during the public comment period and that no new significant information has been added to the IS/MND.

The SRFD as well as the Marin Wildfire Board were provided access to a complete electronic copy of the Draft IS/MND, in June of 2025 and of the Final IS/MND as well as a copy of the Mitigation Monitoring and Reporting Plan (MMRP) as set forth in Appendix B in August of 2025. The SRFD and Marin Wildfire Board hereby find that the Final IS/MND reflects the SRFD's and Board's respective independent judgment, and that both agencies have independently reviewed and analyzed the Final IS/MND prior to taking any final action with respect to the proposed Project.

CEQA requires the lead agency approving a project to adopt a monitoring program for changes to the Project that it adopts or makes a condition of Project approval in order to mitigate or avoid significant effects on the environment and ensure compliance during Project implementation. A Project-specific MMRP has been prepared to serve this purpose, accompanies the Final IS/MND, and is hereby adopted by the SRFD and Marin Wildfire Board in connection with the adoption of the IS/MND and approval of the Project, pursuant to CEQA Guidelines Section 15097. The Project-specific MMRP includes details of the timing and responsibilities for completing the identified mitigation measures.

Various documents and other materials constitute the record of proceedings upon which the SRFD and Marin Wildfire Board base their findings and decisions contained herein. Documents related to this Project and the custodian of the administrative record are located at office of Marin Wildfire at 1600 Los Gatos Dr., Suite 345, San Rafael, CA 94903. The documents are available for download at <https://www.marinwildfire.org/project/san-rafael-hill-and-deer-valley-fuel-reduction-project>.

C.4 Findings Regarding the Project

Having received and considered the information contained in the Final IS/MND and the MMRP, the SRFD and Marin Wildfire Board hereby adopt the following Findings regarding Project impacts and MMs. The agencies find, on the basis of the whole record, that there is no substantial evidence that the Project will have a significant effect on the environment, that all impacts have been mitigated by measures identified in Appendix B of the IS/MND, and that the IS/MND reflects both agency's independent judgment and analysis.

Environmental issue areas for which MMs are proposed include: Biological Resources, Cultural Resources, and Tribal Cultural Resources. The environmental impacts that may result from the Project and require mitigation, along with the associated MMs for these impacts, are summarized below.

Findings Regarding Marin Wildfire Project Design and Implementation Features Applicable to the Proposed Project

The SRFD and Marin Wildfire Board hereby find that the Marin Wildfire standard project design and implementation features (PDIFs) described in Appendix A to the Final IS/MND have been incorporated into the project description and are required to be implemented during project treatments. As explained below in this document, inclusion of these PDIFs in the project guide the design and implementation of treatments in a manner that minimizes or avoids environmental impacts.

Findings Regarding Significant and Unavoidable Effects

The SRFD and Marin Wildfire Board hereby find, based on the whole record before it (including the IS/MND), that there is no substantial evidence that the project will have a significant and unavoidable effect on the environment.

Findings Regarding Significant Effects Mitigated to Less Than Significant Levels

It has been determined that MMs proposed in the Final IS/MND, and as set forth in the MMRP included in Appendix B to the IS/MND, will avoid or mitigate the effects shown below to less than significant levels for the resources summarized below. Refer to the pages associated with each resource for additional information on the analysis of effects.

Biological Resources (IS/MND Pages 2-32 to 2-43)

The burrowing owl has a moderate potential to occur within the Deer Valley fuel reduction zone. Ground disturbing activities (i.e., heavy equipment) in areas where burrowing owls could occur, notably grasslands, could result in the direct loss of active burrows and burn piles could obstruct the openings of burrows. Mitigation Measure BIO-1 requires a targeted survey for burrowing owls if off-road equipment use or pile burning is proposed in areas of suitable grassland habitat on the Deer Valley fuel reduction zone. With mitigation, the impact to burrowing owls would be less than significant.

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Monarch butterflies have a moderate to high potential to occur within the Deer Valley fuel reduction zone. Individual butterfly larvae or pupae could be killed during pile burning, string trimming, or crushed by equipment if present on milkweed, the species' host plant, and if work occurs during March to June when monarch butterfly eggs, caterpillars, and pupae could be present. Mitigation Measure BIO-2 requires a pretreatment survey if off-road equipment use, string trimming, or pile burning is proposed in the Deer Valley fuel reduction zone during February to September. Any observed individuals and the host plants would be flagged for avoidance. Impacts on monarch butterfly would not be significant with mitigation.

Other effects related to biological resources— including to other wildlife species, special status botanical plant species, riparian habitat or sensitive natural communities, state or federally protected wetlands, the movement of any native resident or migratory fish or wildlife species, or other local policies or ordinances—are less than significant. PDIFs implemented as part of the project reduce or avoid effects to these resources but MMs are not required. Refer to pages 2-32 to 2-42 for additional information.

Cultural Resources (IS/MND Pages 2-45 to 2-49)

Graton Rancheria commented that portions of the fuel reduction zones may be sensitive for encountering unrecorded Native American resources. As a result, a site-specific survey was conducted at the fuel reduction zones. Archaeological surveys did not identify any resources within the Deer Valley fuel reduction zone, but one new precontact archaeological resource was identified at the San Rafael Hill fuel reduction zone. The documented boundary of the precontact resource identified at the San Rafael Hill fuel reduction zone would be flagged by a qualified archaeologist and Graton Rancheria tribal monitor prior to treatment in the area to ensure adherence to the avoidance and monitoring measures and that flagging would be removed upon completion of the planned work per PDIF CUL-3. In accordance with Mitigation Measure CUL-1, site record documentation would be prepared (DPR 523 forms) and shared with Graton Rancheria for review and input (for precontact/Native American sites) prior to submittal to the Northwest Information Center. Impacts on archaeological resources would be less than significant with mitigation.

No NRHP or CRHR-listed resources or known cemeteries/burials were identified within or adjacent to the Deer Valley fuel reduction zone. The Robert Dollar House and Estate, an NRHP-listed resource, is located within the San Rafael Hill fuel reduction zone and no known cemeteries/burials were identified in this zone. The Robert Dollar House and Estate and manicured landscaping would not be subject to any of the fuel reduction or broadcast burn activities. Workers would participate in a cultural resource sensitivity and awareness training for both project sites prior to project implementation (PDIF CUL-1). Impacts on historic resources and human remains would be less than significant.

Tribal Cultural Resources (IS/MND Pages 2-106 to 2-107)

The precontact archaeological resource discussed in the Cultural Resource section above is a Tribal Cultural Resource (TCR), as identified by Graton Rancheria. The documented boundary of the precontact resource identified at the San Rafael Hill fuel reduction zone would be flagged

by a qualified archaeologist and a Graton Rancheria tribal monitor prior to treatment in the area to ensure adherence to the avoidance and monitoring measures and that flagging would be removed upon completion of the planned work per PDIF CUL-3. If any culturally sensitive resources or unknown TCRs were impacted by ground disturbance associated with the project treatment, the impacts would be significant. Workers would participate in a cultural resources awareness and sensitivity training prior to proposed project implementation (PDIF CUL-1). Should a previously unidentified precontact archaeological site and/or TCR be discovered, work would halt in the area and the resource fully avoided (PDIF CUL-2). A DPR 523 form would be drafted by a qualified archaeologist (PDIF CUL-2) and shared with Graton Rancheria for review and feedback prior to finalizing and submitting to NWIC per Mitigation Measure CUL-1. Impacts would be less than significant with mitigation.

Findings Regarding Less than Significant Effects and No Impacts

It has been determined that effects to the following resources would be less than significant or have no impact, and no mitigation is needed: Aesthetics (IS/MND pages 2-3 to 2-6); Agriculture and Forestry (IS/MND page 2-8); Air Quality (IS/MND pages 2-13 to 2-21); Energy (IS/MND pages 2-50 to 2-51); Geology and Soils (IS/MND pages 2-55 to 2-59); Greenhouse Gas Emissions (IS/MND pages 2-63 to 2-69); Hazards and Hazardous Materials (IS/MND pages 2-72 to 2-76); Hydrology and Water Quality (IS/MND pages 2-79 to 2-83); Land Use and Planning (IS/MND pages 2-84 to 2-85); Mineral Resources (IS/MND page 2-86); Noise (IS/MND pages 2-90 to 2-92); Population and Housing (IS/MND pages 2-93 to 2-94); Public Services (IS/MND pages 2-97 to 2-98); Recreation (IS/MND pages 2-100 to 2-101); Transportation (IS/MND pages 2-102 to 2-104); Utilities and Service Systems (IS/MND pages 2-109 to 2-110); and Wildfire (IS/MND pages 2-111 to 2-114).

C.5 Findings Related to Potential Growth Inducing Impacts

The Project exclusively involves vegetation and wildfire fuels treatments and would not affect housing, economic development, transportation, social services or any other social resource that could influence growth in the project site or nearby communities.

C.6 Findings Related to MND Recirculation and EIR Preparation

CEQA Guidelines section 15073.5 requires an IS/MND to be recirculated if substantial revisions are made to the document after the public is notified of the document's availability, but prior to its adoption. Pursuant to section 15073.5(b), revisions to an MND are only considered to be "substantial revisions" if they identify a new, avoidable significant effect which can only be addressed by the addition of new mitigation measures or project revisions, or if they reflect a determination by the lead agency that the mitigation measures and project revisions proposed in the IS/MND will not reduce the project's potential effects to less than significant levels, such that new mitigation measures or project revisions are necessary. The SRFD and Marin Wildfire Board hereby find that revisions to the IS/MND made following circulation of the Draft IS/MND

for public review, and as reflected in the Final IS/MND, do not constitute “substantial revisions,” and therefore IS/MND recirculation is not required. The IS/MND revisions contained in the Final IS/MND do not identify the need for new project revisions or mitigation measures, and the Final IS/MND demonstrates that all Project impacts will be mitigated to less-than-significant levels. As demonstrated by the responses to comments included in Chapter 5 of the Final IS/MND, revisions made since publication of the Draft IS/MND merely reflect the addition of information designed to clarify, amplify, and/or make insignificant modifications of the IS/MND. As such, the SRFD and Marin Wildfire Board find that IS/MND recirculation is not required.

Consistent with section 15073.5(d) and as reflected in the IS/MND, the SRFD and Marin Wildfire Board further finds that based upon the whole record, there is no evidence that the Project may cause significant environmental impacts that cannot be mitigated or avoided. As such, Marin Wildfire is not required to prepare an Environmental Impact Report for the Project.

C.7 Findings Related to Project Approval

Based on the foregoing Findings and the information contained in the record, including the IS/MND and all comments received, the SRFD and Marin Wildfire Board find with respect to the Project:

1. There is no substantial evidence that the Project will have a significant effect on the environment.
2. The IS/MND reflects the SRFD’s and Marin Wildfire Board’s independent judgment and analysis.

The SFRD and Marin Wildfire therefore take the following actions:

1. Approve the Initial Study and Adopt the Final MND for the Project as described above.
2. Approve and incorporate into the Project all Project elements and all MMs described in the Project-specific MMRP.
3. Adopt these Findings in their entirety, as set forth herein.
4. Having independently reviewed and analyzed the Initial Study, as well as the Mitigated Negative Declaration and all comments received on these documents, and having adopted these Findings, the SRFD and Marin Wildfire Board approve the San Rafael Hill and Deer Valley Fuel Reduction Project.