LEAPS | THE HYDRO COMPANY

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June 28, 2019

The Honorable Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street NE
Washington, DC 20426

RE: **Lake Elsinore Advanced Pumped Storage Project**
FERC Project No. 14227
Submittal of Study 28 Fire Study

Dear Secretary Bose,

The Nevada Hydro Company, (the "Company") filed an application for an original license with the Federal Energy Regulatory Commission ("Commission") for the Lake Elsinore Advanced Pumped Storage facility, FERC Project No. 14227 (the "Project") on October 2, 2017. In response to the Commission's June 15, 2018 request for additional studies, January 22, 2019 request for additional information, and May 13, 2019 letter approving the Fire Study Plan, with modifications, the Company herein submits its Fire Study Report (Study 28).

The Commission's May 13, 2019 letter requested the Company to file the results of the modified Fire Study by June 30, 2019. The Company has actively solicited information required to complete the Fire Study Report from the U.S. Department of Agriculture, Forest Service ("USFS") and the enclosed study report represents the Company's best efforts to complete the study in the absence of the USFS information. The Company notes that there are a small number of yellow highlights throughout the document – particularly Section 6 and Section 7 – where additional operation-specific information is needed from the USFS.

While more detailed information specific to USFS operations and capabilities will be helpful to understand the impact of the proposed project on USFS fire suppression capabilities, the information provided in the Study Report submitted herewith addresses the objectives of the Commission's June 30, 2019 study request letter by including a robust analysis of fire risk and fuel loading, potential project effects on fire suppression activities, and the availability of the upper reservoir water for firefighting. The Company will update appropriate parts of this study report when the USFS provides the additional USFS-specific operational information.

For reference, the Company has included a comment response matrix that describes all of the comments and directives received from the Commission and USFS to date, and describes how each has been addressed in the previously filed Fire study plan and in this Fire Study Report.

Please let me know if you have any questions or require clarifications to any aspect of this filing.

Sincerely,

/s/ David Kates
David Kates
On behalf of The Nevada Hydro Company
David Kates

Attachments

FIRE STUDY: LAKE ELSINORE ADVANCED PUMP STORAGE PROJECT (PROJECT NUMBER 14227-003)

Riverside County, CA

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JUNE 28, 2019

PROJECT NO. 1855400727

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ACRONYMS AND ABBREVIATIONS

BI	Burning Index
BLM	Bureau of Land Management
BTU	British Thermal Units (used to describe flame and heat for fire – larger numbers = larger amounts of flame and heat)
CAL FIRE	California Department of Forestry and Fire Protection
CEC	California Energy Commission
CNF	Cleveland National Forest
CPUC	California Public Utilities Commission
DPA	Direct Protection Areas
EIS	Environmental Impact Statement
FDOP	Fire Danger Operation Plan
FERC	Federal Energy and Regulatory Commission
FFS	Forest Fire Stations
FLA	Final License Application
FRAP	Fire and Resource Assessment Program
HFTD	High Fire-Threat District
HHZs	High Hazard Zones
IC	Ignition Component
kV	kilovolt
LEAPS	Lake Elsinore Advanced Pumped Storage
MAST	Mountain Area Safety Task Force
NCEP	National Centers for Environmental Prediction
NDFD	National Digital Forecast Database

ACRONYMS AND ABBREVIATIONS (CONTINUED)

Nevada Hydro	The Nevada Hydro Company
NFFL	Northern Forest Fire Laboratory
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NWS	National Weather Service
OAL	Office of Administrative Law
OES	Office of Emergency Services
OSFM	Office of the State Fire Marshal
PPE	personal protective equipment
PSPS	Public Safety Power Shutoff
ROD	Record of Decision
RRU	Riverside Unit
RWQCB	Santa Ana Regional Water Quality Control Board
SCE	Southern California Edison
SDG&E	San Diego Gas and Electric
USFS	United States Forest Service
USGS	United States Geological Survey
WFAS	Wildland Fire Assessment System
WFDR	Wildfire Danger Rating

1.0 INTRODUCTION

The Lake Elsinore Advanced Pumped Storage (LEAPS) Project (Project No. 14227) is an energy generation and storage project, proposed in Riverside County, San Diego County, and Orange County. The project area – located in and around the Cleveland National Forest (CNF) – has been affected by wildfires, both historically and more recently (e.g., the Hope Fire of 2018). Additionally, residential development, particularly in the last few years, has occurred along the border of the CNF creating additional hazards within the wildland-urban interface.

A Fire Study was requested (Fire Study 28) by the U.S. Forest Service (USFS) and Decker Landowners to assess fire risk and fuel loading, potential project effects on fire suppression efforts, and availability of the upper reservoir for firefighting. This Fire Study has been prepared for The Nevada Hydro Company, Inc. (Nevada Hydro) to satisfy the study requested by the Federal Energy Regulatory Commission (FERC) in its study determination letter dated June 15, 2018 (FERC 2018)

The objective of the Fire Study is to assess the potential fire risk associated with the proposed LEAPS Project. Specifically, the Fire Study: 1) identifies and quantifies the extent of hazardous fuel loading near the project area; 2) describes how proposed project infrastructure could impact fire suppression efforts; and 3) provides an analysis of proposed project operations' impacts on the availability of upper reservoir water for firefighting. The Fire Study is intended to provide FERC and the USFS with the opportunity to assess hazardous fuel loading and fire risk as a part of the project's environmental review. In addition, it will provide the information necessary to recommend design and mitigation measures that may be needed to reduce biomass on proposed project lands and mitigate for impacts to fire suppression efforts.

2.0 BACKGROUND

In 2004, the Elsinore Valley Municipal Water District and Nevada Hydro filed an application for an original license with FERC for the construction and operation of the LEAPS Project, an energy generation and storage project located in Riverside County, San Diego County, and Orange County. As originally proposed, the LEAPS Project would occupy approximately 2,412 acres of Federal lands and would include a lined upper reservoir with a dam and dike and an underground powerhouse located in Riverside County as well as a 500-kilovolt (kV) transmission line linking two existing transmission lines to the north and south of the Project area extending into San Diego County and Orange County. A staff alternative – consisting of modifications to the original design as requested by FERC and USFS – was also considered in the 2007 Final EIS. This staff alternative included an alternate location for the upper reservoir, which would provide the same usable storage with a smaller total footprint, as well as alternate alignments for the transmission line to avoid crossing private inholdings in the CNF (thereby avoiding potential conflicts with USFS fire suppression activities).

On June 1, 2017, Nevada Hydro filed a Notice of Intent (NOI) to file a license application and a draft license application for the LEAPS Project (Project No. 14227), which had been substantially re-designed to be similar to the staff alternative that was assessed in the 2007 Final EIS. The LEAPS Project as presented in the Final License Applicatoin (FLA) proposes similar facilities and alignments as the staff alternative in the 2007 Final EIS, with a several notable distinctions. Nevada Hydro is now proposing to develop two separate primary transmission lines. One primary line follows a northern route that would connect only to Southern California Edison's (SCE's) 500-kV Talega-Escondido transmission line, and the other is a southern route that would connect only to San Diego Gas and Electric's (SDG&E's) 230-kV Valley-Serrano transmission line. The alignment of the primary transmission lines is similar to the alignments reviewed in the 2007 Final EIS; however, the Case Springs substation has been sited in the CNF, rather than Camp Pendleton. The new substation location was chosen in consultation with USFS after the Record of Decision (ROD) for the 2007 Final EIS for Project No. 11858 was issued. After Nevada Hydro filed a FLA in October 2017, study requests were filed by Federal and state agencies, Native American tribes, and non-governmental organizations.

Among the numerous study requests, FERC's June 15, 2018 study plan determination requires Nevada Hydro to complete this Fire Study. Nevada Hydro submitted a draft Fire Study Plan to the Commission on September 13, 2018. On January 22, 2019, FERC staff requested additional information from Nevada Hydro regarding consultation with the USFS on the Fire Study Plan. On April 11, 2019, the USFS filed comments on the Fire Study Plan with the Commission. On May 13, 2019, FERC issued a letter approving the Fire Study Plan and requiring modifications requested by the USFS in its April 11 letter. FERC's May 13, 2019 letter directed Nevada Hydro to complete the Fire Study and submit the results in a Fire Study Report by June 30, 2019.

This Fire Study Report is submitted in compliance with FERC's May 13, 2019 letter. Limited sections of this Fire Study Plan require information from the USFS, which has been requested by Nevada Hydro, but which has not been provided by the USFS to date. These narrative sections are highlighted in yellow in this Final Study Report. Nevada Hydro will update these sections as information from the USFS becomes available.

3.0 METHODOLOGY

Readily accessible federal, state, and interagency sources were used to gather data in an effort to summarize the physical (e.g., location, population, climate, etc.) and biological (e.g., vegetation, wildfire history, etc.) characteristics within and immediately surrounding the project area. In addition, information was also gathered from federal, state, and county agencies through inquiries via email and telephone communications.

Methods for specific characteristics discussed in Physical Setting, Biological Setting, and Fire Study Elements, below, are described in more detail under each heading. Sources used are provided in **Section 9.0** or are indicated in text with a corresponding URL.

4.0 PHYSICAL SETTING

4.1 Location

The LEAPS Project is located within an approximately 2,412-acre site, the majority of which is located in Riverside County. Portions of the transmission line extend into San Diego County and Orange County (**Figure 1**). The proposed project is located within and in immediate vicinity of the CNF, a 460,000-acre parcel of USFS-managed public land situated in Riverside County, San Diego County, and Orange County in Southern California. CNF is a highly dynamic environment, with rapid residential growth nearby, varied topography, and a Mediterranean climate typical of the region.

The proposed transmission alignments cross primarily undeveloped and publicly-held lands in the CNF characterized by forests, chaparral, and coastal sage habitats, sometimes near single-family homes or other land uses, such as a private airstrip and the Wildomar Off Highway Vehicle (OHV) Area (FERC 2007). There are three alternative routes for the northernmost transmission line segment that will connect to the existing Valley Serrano (V-S) transmission line.

- FERC Alternative 1 - A route remains in the CNF and ties to the V-S line within the CNF;
- FERC Alternative 2 - A route passing through Alberhill Ranch, tying to the V-S line above Lee Lake; and
- FERC Alternative 3 - A route passing through the undeveloped area between Glen Eden Road and Horse Thief Canyon Road.

Communities on the east-facing side of the CNF and the project area include Lake Elsinore, El Cariso (located southwest of Lake Elsinore and west of Ortega Highway), and Lakeland Village (located south of Lake Elsinore and east of Ortega Highway). On the western portion of the project area, a small residential community called Rancho Capistrano is located on a private in-holding in the CNF.

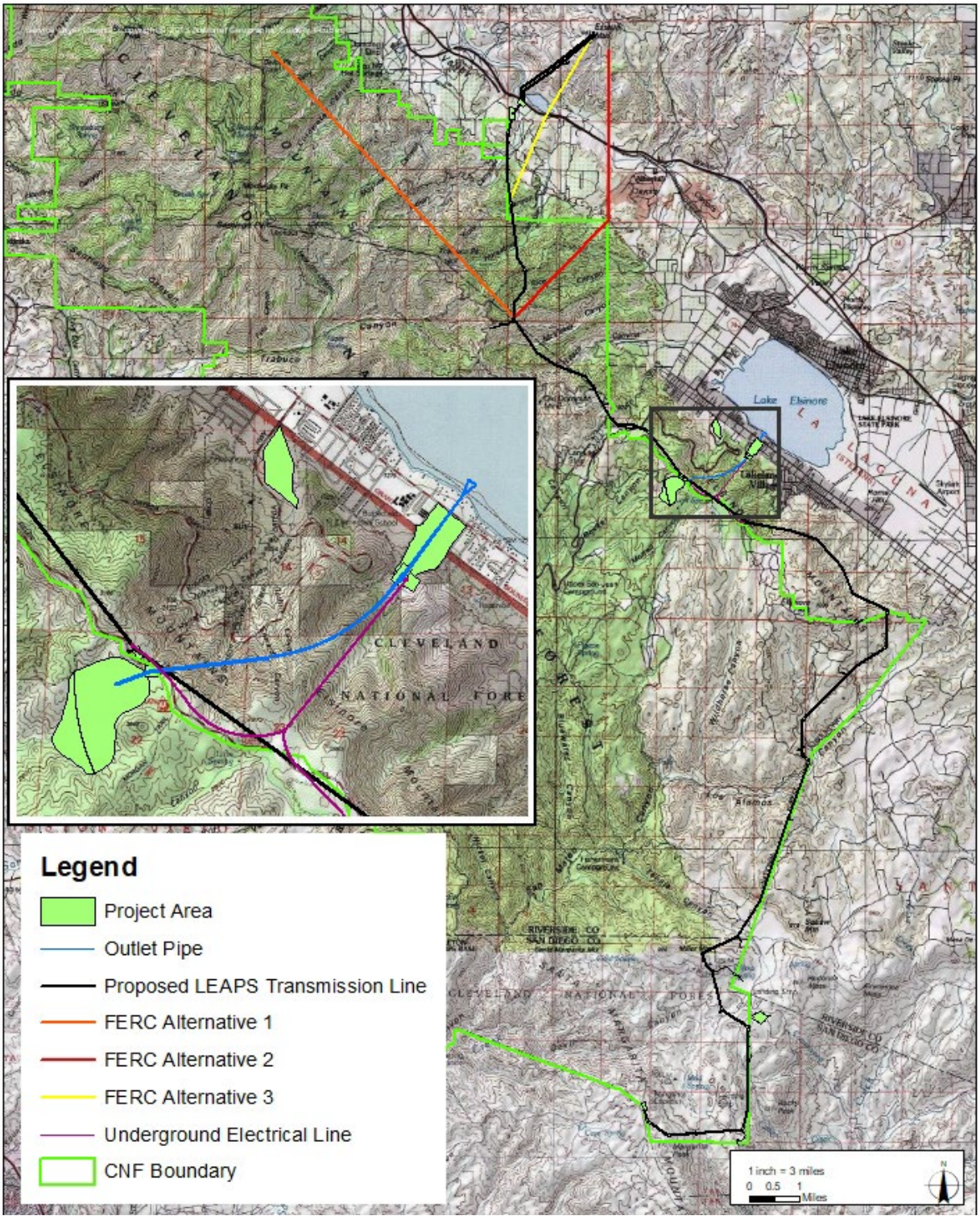

Figure 1. Location of the Proposed Lake Elsinore Advanced Pumped Storage Project

4.2 Regional Land Use

Residential development and significant population growth have occurred in the vicinity of the project area in recent years, indicating potentially greater fire risk than was analyzed in the 2007 FEIS for this proposed project. U.S. Census Bureau and Riverside County data was used to characterize the land use and population trends over approximately the last decade.

The General Plan Land Use Map depicts Riverside County as being predominately rural and natural in character, with Rural, Agricultural, Rural Community and Open Space General Plan Foundation Component-designated lands account for 94% of the entire unincorporated area (Riverside County 2017a). The project area is located in the far western portion of Riverside County, where it borders Orange County to the west and San Diego County to the south, in what is shown in the General Plan as City Boundary, Community Development, Rural Community, and Open Space (Riverside County 2017a). CNF spans parts of Riverside County, San Diego County, and Orange County. Orange County's eastern area is largely unincorporated.

From 2000 to 2010, the population of Lake Elsinore, where the proposed LEAPS Project powerhouse will be situated, grew by over 79%, adding more than 22,800 people (U.S. Census Bureau 2012). Estimates for the 2017 population are, on average, 24% higher than the 2010 census count at over 64,300 people (U.S. Census Bureau 2012). The region as a whole is growing rapidly; Riverside County was fifth in in the State of California for population growth from 2010 to 2016, San Diego County was eleventh, and Orange County was fourteenth (Riverside County Economic Development Agency 2019). Further, according to Riverside County's economic development estimates, there are multiple housing opportunity block groups bordering the CNF on the southeastern and eastern boundaries, showing continued potential for residential growth in the area (Riverside County 2019). Several communities in Riverside County, San Diego County, and Orange County (including Lake Elsinore) were listed in the Federal Register in 2001 as high risk communities identified within the wildland-urban interface (CAL FIRE Office of the State Fire Marshal [OSFM] 2019).

4.3 Climate

Weather is the most variable factor affecting wildfire behavior,[1] with some geographic locations having a favorable overall climate for wildfire activity. Predominant wind directions also play a role in influencing a wildfire's path. Southern California is considered to have a Mediterranean climate characterized by hot summers and mild winters. The majority of the rainfall in this region comes in the winter months, with very little precipitation occurring throughout the remainder of the year. Seasonal

[1] The three variables affecting wildfire behavior include weather, topography, and fuels.

winds know as Santa Anna Winds, that come in late summer and autumn also greatly affect the region's climate. The Santa Anna Winds are strong downslope winds that originate inland and push hot dry air towards the California Coast, often bringing the hottest temperatures of the year (NOAA 2019a). **Table 1** provides long-term climate data for the region surrounding the project area in Riverside County.

Table 1. 1981-2010 Temperature Normals at Lake Elsinore, CA (USC00042805)

Month	PRECIP (IN)	AVG MIN TMP (°F)	AVG TMP (°F)	AVG MAX TMP (°F)
January	3.04	39.3	52.6	65.9
February	2.91	40.9	54.2	67.5
March	1.77	43.4	57.9	72.3
April	0.62	46.8	62.0	77.3
May	0.14	52.4	68.1	83.9
June	0.02	56.6	73.8	91.1
July	0.21	61.9	79.8	97.7
August	0.01	62.7	80.8	98.9
September	0.24	59.1	76.4	93.6
October	0.61	52.3	67.8	83.3
November	0.86	43.5	58.4	73.3
December	2.01	38.2	51.8	65.3

Source: NOAA 2019b.
Notes: The Lake Elsinore National Climatic Data Center (NCDC) Station (USC00042805)

Wildfire conditions, particularly in Southern California, are generally considered most dangerous (i.e., vegetation and weather are most flammable) during late summer and early fall months, with a sharp decrease in precipitation and a corresponding increase in overall temperature (**Table 1**). However, it is likely that future conditions could be even warmer and drier during the spring and winter months as a result of climate change. Nature Conservancy climate models comparing long-term average climate data between 1961-1990 to modeled climate data in 2040-2069 predict an approximately 5-degree increase in annual temperature throughout the state with little-to-no increase in annual precipitation (**Figure 2**) (TNC 2019).

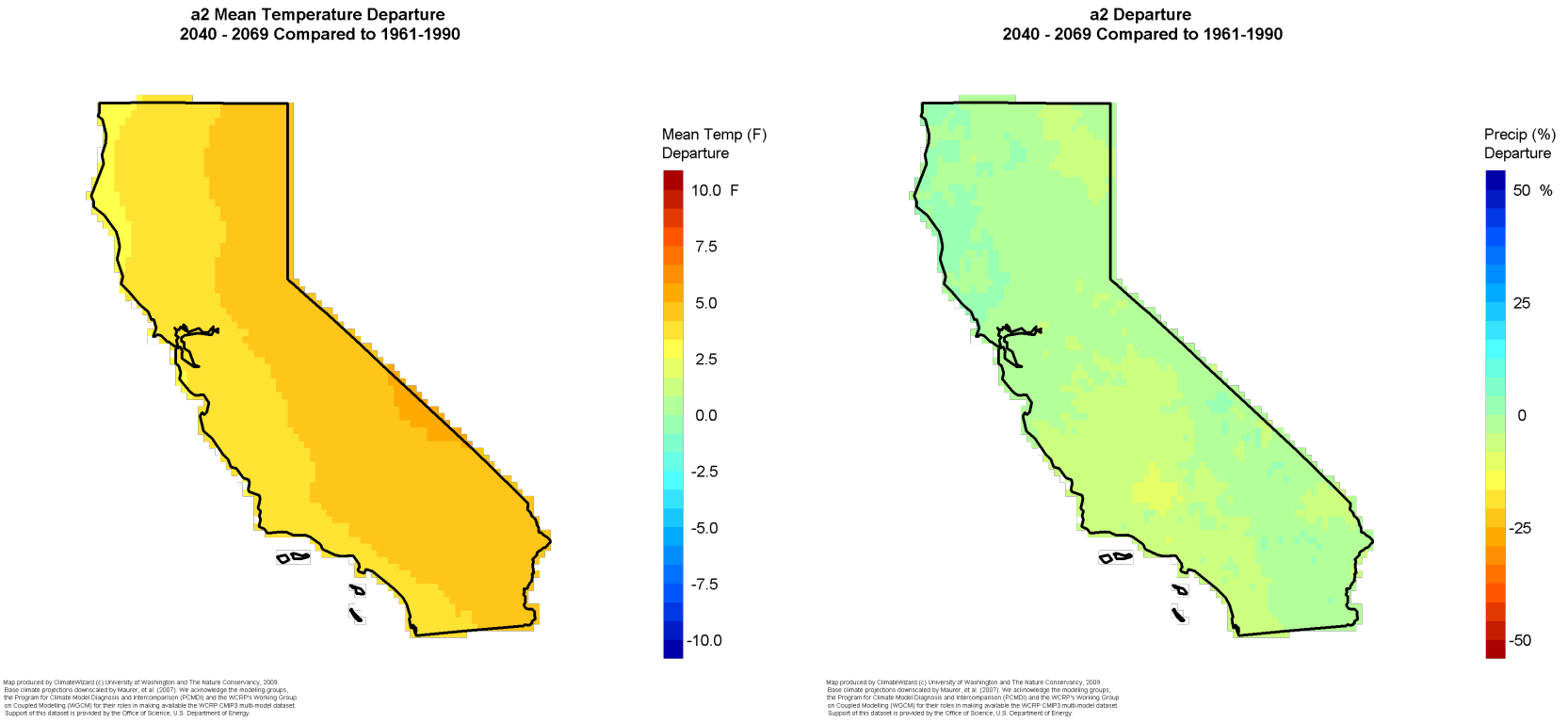

Figure 2. Long-Term Modeled Climate Data Temperature Comparison (left) and Precipitation Comparison (right) for 2040-2069 and 1961-1990 (The Nature Conservancy 2019)

4.4 Topography

Topography influences the movement of air, directing the course of wildfire. Slope is a key topographic feature in fire behavior. The project area is located within the USGS Lake Elsinore and Alberhill topographic quad. According to USGS 7.5-minute topographic maps, the topography of the area surrounding the LEAPS Project is highly varied and consists of mountainous regions, large valleys, and high elevation plateaus. The area directly within the LEAPS Project boundary has an elevation ranging from approximately 2,600 to 2,880 feet above mean sea level (MSL). The LEAPS Project stretches across a canyon that serves as a tributary to Decker Canyon to the southwest.

The project area is located within the larger setting of the CNF, where topography varies greatly on a larger scale. A general statement about the area's topography cannot be presented in a way that is meaningful in describing fire hazard severity. However, it can be stated that during times of low fuel moisture, areas with complex topographies can be more prone to the spread of large fires. Indeed, this was seen during the Holy Fire in 2018, when the majority of the project area burned (**Section 6.1**).

4.5 Existing Regional Infrastructure

The California Energy Commission (CEC) provides publicly available maps and GIS data of existing electrical infrastructure throughout the State of California. Within an approximately 20-mile radius of Lake Elsinore, the following electric infrastructure is currently in place: one 500-kV transmission line; one 230-kV transmission line; approximately seven 115-kV transmission lines; and approximately eight 66-kV transmission lines (**Figure 3**). The existing 40-mile 500-kV line is owned by SCE and is the line that the northern portion of the proposed LEAPS transmission line would tie into (i.e., the existing V-S transmission line).

5.0 BIOLOGICAL SETTING

5.1 Ecological Setting

The project area is located within the Southern California/Northern Baja Coast Ecoregion (Ecoregion 85), and is in the Level IV Santa Ana Mountains Ecoregion (85m) (Griffith et al. 2016). The Santa Ana Mountains Ecoregion is characterized by very steep terrain with narrow canyons and rounded summits. Elevations in the area range from approximately 700 to 5,687 feet at Santiago Peak. The Santa Ana Mountains Ecoregion is modified moderately by marine air, and generally is hotter and drier on the inland side. Annual precipitation is approximately 14 to 24 inches annually, and the soil moisture regime is considered xeric. Natural vegetation includes mixed and chamise chaparral, coastal sage scrub, coast live oak, and areas of annual grassland. Some canyon live oak occurs, big cone Douglas-fir is found at the heads of some canyons, and sparse stands of Coulter pine are at high elevations (Griffith et al. 2016).

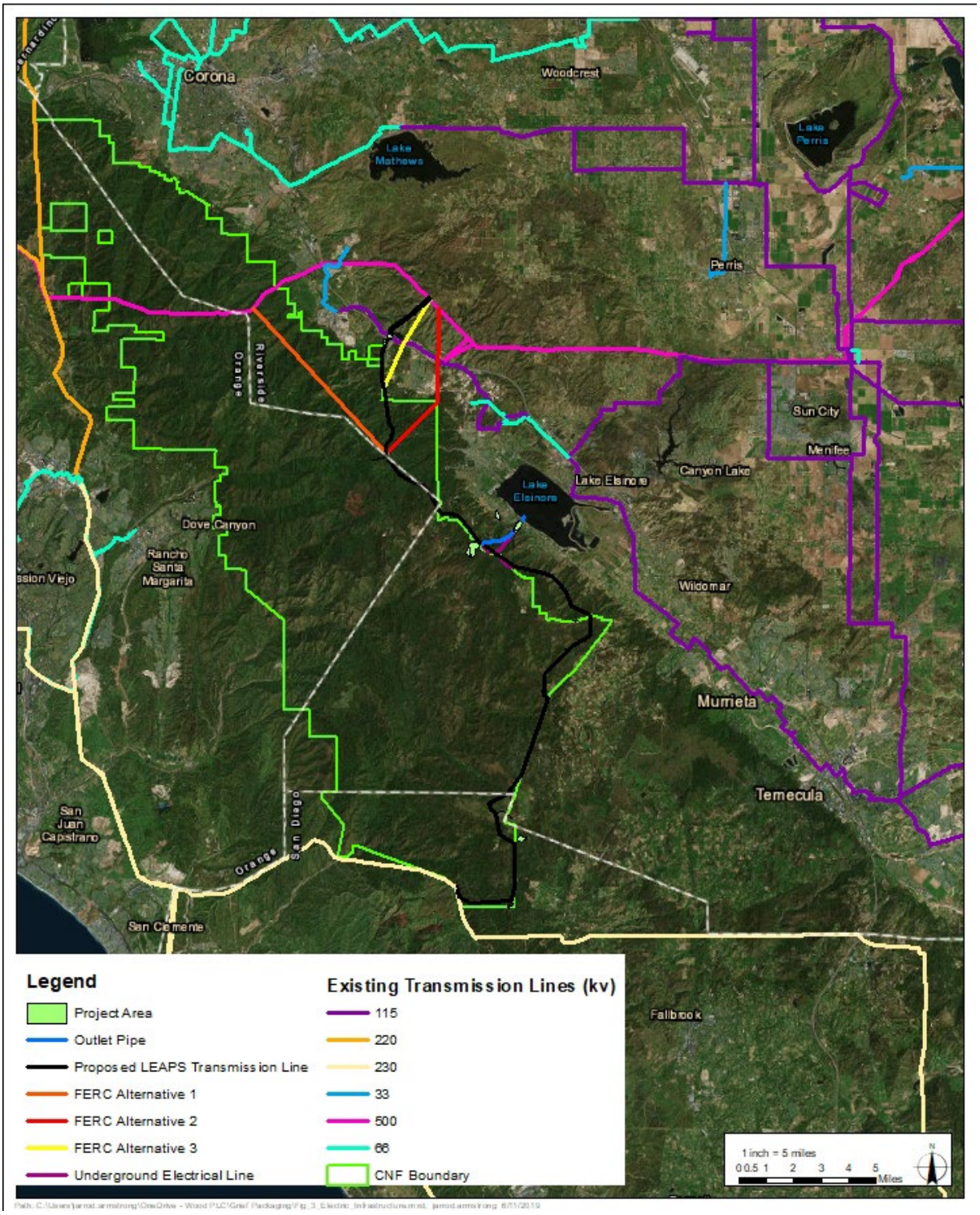

Figure 3. LEAPS Existing Electrical Infrastructure Map (CEC 2019)

5.2 Vegetation

According to current CalVeg vegetation mapping data from the USFS, four National Vegetation Classification (NVC) communities (classified at the Group level) are dominant in the vicinity of the project area. In addition, there are two non-dominant NVC communities in the vicinity of the project area. Nondominant communities include: Group 344: Incense-cedar - Sugar Pine - White Fir Forest & Woodland Group and Group 496: Purple Needlegrass - California Melicgrass - Giant Wildrye Grassland Group. Dominant vegetation communities include: Group 257: Chamise - Buckbrush - Sticky Whiteleaf Manzanita Xeric Chaparral Group; Group 195: California Live Oak - Valley Oak - California Laurel Forest & Woodland Group; Group 264: Coastal Sagebrush - Black Sage - White Sage Coastal Scrub Group; and Group 766: Californian Annual Grassland & Forb Meadow Group (**Figure 4**) (USFS 2018). A description of each of the dominant vegetation communities, their fire interval, and their prevalence in the project area is provided below.

Group 257: Chamise - Buckbrush - Sticky Whiteleaf Manzanita Xeric Chaparral (G257)

This group is by far the most common group in the project area (**Figure 4**) and is the dominant vegetation type in the region. This shrubland group includes chaparral typically located inland from sea level up to 7,220 feet in elevation. Characteristic species include chamise (*Adenostoma fasciculatum*), red shanks (*Adenostoma sparsifolium*), buckbrush (*Ceanothus cuneatus*), big pod ceanthons (*Ceanothus megacarpus*), hoary leaf ceanthons (*Ceanothus crassifolius*), sticky whiteleaf manzanita (*Arctostaphylos viscida*), and common manzanita (*Arctostaphylos manzanita*). Individual sites may support pure stands of a single species or a diverse mixtures of several species (California Department of Fish and Wildlife 1988; USNVC 2017).

Structurally, this community is a homogeneous brushland dominated by shrubs with thick, stiff, heavily cutinized evergreen leaves. Considerable leaf litter and standing dead material may accumulate in stands that have not burned for several decades. Mature stands of this group are closed-canopy shrublands up to 16 feet tall with 80% or more canopy cover and very little understory growth. However, the structure of mature stands may vary considerably with age since last burn, precipitation regime, aspect, and soil type (California Department of Fish and Wildlife 1988; USNVC 2017).

In the southern portion of the range, Santa Ana winds drive late-summer, stand-replacing fires in these shrublands. Following fire in mature stands, herbaceous ground cover is abundant in the first 3-5 years following a burn (California Department of Fish and Wildlife 1988; USNVC 2017). According to the USFS, the mean fire return interval of chaparral communities in California is 50 years. However, in the last century the high frequency of human ignitions have reduced the mean fire interval to 30-35 years in Southern California (USFS 2012).

Group 195: California Live Oak - Valley Oak - California Laurel Forest & Woodland Group (G195)

This group consists of oak and other endemic broadleaf woodland plants. It forms one of the most extensive and conspicuous vegetation types in California. Within the project area, this vegetation type occurs in pockets in valleys throughout the CNF (**Figure 4**). The community is dominated by six characteristic oak species which include: coast live oak (*Quercus agrifolia*), canyon live oak (*Quercus chrysolepis*), blue oak (*Quercus douglasii*), California black oak (*Quercus kelloggii*), valley oak (*Quercus lobate*), and interior live oak (*Quercus wislizeni*). However, in drier, interior sites, coast live oak mixes with valley oak, blue oak, and foothill pine (California Department of Fish and Wildlife 1988; USNVC 2017).

Where oaks are more widely spaced, the understory may consist almost entirely of grassland species with few shrubs. Where coast live oak woodlands intergrade with chaparral, and species such as greenleaf manzanita, chamise, gooseberries, currants, and ceanothus species form the understory (California Department of Fish and Wildlife 1988; USNVC 2017).

Structurally, these woodland communities are extremely variable. The overstory consists of deciduous and evergreen hardwoods, mostly oaks, 15 to 70 feet tall and sometimes mixed with scattered conifers. In mesic sites, the trees are dense and form a closed canopy. In drier sites, the trees are widely spaced, forming an open woodland or savannah. The understory is also variable, in some instances composed of shrubs from adjacent chaparral or coastal scrub with a very dense understory and in other instances with shrubs scattered between trees. Where trees form a closed canopy, the understory can be lush with shade-tolerant species or covered in a thick layer of litter (California Department of Fish and Wildlife 1988; USNVC 2017). According to the USFS, the typical fire regime of California Oak Woodlands consists of frequent low-intensity surface fires that occur every 0-35 years (USFS 2012)

Group 264: Coastal Sagebrush - Black Sage - White Sage Coastal Scrub Group (G264)

This group is dominated by drought-deciduous shrubs with sclerophyll leaves. Sclerophyll leaves have physical adaptations that help drought-deciduous shrubs prevent wilting, water loss, and resist the intense heat of hot and dry summers. This vegetation type is abundant in the region near the project area, though not as dominant as the chemise type (G257), and it tends to occur near the wildland-urban interface in the vicinity of the project area (**Figure 4**). This group occurs below 3,000 feet in elevation and may extend inland from the maritime zone into hotter, drier conditions. Dominant shrub species include California sage brush (*Artemisia californica*), black sage (*Salvia mellifera*), white sage (*Salvia apiana*), purple sage (*Salvia leucophylla*), bush sunflower (*Encelia californica*), California buckwheat (*Eriogonum fasciculatum*), ashyleaf buckwheat (*Eriogonum cinereum*), Baja desert-thorn (*Lycium brevipes*), California box thorn (*Lycium californicum*), and coastal prickly pear (*Opuntia littoralis*) (California Department of Fish and Wildlife 1988; USNVC 2017).

Structurally, the community is typified by low to moderate-sized shrubs with mesophytic leaves, flexible branches, semi-woody stems growing from a woody base, and a shallow root system. The shrub layer can be up to 7 feet tall, and although canopy cover usually approaches 100%, bare areas (3 feet wide)

are sometimes present where sage species extend into surrounding grasslands. Sufficient light penetrates through the canopy to support an herbaceous understory. According the USFS, this community burns at a similar frequency to that of neighboring chaparral communities. However, in recent years adjacency to urban and suburban areas has increased the fire frequency (USFS 2012).

Group 766: Californian Annual Grassland and Forb Meadow Group (G766)

This group encompasses annual grasslands and annual forb-dominated meadows of California, ranging from the coast to the lower foothills of the Sierra Nevada. This vegetation community is most prevalent on the southern transmission line portion of the project area, on the east side (**Figure 4**). These annual grasslands and meadows occur on upland slopes, broad valleys, and ocean bluffs, from sea level to over 3,900 feet in elevation. They may occupy dry, raised portions of meadow systems, forest edges, and pockets of sandy loams within montane meadow habitats. Dominant species include the native annual species mezies fiddleneck (*Amsinckia menziesii*), various poppy species (*Eschscholzia spp.*), spreading groundsmoke (*Gayophytum diffusum*), American birds-foot trefoil (*Lotus unifoliolatus*), rusty popocornflower (*Plagiobothrys nothofulvus*), whitetip clover (*Trifolium variegatum*), and Pacific fescue (*Vulpia microstachys*). Most occurrences have significant non-native species presence.

California grasslands have been significantly altered through invasion of exotic species, livestock grazing, clearing, and seeding. Stands vary greatly in composition, and at least 95% are considered uncharacteristic of historic conditions (USFS 2012). Structure in annual grasslands depends largely on weather patterns and livestock grazing. Dramatic differences in physiognomy, both between seasons and between years, are characteristic of this habitat. Fall rains cause germination of annual plant seeds. Plants grow slowly during the cool winter months, remaining low in stature until spring, when temperatures increase and stimulate more rapid growth. Large amounts of standing dead plant material can be found during summer in years of abundant rainfall and light to moderate grazing pressure (California Department of Fish and Wildlife 1988; USNVC 2017). According the USFS, the this community burns very frequently and has an average fire return interval of 2 years (USFS 2012).

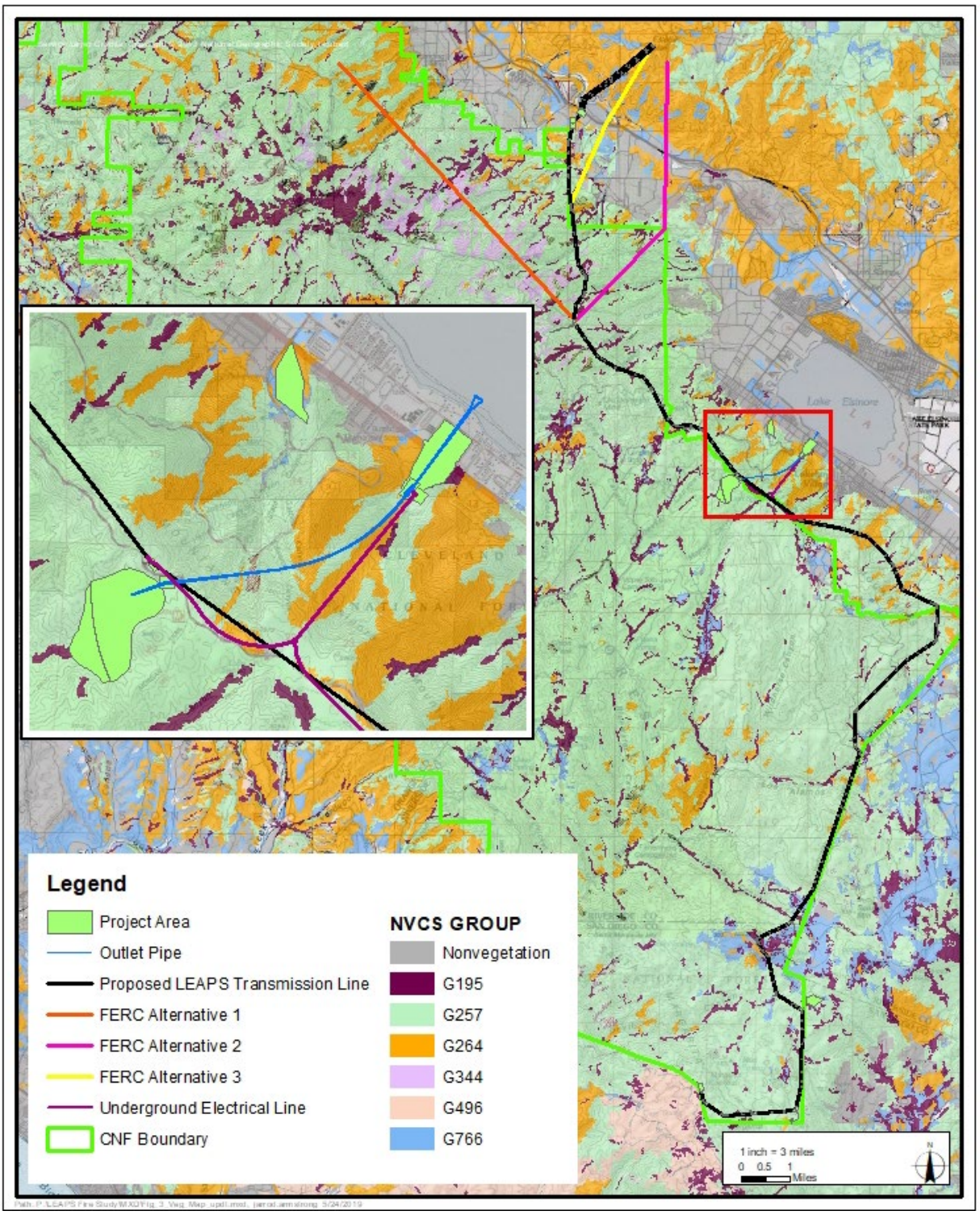

Figure 4. LEAPS Vegetation Map (USNVC 2017; USFS 2018)

5.3 Fuels and Fuel Moisture

Wildland fuels are the portion of live and dead vegetation, that are likely to burn if ignited. Fuels can include dead vegetative litter, dry standing vegetation, and live vegetation that can become a viable fuel source during drought conditions or when dried by the heat of the fire itself. The type and quantity of fuel depends on the soil, climate, topographic features, and the fire history of the site. Petroleum based fuels, wood products, and plastics associated with human development are normally not fuel sources for wildland fire and are not considered here.

Fuels are classified by the amount required to lose or gain approximately two-thirds of the moisture above or below its equilibrium moisture content. The shorter the time lag, the more responsive the fuels are to changes in environmental moisture. The four standard classifications are:

- 1-hour fuels – Dead vegetation with stem less than ¼-inch diameter (the most sensitive to ignition);
- 10-hour fuels – Vegetation with stem ¼-inch to 1-inch diameter;
- 100-hour fuels – Vegetation with stem 1-inch to 3-inch diameter; and
- 1,000-hour fuels – Vegetation with stem greater than 3-inch diameter.

Moisture content of the 1-hour fuels, which provides an indication of fuel combustibility, responds quickly to changes in temperature and relative humidity. Areas dominated by 1-hour fuels are a critical concern for fires because they react rapidly to changes in weather conditions and are the primary carrier of fire, especially in wind-driven conditions.

Because many plant communities have similar fuel classification characteristics, they can be grouped into various fuel types known as fuel models. The most widely used for calculating fire behavior are the Northern Forest Fire Laboratory (NFFL) fuel models. NFFL fuel models are organized into four groups: grass, shrub, timber, and logging slash. The thirteen NFFL models are listed in **Table 2**, with fuel models that best fit the project area shaded in blue.

Table 2. Standard Thirteen Fuel Models Used in Fire Behavior

Fuel Model #	Typical Fuel Complex	Fuel Loading (Tons per acre)[1]				Fuel Bed Depth (ft)	Moisture of Extinction Dead Fuels (%)[2]
		1-hr	10-hr	100-hr	Live		
Grass and Grass-Dominated							
1	Short grass (1 foot)	0.74	-	-	-	1.0	12
2	Timber (Grass and Understory)	2.0	1.0	0.50	0.50	1.0	15
3	Tall Grass (2.5 feet)	3.0	-	-	-	2.5	25
Chaparral and Shrub Fields							
4	Chaparral (6 feet)	5.0	4.0	2.0	5.0	6.0	20
5	Brush (2 feet)	1.0	0.50	-	2.0	2.0	20
6	Dormant Shrub and Hardwood Slash	1.5	2.5	2.0	-	2.5	25
7	Southern Rough	1.1	1.9	1.5	0.37	2.5	40
Timber Litter							
8	Closed Timber Litter	1.5	1.0	2.5	-	0.2	30
9	Hardwood Litter	2.9	0.41	0.15	-	0.2	25
10	Timber (Litter and Understory)	3.0	2.0	5.0	2.0	1.0	25
Slash							
11	Light Logging Slash	1.5	4.5	5.5	-	1.0	15
12	Medium Logging Slash	4.0	14.0	16.5	-	2.3	20
13	Heavy Logging Slash – no lopping	7.0	23.0	28.0	-	3.0	25

Source: Anderson 1982
1 - Fuel loading - the mass of fuel per unit area, live and dead, grouped by particle size classes.
2 - Moisture of extinction - the upper limit of fuel moisture content beyond which the fire will no longer spread with a uniform front.

According to surface fuel maps produced by CAL FIRE and Fire Resource and Assessment Program (FRAP) mapping (CAL FIRE 2019a), the six fuel models that best describe the fuels present in the vicinity of the project area are described below (**Figure 5**). These roughly match the vegetative groups described in **Section 5.2**.

- Fuel Model # 1 – **Short grass (1 foot)**: Includes annual and perennial grasses. This fuel model type co-occurs with Model #2 and is mostly present in the upland area near the proposed reservoir in CNF (**Figure 5**).
- Fuel Model # 2 – **Timber (grass and understory)**: Includes all of the woodland communities and shrub communities with an open overstory and a litter layer. The litter layer may consist of both leaf litter and significant herbaceous fuels. Such stands may include clumps of fuels that

generate higher intensities and that may produce firebrands. This fuel model type co-occurs with Model #1 and is mostly present in the upland area near the proposed reservoir in CNF (**Figure 5**).

- Fuel Model # 4 – **Chaparral (6 feet)**: Includes mixed and xeric chaparral communities (chamise, buckbrush, sticky whiteleaf manzanita, and other associated species). Intense and fast-spreading fires burn foliage and live and dead fine woody material in the crowns of a nearly continuous secondary overstory. Stands of mature shrubs can often be 6 feet tall or more. This model type is most prevalent in the transmission line path leading north from the pump station and reservoir (**Figure 5**).
- Fuel Model # 5 – **Brush (2 feet)**: Includes the chaparral and coastal sage communities. Fire is generally carried in the surface fuels that are made up of litter cast by the shrubs and the grasses or forbs in the understory. The fires are generally not very intense because surface fuel loads are light and the shrubs are young. Little dead material is present, and foliage is not volatile as with Model #4. Usually, shrubs are short, young, and green (e.g., laurel, vine maple, alder, or even chaparral, manzanita, or chamise), and almost totally cover the area. This model type co-occurs with fuel Model #6 and is most common along the northern and southern transmission line path (**Figure 5**).
- Fuel Model # 6 – **Dormant Shrub and Hardwood Slash**: This shrub fuel model occurs where foliage is more flammable than fuel model #5 but requires moderate winds to ignite (> 8 miles per hour at midflame height). Fire will drop to the ground at low wind speeds or at openings in the stand. These stands of shrubs are older, but not as tall as shrub types of Model #4, nor do they contain as much fuel as Model #4 and include intermediate stands of chamise, chaparral, oak brush, low pocosin, Alaskan spruce taiga, shrub tundra, and cured hardwood slash. Pinyon-juniper shrublands may be represented but may overpredict rate of spread except at high winds, like 20 miles per hour at the 20-foot level. This model type co-occurs with Model #5 and is most common along the northern and southern transmission line path (**Figure 5**).
- Fuel model # 8 – **Closed timber litter**: Slow-burning ground fires with low flame lengths are generally the case with this fuel model, although the fire may encounter an occasional heavy fuel concentration that can flare up. Only under severe weather conditions involving high temperatures, low humidity, and high winds do the fuels pose fire hazards. Closed canopy stands of short-needle conifers or hardwoods that have leafed out support fire in the compact litter layer. This layer is mainly needles, leaves, and occasionally twigs because little undergrowth is present in the stand. Representative conifer types are white pine, lodgepole pine, spruce, fir, and larch. Communities near the project area that have been grouped into this fuel model include mature, closed-canopy stands of the California Live Oak - Valley Oak - California Laurel Forest & Woodland Group. This fuel model type occurs in pockets throughout the project area (**Figure 5**).

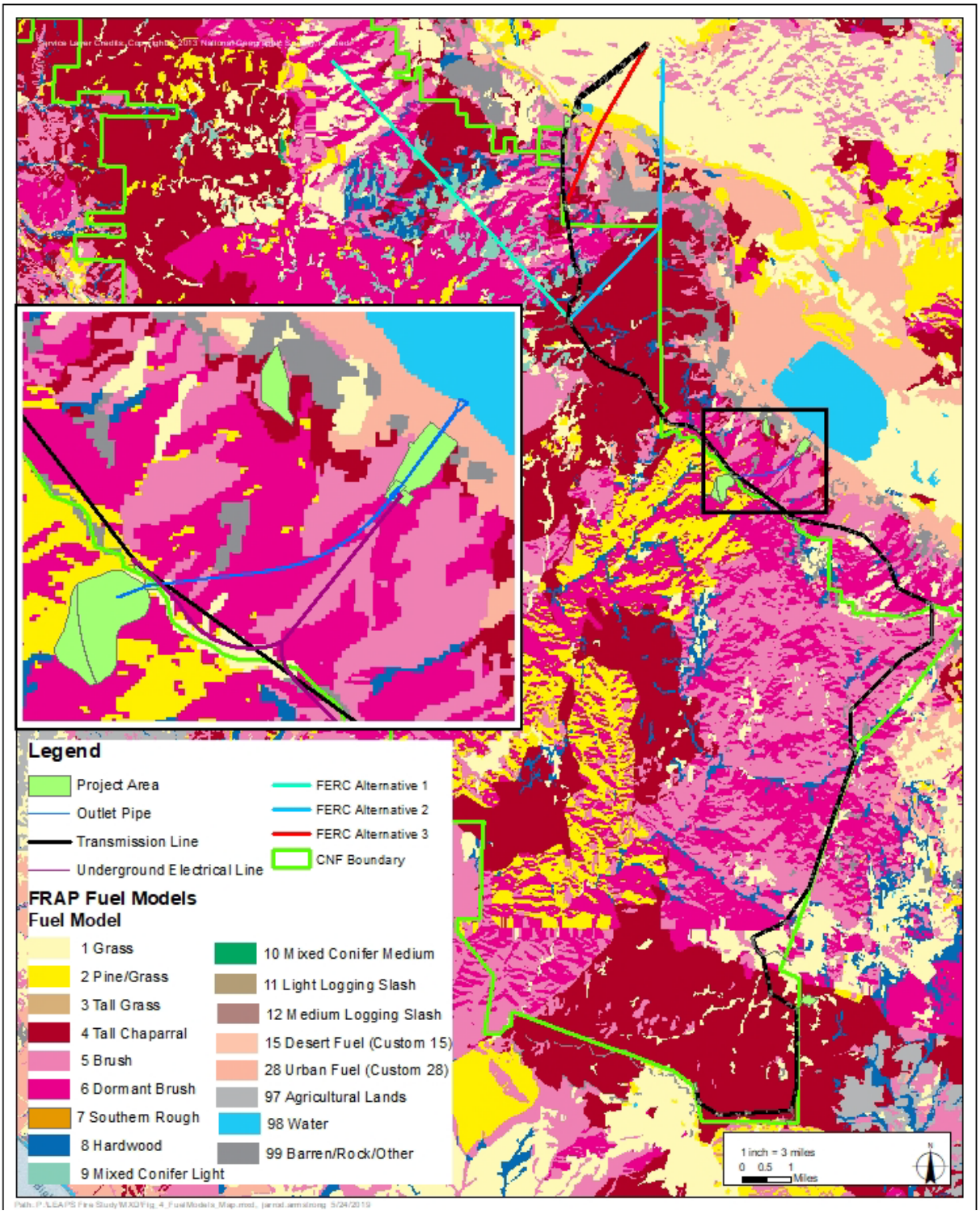

Figure 5. Fuel Models Map for Lake Elsinore Advanced Pumped Storage Project (CAL FIRE 2019a)

CAL FIRE has also developed a Fuel Rank assessment methodology for the *California Fire Plan* to identify and prioritize pre-fire projects that reduce the potential for large catastrophic fire. The fuel ranking methodology assigns ranks based on expected fire behavior for unique combinations of topography and vegetative fuels under a given severe weather condition (e.g., wind speed, humidity, and temperature). This procedure makes an initial assessment of fuel rank based on an assigned fuel model, resulting in four developed fuel rankings: Non-Fuel, Moderate, High, and Very High. According to surface fuel rank maps produced by CAL FIRE FRAP Mapping, the majority of the project area is within High or Very High ranked fuels (**Figure 6**) (CAL FIRE 2019a).

CAL FIRE has also developed a rating of wildland fire threat based on the combination of potential fire behavior (Fuel Rank) and expected fire frequency. This creates a 5-class index of fire threat: Non-Fuel, Moderate, High, Very High, and Extreme. According to fire threat maps produced by CAL FIRE FRAP Mapping, nearly all of the project area is within either Very High or Extreme fire threat areas (**Figure 7**).

Insert USFS-provided information regarding ongoing fuel management programs/projects in the project area and surrounding vicinity.

Although fuel structure and fuel moisture are important determining factors in fire behavior, research has shown that these factors are overwhelmed by the influence of extreme fire weather in California brushlands (Keeley et al. 1999). Under dry, hot, Santa Anna wind conditions, chaparral wildfires burn through all age classes of fuels, and fuel management programs that aim to bring younger chaparral and/or fuel breaks into ecosystems do not act as barriers to fire spread under these conditions.

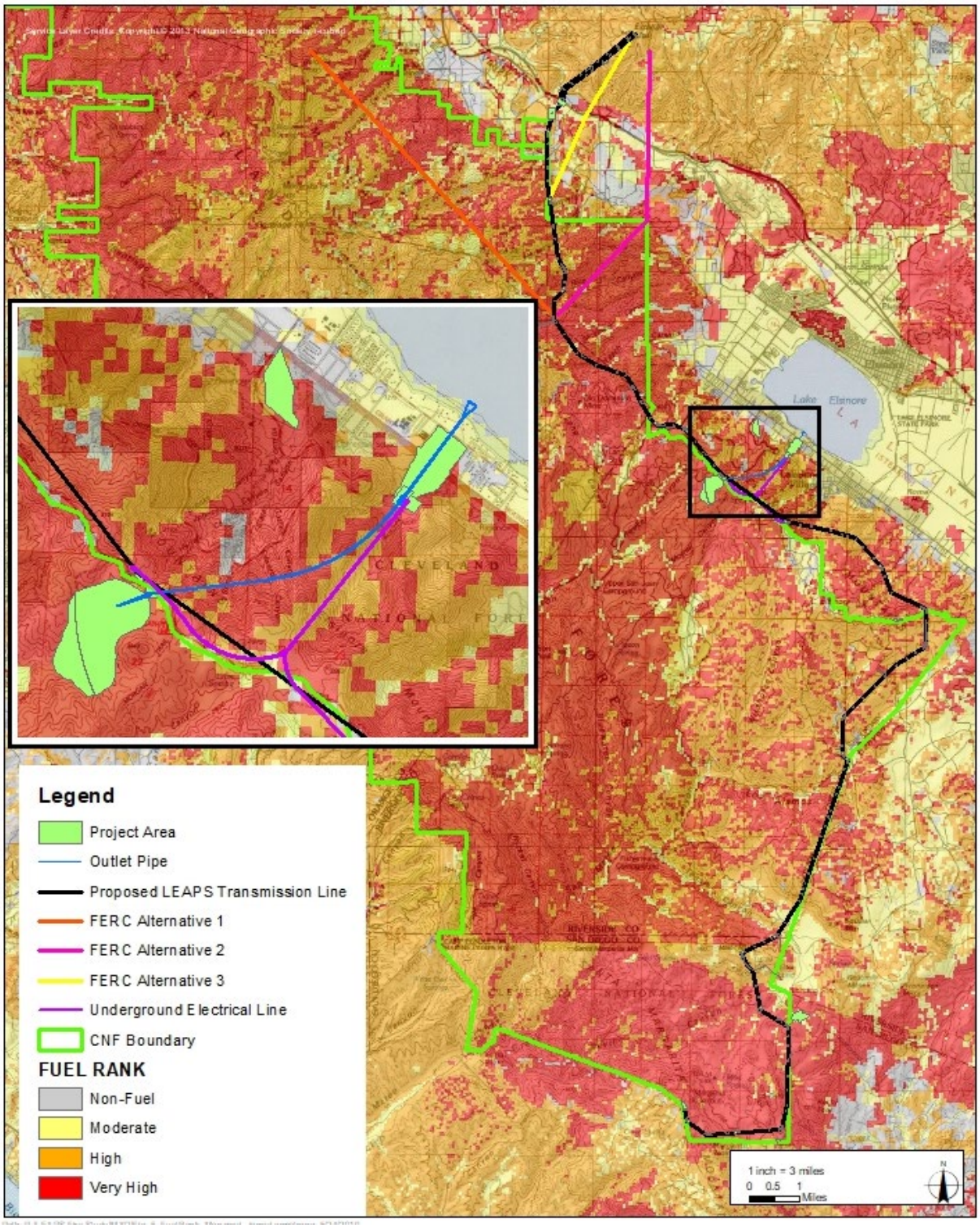

Figure 6. Fuel Rank Map for Lake Elsinore Advanced Pumped Storage Project (CAL FIRE 2019a)

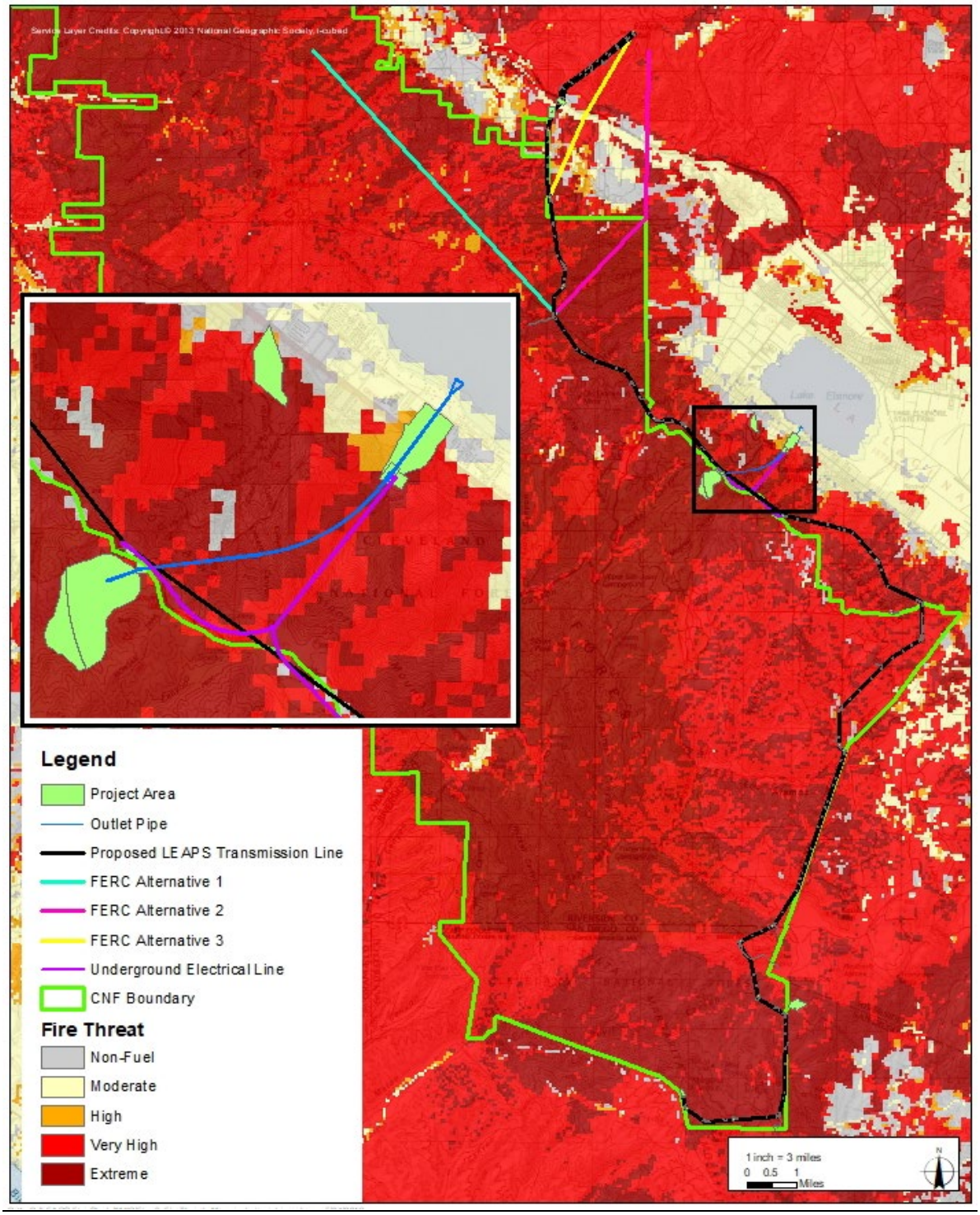

Figure 7. Fire Threat Map for Lake Elsinore Advanced Pumped Storage Project (CAL FIRE 2019a)

6.0 FIRE STUDY ELEMENTS

6.1 Fire History

Fire records in chaparral vegetation are difficult to obtain, since shrubland fires are almost always lethal crown fires. USFS records show that in the 20th century, fires burned in this ecosystem type roughly every decade, with prehistorical fires burning every 20 to 30 years (USFS 2019a).

Fires have occurred in this region in each decade since the 1950s. However, fires are not uniform and have occurred as a mosaic over the landscape. Some areas near the project have burned regularly since the 1950s while other areas may not have burned since the 1980s (**Figure 8**). When examining the project area specifically, it can be seen that that the area surrounding the proposed upper reservoir and the outlet pipe (southwest of Lake Elsinore) has a much more extensive fire history, compared to other portions of the project area. This proposed upper reservoir and the outlet pipe has burned as recently as the 2013 when the Falls fire burned approximately 1,385 acres. In addition, it is clear that the northern end of the transmission line also has an extensive fire history with areas burning regularly since the 1950s. However, areas within the immediate footprint of the proposed transmission line have not burned as frequently as the previously described areas. According to the data from CAL FIRE, the area where the proposed transmission line crosses Rice Canyon, McVicker Canyon, and Lasch Canyon has not burned since the 1950s. (However, this area was burned in the recent Holy Fire described below). In addition, the area where the proposed transmission line crosses the Los Alamos has not burned since the 1980s, and the area just west of Rocky Peak has not burned since the 1970s.

In August of 2018, the Holy Fire burned approximately 23,136 acres (36.2 square miles) in Riverside County and Orange County (**Figure 9**). The fire started as a result of arson in the area of Trabuco Canyon and Holy Jim Canyon (approximately 9 miles northwest of Lake Elsinore) in the CNF. The Holy Fire burned through the majority of the proposed transmission line corridor between the proposed upper reservoir and Interstate 15 (I-15). As previously described, some of these areas had not burned since the 1950s. A total of 18 structures were destroyed – 12 in Orange County and 6 in Riverside County. Local and state responsibility areas accounted for approximately 20% of the burn area, with the remaining 80% under federal responsibility (NWCG 2018; CAL FIRE 2019b).

There are slight differences in the fire history of the three alternative northern routes for the proposed transmission line. The footprint of FERC Alternative 1 was mostly burned in the Holy Fire, with the exception of the far northwest portion (between Coldwater Canyon and Bald Peak), which has not burned since the 1980s. The footprint of FERC Alternative 2 was also mostly burned in the Holy Fire, except the portion north of I-15, which has not burned since the 1990s. Similarly, the footprint for FERC Alternative 3 was burned in the Holy Fire, except the portion north of I-15, which has not burned since the 2000s. It should be noted that this mapping data does not include the fire perimeter of the 2018 Holy Fire.

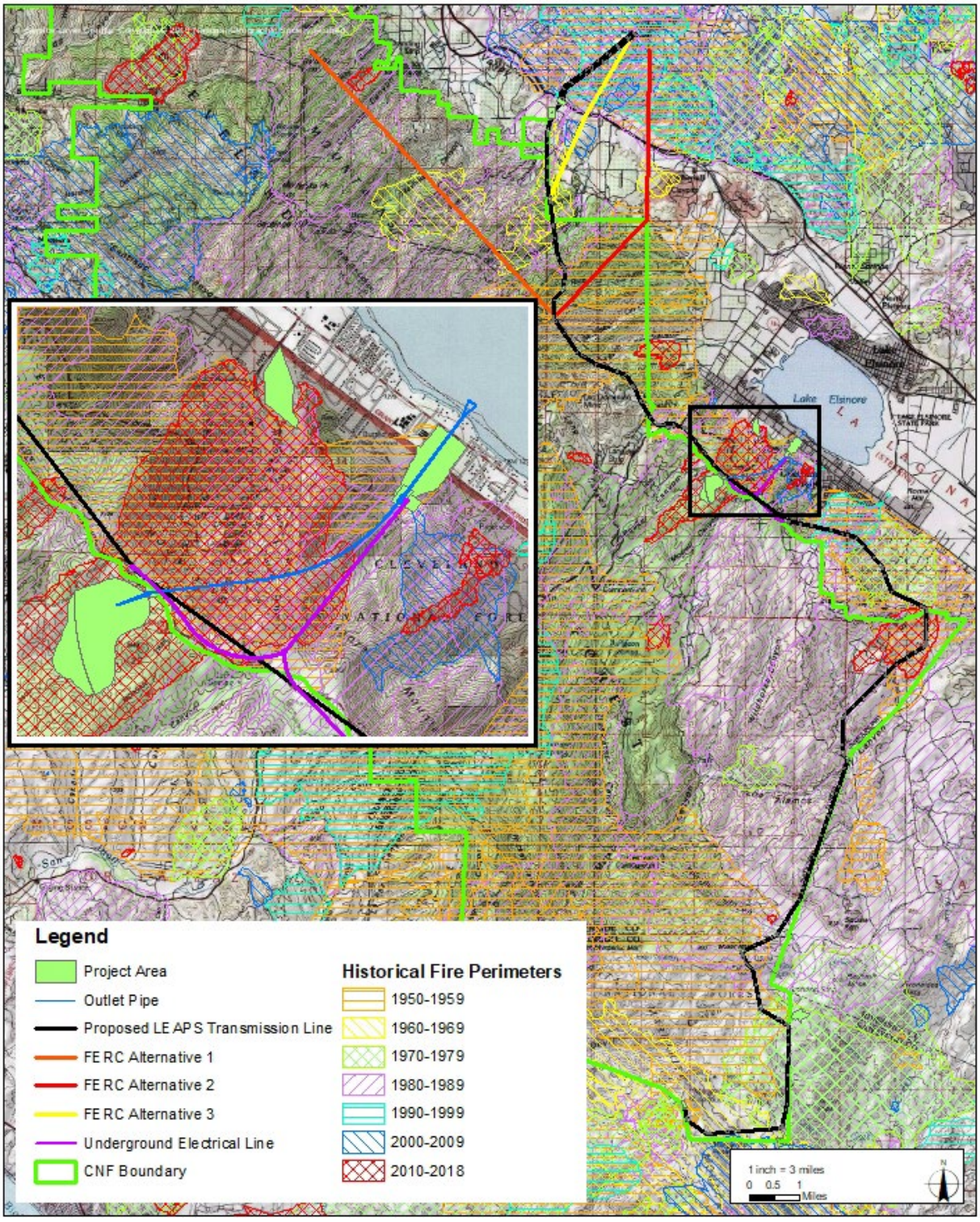

Figure 8. LEAPS Fire History Map (CAL FIRE 2019a)

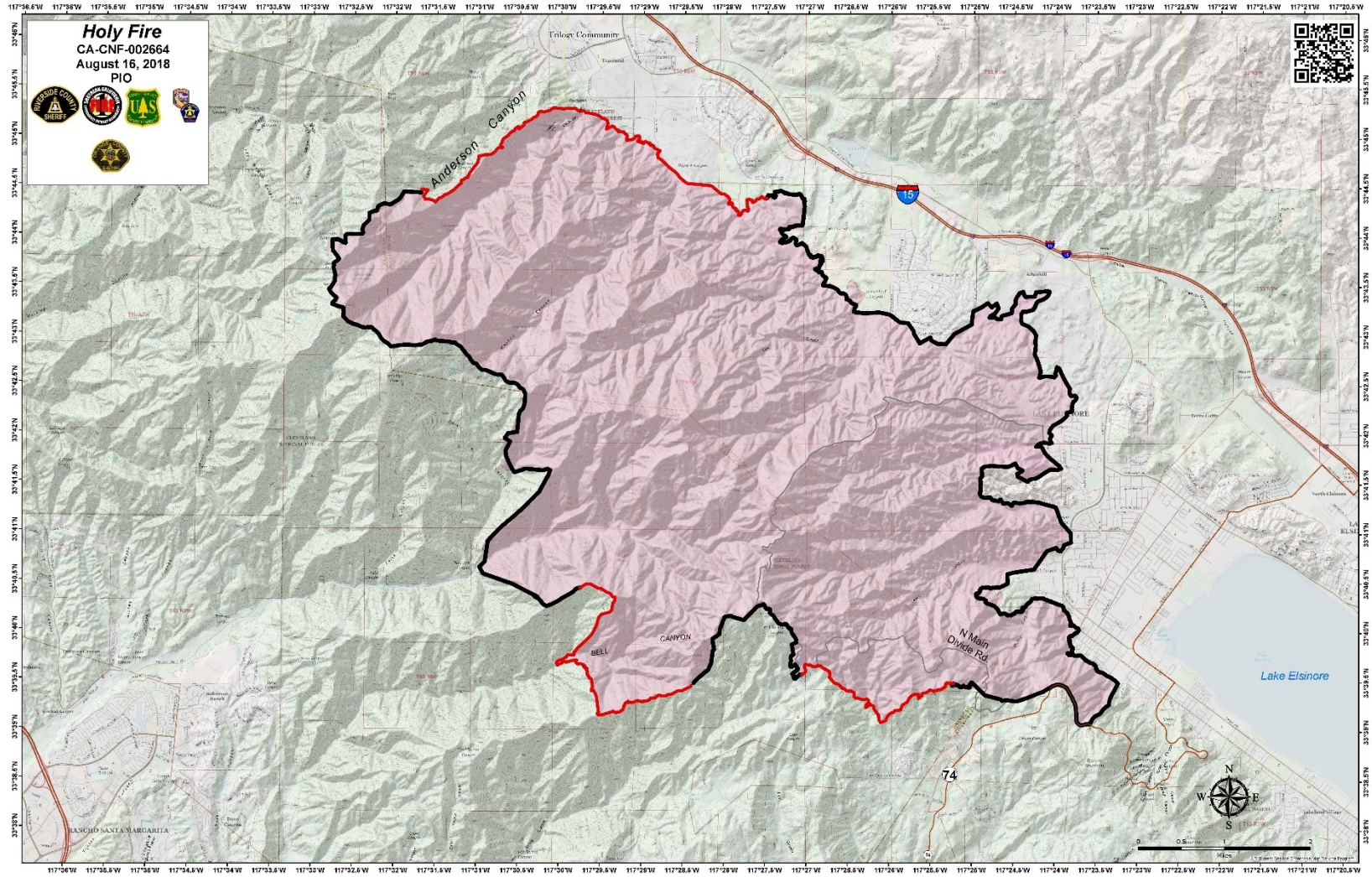

Figure 9. Holy Fire Map (NWCG 2018)

6.2 Fire Season

Fire season in California is based on a number of factors, including temperature, precipitation, and fuels moisture. Historically, fire season Southern California has occurred between May and November when fuel moisture levels are dropping. This is evident in **Figure 10**, where a clear increase in the number of active fires can be seen between the months of May and November.

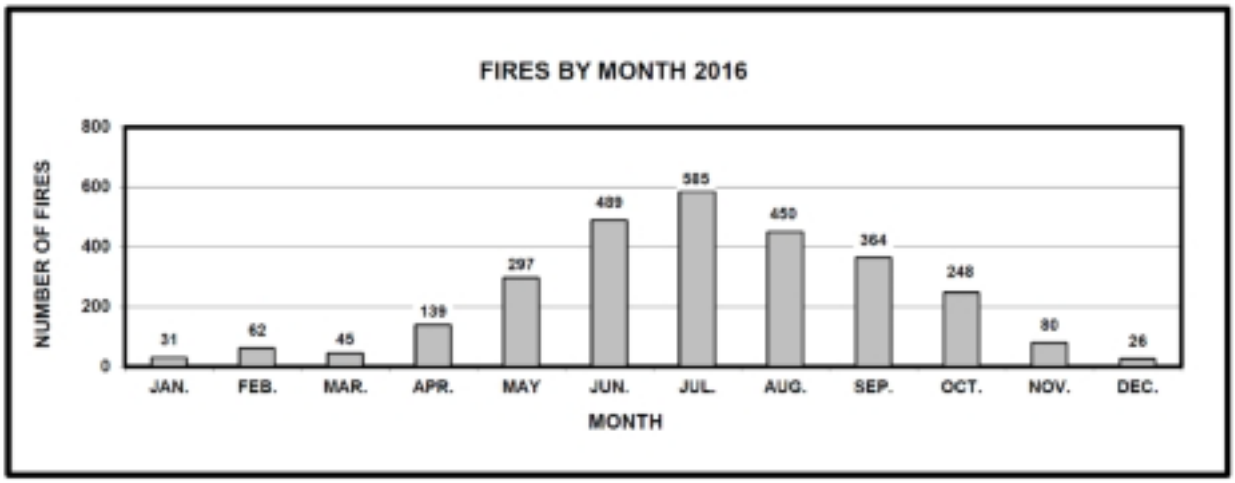

Figure 10. Number of California Fires by Month for 2016 (CAL FIRE 2016a)

CAL FIRE defines fire season as that portion of the year, generally 6 to 8 months in the summer and fall in California, where fuel and weather conditions are conducive to the ignition and spread of wildland fires (CAL FIRE 2019c). However, in recent years, parts of Southern California have seen a near year-round fire season due to a combination of climate change, historic drought and favorable weather conditions.

In general, fuel moisture tends to be highest in the early spring (March) and lowest toward the end of the year in late summer and fall (**Figure 11**). For this region, fire season is typically between May and October when fuel moisture is low. This can be seen in the fuel moisture for new growth chamise, a type of chaparral vegetation, that is common in the project area (**Figure 12**). However, Riverside County is considered to be on a year-round fire season (CAL FIRE 2019d).

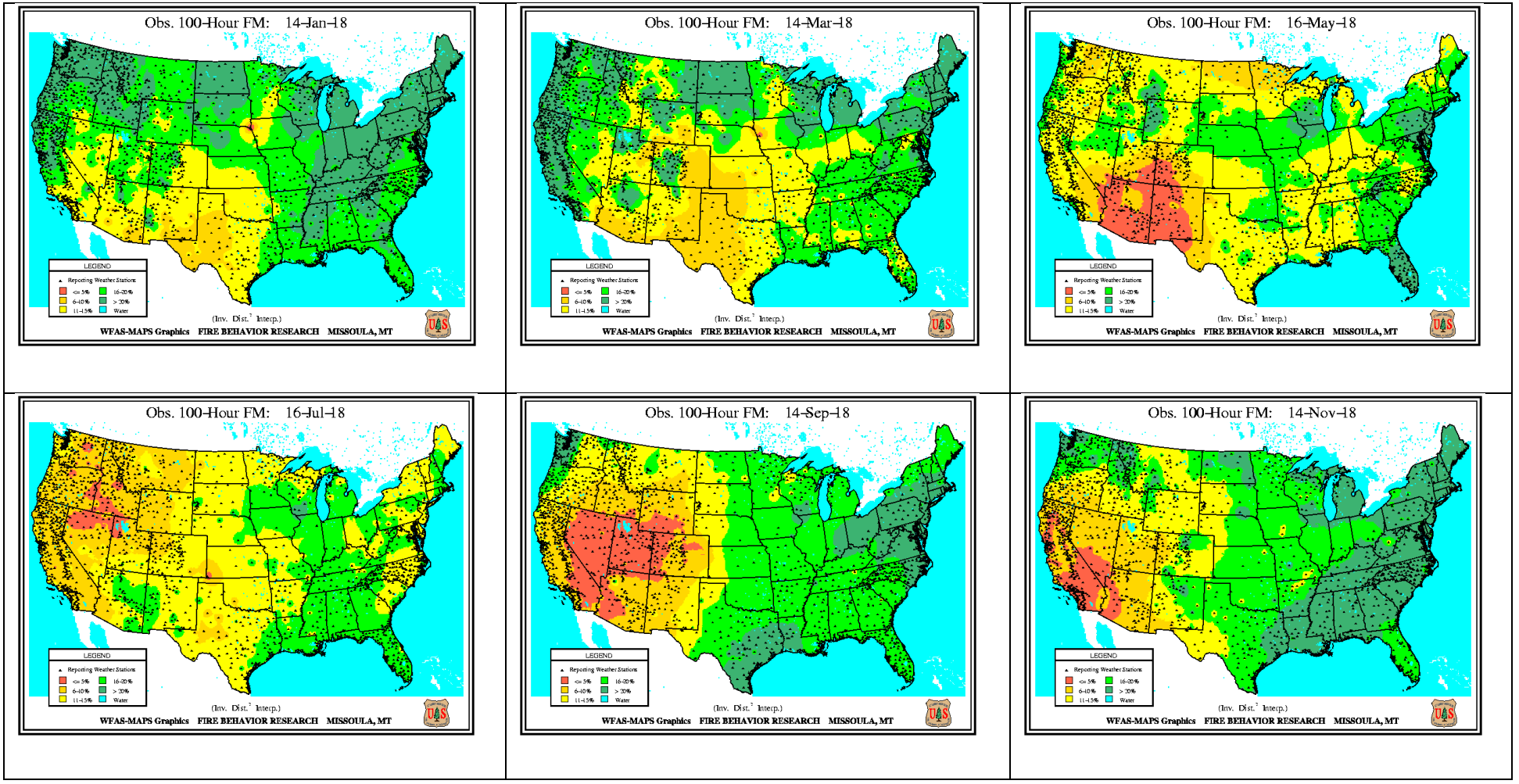

Figure 11. Observed 100-Hour Fuel Moisture Across the U.S., during January, March, May, July, September, and November 2018 (USFS 2019b, 2019c)

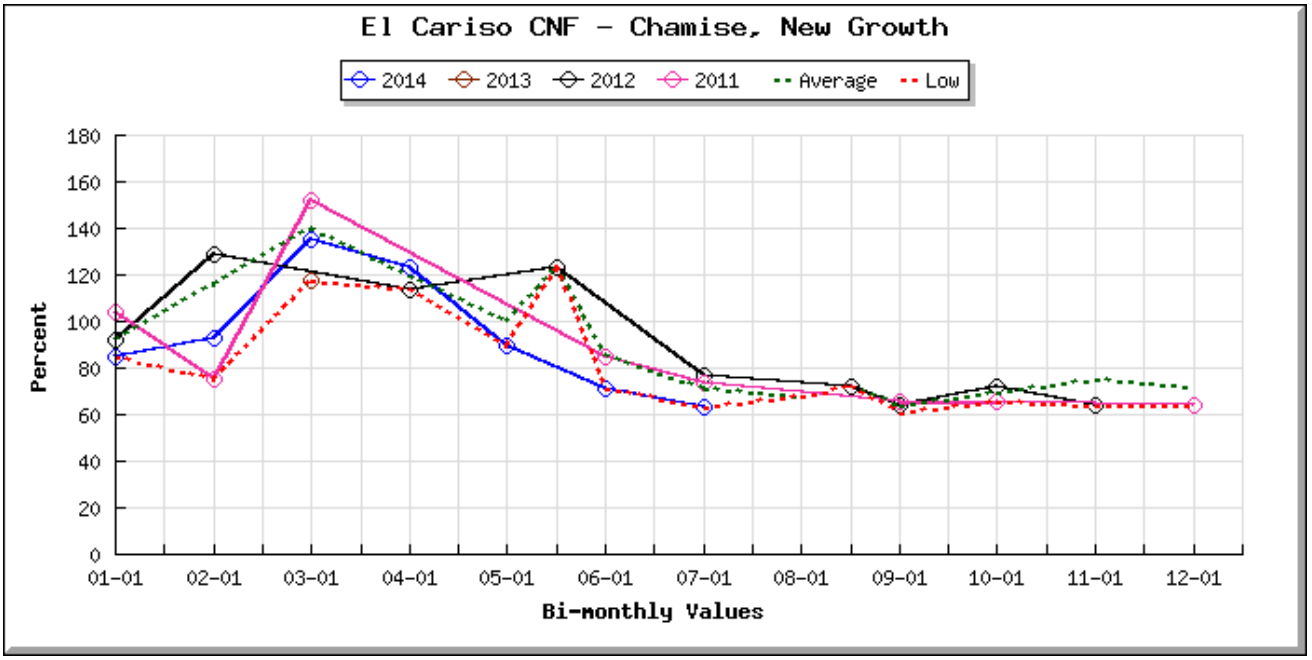

Figure 12. Fuel Moisture for New Growth Chamise at the El Cariso Site in the Cleveland National Forest (USFS 2019c)

6.3 Wildfire Danger

Wildfire danger is normally defined as a descriptor of the combination of factors which affect the initiation, spread, and difficulty of control of wildfires in an area. These factors include fuels, weather, topography, and risk. The adjective class rating (i.e., "low," "moderate," "high," "very high," and "extreme") is a method of normalizing rating classes across different fuel models, indexes, and station locations. This adjective class rating or fire danger rating level (hereafter referred to as "fire danger day[s]") takes into account current and historical weather, fuel types, and live and dead fuel moisture and assigns a rating for the day. Regional wildfire danger statistics for the proposed project were derived from the Wildland Fire Assessment System (WFAS) (https://www.wfas.net/). The WFAS is supported and maintained at the National Interagency Fire Center.

WFAS has produced wildfire danger forecasts using data from the National Digital Forecast Database since 2007 (USFS 2019b). Overall wildfire danger throughout a region is extremely localized given the varying microclimates, fuels, and topographies that occur over large land areas. The WFAS maintains data on observed wildfire danger across the country, but uniform reporting from individual stations has not yet been achieved and data are not collated. Although some stations report data regularly, other stations report more sporadically. Therefore, it is not time-efficient (sometimes also not possible) to compare wildfire danger ratings at one station or within one particular region over large expanses of time.

In order to generalize the overall wildfire danger over time for the project area, each day of 2017 observed wildfire danger record was examined at a fire station available from the WFAS located closest to the project area. The fire station utilized to obtain wildfire danger data was the USFS El Cariso Fire Station (El Cariso).[2] El Cariso is located near the proposed upper reservoir within the CNF.

In addition to WFAS, CAL FIRE has information available on multiple variables of wildfires in California, providing an overview of wildfire danger characteristics for the state as a whole. Characteristics available from CAL FIRE include the size, location, and cause of fires (CAL FIRE 2019e). Both sources (WFAS and CAL FIRE) were consulted when characterizing the wildfire danger of the project area.

Another source of information for wildfire danger comes from the California Public Utilities Commission (CPUC). In May 2015, the CPUC initiated rulemaking R.15-05-006 to develop and adopt a statewide fire-threat map that shows the boundaries of what are called High Fire-Threat Districts (HFTD) (completed January 2018, when the CPUC adopted the final CPUC Fire-Threat Map) and to apply regulations to the HFTDs and determine whether any additional fire-safety regulations are needed (completed December 2017). In addition, R.15-05-006 revises California General Order 95 (GO 95 – Rules for Overhead Electric Line Construction).

Several of the adopted fire-safety regulations apply only to HFTDs, where there is an elevated risk for power line fires igniting and spreading rapidly due to strong winds, abundant dry vegetation, and other environmental conditions. These HFTDs are categorized in to Tier 1, Tier 2, and Tier 3 hazard zones, which are defined below.

- Tier 1 High Hazard Zones on the U.S. Forest Service – CAL FIRE joint map of tree mortality are zones in direct proximity to communities, roads, and utility lines, and are a direct threat to public safety due to tree mortality.
- Tier 2 of the CPUC Fire-Threat Map depicts where there is an *elevated* risk for utility-associated wildfires.
- Tier 3 of the CPUC Fire-Threat Map depicts where there is an *extreme* risk for utility-associated wildfires.

The majority of the project area is located in Tier 3. In addition, nearly all of the CNF is located within either Tier 2 or Tier 3 (**Figure 13**).

[2] USFS Fire Station #45619 or CAL FIRE Station #51 in the Riverside Unit.

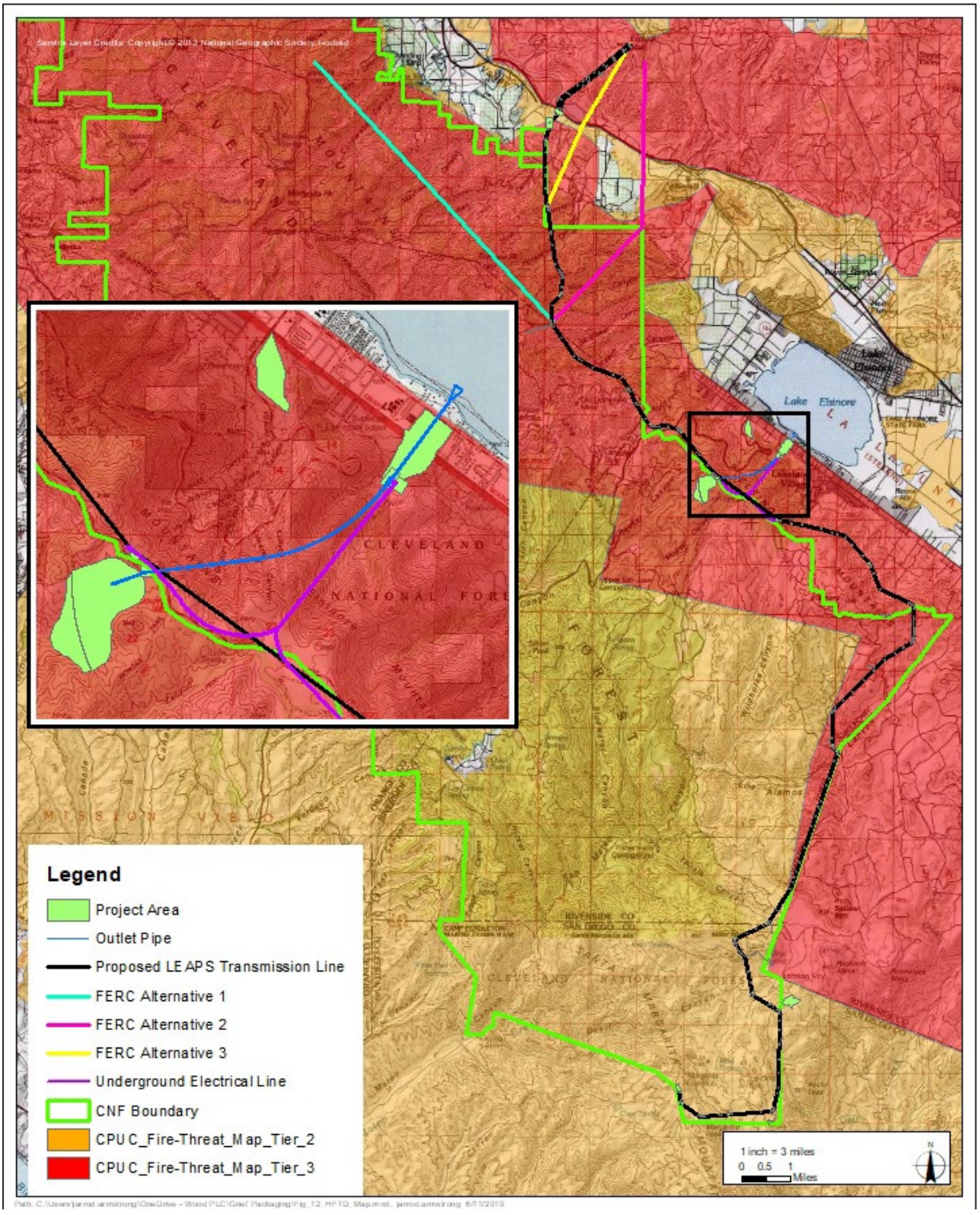

Figure 13. LEAPS High Fire-Threat Districts Map (CPUC 2019)

Looking at the data more locally available for the El Cariso fire station, there were 41 days in 2017 that did not have any data available for wildfire danger. For available wildfire danger data, the majority of days in 2017 were rated as "low" fire danger days (32%), followed by "moderate" fire danger days (22%) (**Table 3** and **Figure 14**) (USFS 2019d).

Table 3. Wildfire danger days in Cleveland National Forest in 2017 (El Cariso Fire Station)

Adjective[+]	Days in 2017	Annual Rate (%)
L	116	32
M	79	22
H	72	20
V	22	6
E	35	10
ND	41	11

[+]L=Low, M=Moderate, H=High, V=Very High, E=Extreme, ND=No Data
Source: USFS 2019d

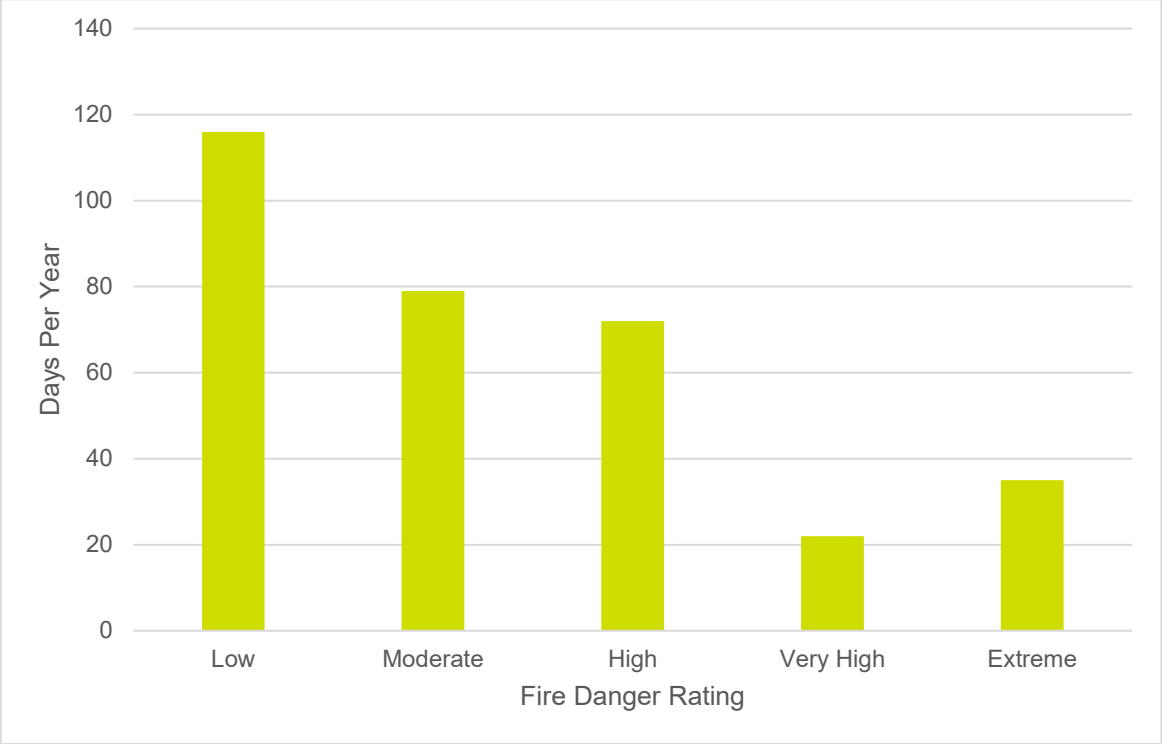

Figure 14. Fire danger ratings in 2017 from the El Cariso fire station in Cleveland National Forest

The greatest concern for wildfire danger is those days with a fire danger level of "high," "very high," and "extreme." Although these days occurred less frequently than "low" and "moderate" wildfire danger, they are more urgent in terms of preparedness.

Available data from the El Cariso fire station was grouped by the highest-rated categories for 2017. Fire hazard occurred most often in July – December, during which 10 or more days were rated with a fire danger level of "high," "very high," or "extreme." Riverside County is considered to be on a year-round fire season (CAL FIRE 2019d), but peak fire danger levels occurred in the second half of 2017 (**Table 4** and **Figure 15**). In addition, "very high" and "extreme" fire danger levels are not frequent in 2017 until the summer months and rise in occurrence for the duration of 2017. This corresponds to the chaparral fuel moisture trends shown for this region discussed in **Section 5.3** and shown in **Figure 11**. As fuel moisture drops, the number of days "high," "very high," and "extreme" fire danger increases (**Table 4** and **Figure 15**). For 2017, August has the greatest number of days with "high" fire danger levels, and December has the greatest number of days with "very high" and "extreme" fire danger levels.

Table 4. Fire Hazard Days Greater than "Moderate"[+] by Month in 2017 or El Cariso fire station in Cleveland National Forest

	Fire Danger Rating		
Month	**High**	**Very High**	**Extreme**
January	4	1	1
February	4	0	0
March	1	0	1
April	1	1	0
May	1	0	0
June	2	3	0
July	12*	2	0
August	14*	2	4
September	8	4	3
October	5	3	11*
November	13*	1	1
December	7	5	14*
TOTAL	**72**	**22**	**35**

[+]L=Low, M=Moderate, H=High, V=Very High, E=Extreme
* Indicate day counts >10
Source: USFS 2019d

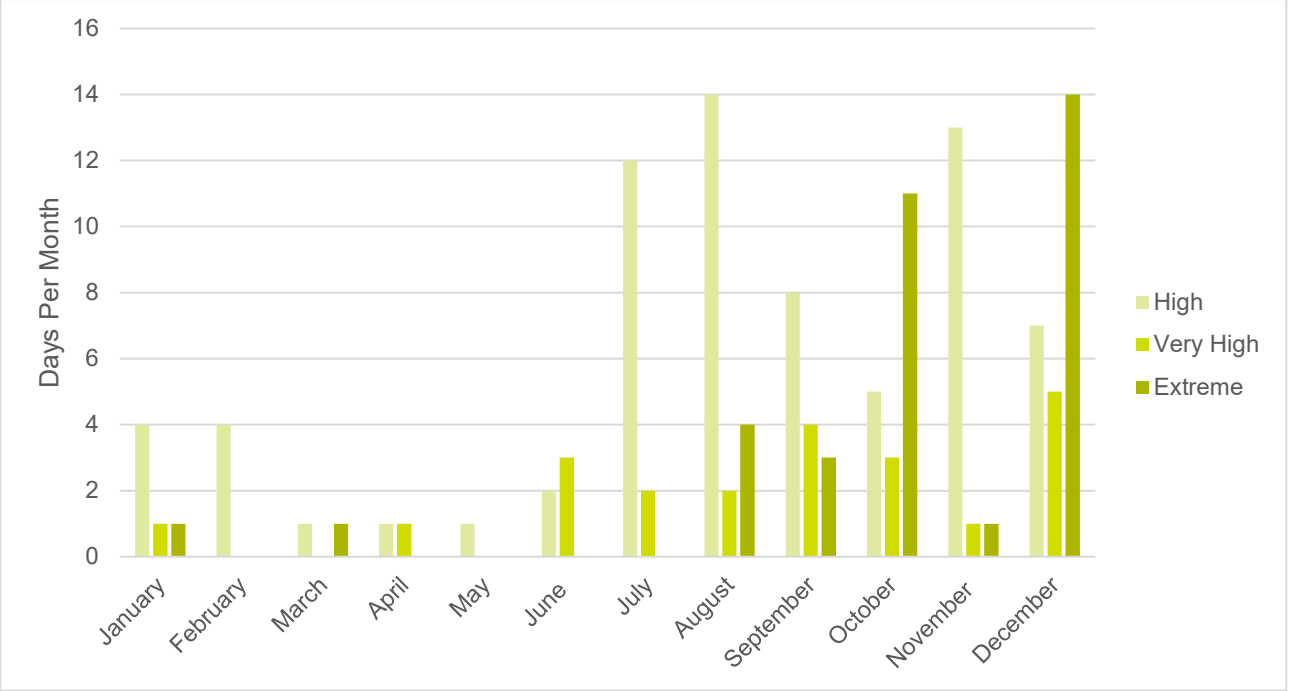

Figure 15. Number of days per month with fire danger ratings greater than "moderate" in 2017 for El Cariso fire station in Cleveland National Forest (USFS 2019d)

6.3.1 Cause of Wildfires in Project Area

In the State of California, the most common cause of fires in recent years has been "undetermined," followed by "debris burning" (**Figure 16**).

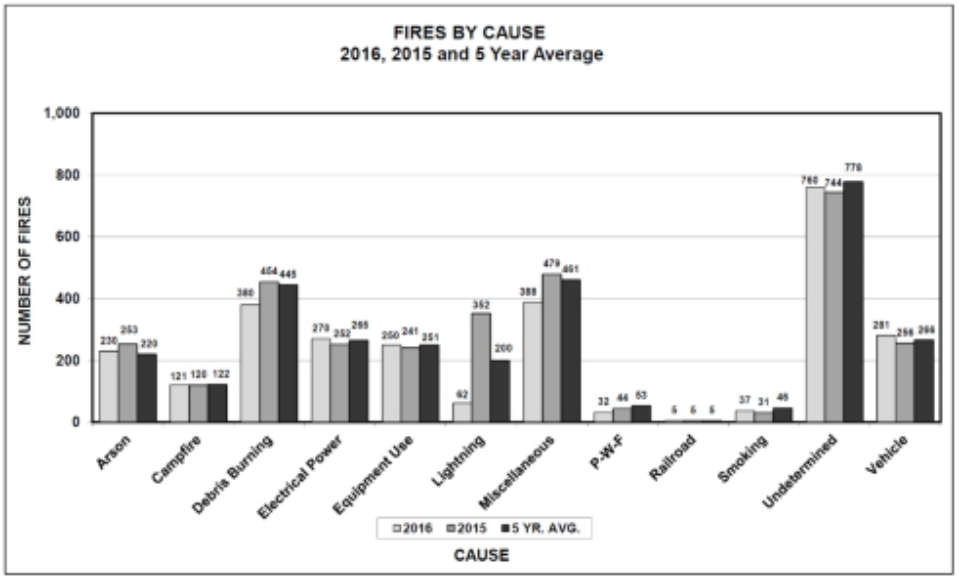

Figure 16. Number of California Fires by Cause for 2016 (CAL FIRE 2016a)

According to CAL FIRE, wildfires caused by electrical infrastructure occur roughly as often as wildfires caused by vehicles and equipment use when observing data over the last 5 years (CAL FIRE 2019e). As shown in **Table 5**, electrical infrastructure caused an average of about 6% of all fires occurring in Riverside and San Diego counties between 2012 and 2016.

Table 5. Total fires and fires caused by electrical infrastructure in two California counties over 5 years

	2012		2013		2014		2015		2016	
County	**Total**	**Elect.**	**Total**	**Elect.**	**Total**	**Elect.**	**Total**	**Elect.**	**Total**	**Elect.**
Riverside	172	8 (4.7%)	224	10 (4.5%)	106	7 (6.6%)	120	5 (4.2%)	133	5 (3.4%)
San Diego	162	9 (5.5%)	197	10 (5.1%)	145	11 (7.6%)	110	6 (5.5%)	131	16 (12.2%)

Source: CAL FIRE 2019e
Note: No data on the fires caused by electrical infrastructure was available for Orange County.

It is important to note that although the total percentage of fires ignited by electrical infrastructure is not high, the number of electrically-started fires in recent years have resulted in large and destructive fires. The most recent example is the Camp Fire of 2018 in Butte County, California, which was shown to be caused by PG&E.

6.4 Wildfire Preparedness and Response

Wildfire fighting in Riverside County is undertaken by the USFS, CAL FIRE, and various local agencies including the Riverside County Fire Department. The California Department of Forestry and Fire Protection and CAL FIRE are the agencies which provide wildfire protection. Many interagency fire groups exist in Southern California and the surrounding regions, necessitated by the high cost and technical skill required of fighting wildfires. The level of resources – including personnel and equipment – available at any given time fluctuates depending on the time of year, location, and wildfire danger. In addition to this, residential development near the proposed LEAPS Project complicates the properties and structures that need to be protected. The CNF, in conjunction with the California Department of Forestry and Fire Protection, the Bureau of Land Management (BLM), and numerous other state, county, and local control organizations, maintains a constant state of readiness in an effort to keep fire-related damage to a minimum.

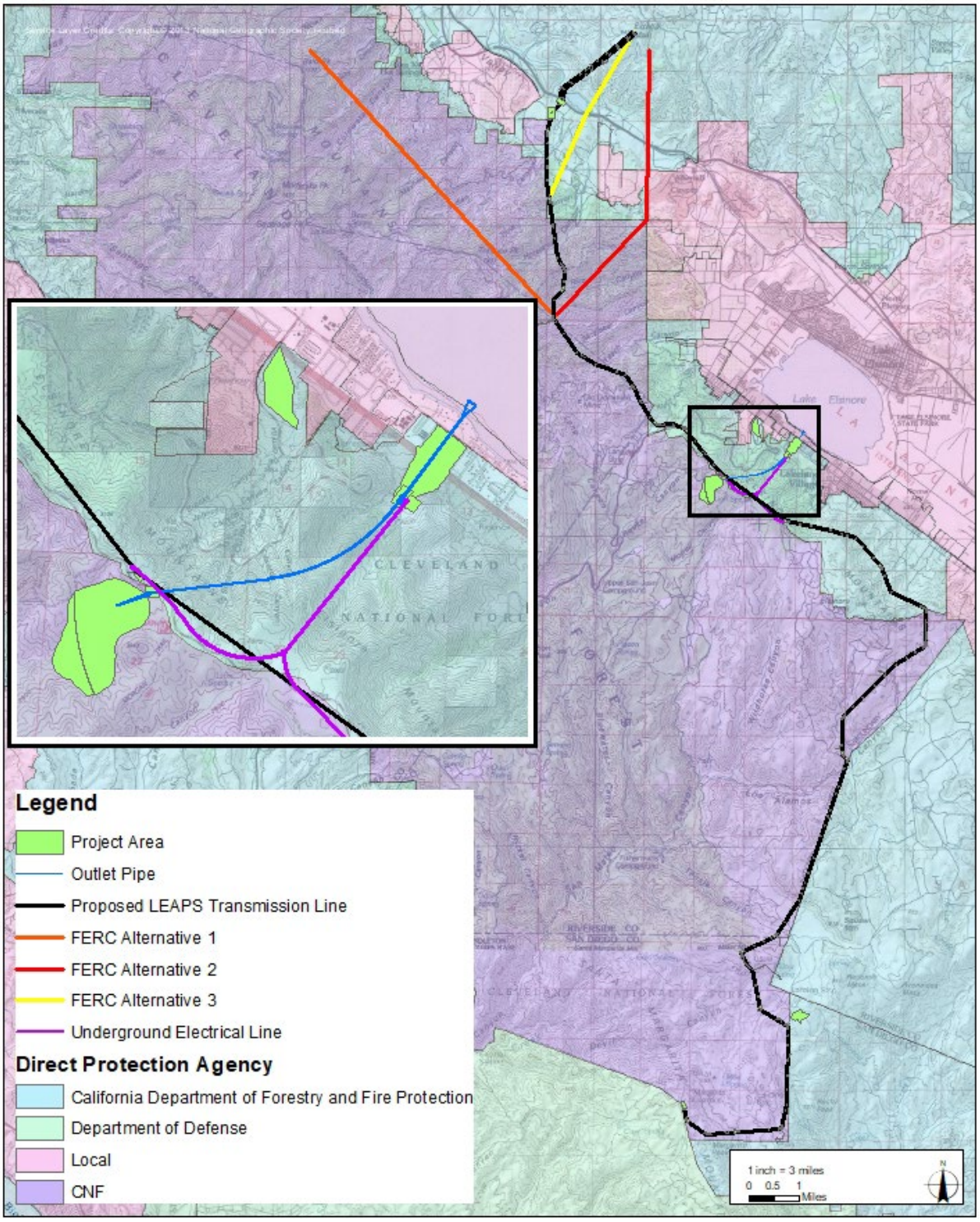

Figure 17. Areas Under Protection from Wildfire and Agency Responsible for Protection near the Proposed LEAPS Project (CAL FIRE 2019a)

The project area is located within the CAL FIRE Southern Region Riverside Unit. The Riverside Unit contains multiple direct protection areas (DPAs). A DPA is that area for which a particular fire protection organization has the primary responsibility for attacking an uncontrolled fire and for directing the suppression action. The project area is located within DPAs for the USDA Forest Service, CAL FIRE, and local agencies. **Figure 17** shows the project area and which agencies are responsible for fire protection in the region.

Insert USFS-provided information regarding response times, routes, interagency communication, etc. for fires within the Cleveland National Forest.

6.4.1 Fire Plans

Insert description of USFS-provided fire plans and wildfire control methods for the Cleveland National Forest.

Each of CAL FIRE's 21 Units and six contract counties create an annual Strategic Fire Plan. The plans include stakeholder contributions and priorities and identify strategic areas for pre-fire planning and fuel treatment. The purpose of the Riverside Unit Strategic Fire Plan is to describe the Riverside Unit's preparedness and firefighting capabilities, identify collaboration with all County stakeholders, identify Values at Risk, discuss pre-fire management strategies, and articulate pre-fire management tactics (CAL FIRE 2018a).

The Riverside Unit (RRU) Fire Danger Operating Plan (FDOP) provides a framework to assess historical fire and weather data based on vegetation, climate, and topography in conjunction with NFDRS modeling. The fire danger level adjectives, as described in **Section 7.0**, are posted on the unit's roadside "Smokey Fire Danger Rating" signs at the Unit's Forest Fire Stations (FFS). These adjectives are an important public and departmental information dissemination tool (CAL FIRE 2016b). In addition, the fire danger level ratings are defined in the Fire Danger Operating Plan and can be used as a tool to support short term fire business decisions such as dispatch levels, staffing patterns, resource prepositioning, etc. (CAL FIRE 2016b).

6.4.2 Staffing

For larger incidents such as wildland fires, CAL FIRE/Riverside County Fire Department responds with a partnership between the state, county, and local jurisdictions. The resources pooled through this partnership includes firefighting rescue aircraft, bulldozers, hand crews, hazardous materials team and urban search and rescue units. Fire danger ratings (**Section 7.0**) are used to determine needed firefighting staffing levels. During the Peak Staffing period, Riverside Unit has 94 Stations staffed with 1150 CAL FIRE career personnel, 240 Riverside County & Office of Emergency Services (OES) personnel and 150 volunteer/reserve firefighters available to staff the following resources (CAL FIRE 2018a).

- Insert USFS-provided wildfire asset information for Cleveland National Forest.

- CAL FIRE resources include: 11 Battalion Chiefs, 16 Type 3 Engines, 17 Hand Crews, 1 Air Attack, 1 Type 2 Helicopter, 2 Type 3 Air Tankers, and 3 Dozers
- Riverside County Fire Department resources include: 37 Battalion Chiefs, 81 Type 1 Engines, 5 Type 2 Engines, 1 Dozer, Water Tenders, 8 Truck Companies, 2 Medic Squads, 10 Medic Ambulances, 2 Haz-Mat Units and 2 Breathing Supports

The CAL FIRE Riverside Unit uses the Burning Index (BI) and Ignition Component (IC) to help set daily staffing levels. BI is a number that relates the contribution of a fire's behavior in containing the fire. Containment difficulty directly relates to fire line intensity (BTU/feet/sec). This is the heat release along the fire perimeter at its head. BI is an index that rates fire danger related to potential flame length over a fire danger rating area. IC is an expressed probability that a firebrand will cause an actionable fire, one that requires suppression action (CAL FIRE 2016b).

The staffing level forms the basis for decisions regarding the "degree of readiness" of initial attack (IA) resources and support resources. The staffing level is based on an analysis of the value of BI as they relate to a Local Preparedness Levels. Staffing levels are expressed as numerical values where 1 represents the low end of the fire danger continuum and 5 the high end. **Table 6**, below, depicts the staffing levels as they relate to the adjective class WFDR, IC, and BI percentile (CAL FIRE 2016b).

Table 6. Staffing levels for firefighting as adjective class increases.

Staffing Level					
	<90th/4	90th/4	90th/2	90th	97th
1	L	L	L	M	M
2	L	M	M	M	H
3	M	M	H	H	VH
4	M	H	VH	VH	E
5	H	VH	VH	E	E
Ignition Component	0-20	21-45	46-65	66-80	81-100

The Riverside County Fire Department has several ordinances in place to reduce the risk of wildland fire and conducts inspections and issues warnings and citations as part of their responsibilities. Ordinances include Weed Abatement (695.4), Orchard Abatement (772), Railroad Right of Way, and Powerline Inspections (PRC 4292 & 4293) (Riverside County 2017b).

6.4.3 Aviation

Insert USFS-provided information on aerial firefighting and concerns associated with potential impacts to fire suppression efforts (e.g., impacts to aircraft).

The State of California has over 45 aircraft for use in suppressing wildfires. There are 13 air attack and 9 helitack bases located statewide, and most fires in the state can be reached within 20 minutes (CAL FIRE 2019f). Many different types of aircraft are used in firefighting in California. Some aircraft employed by

CAL FIRE, especially helicopters, can utilize open water sources, such as reservoirs, to refill their tanks when fighting fires.

6.4.4 Safety Measures

Insert description of USFS-provided fire safety measures in the project area (i.e., wildfire plan plans, fire drills, public training, fire detection systems, etc.).

Insert description of USFS-provided evacuation/escape procedures.

Large fires are an inevitable part of Southern California ecosystems, with flammable vegetation, extreme fire weather, and steep topography being key factors in the area near the project area. Ignition in this ecosystem is commonly caused by people, and residential areas around the project area have pushed up into the foothills in many places due to rapid and expanding development. This has led to a large increase in the amount of wildland-urban interface areas that are at risk and in need of protection from wildland fire.

As described in **Section 4**, these interface areas are situated within chaparral vegetation, and high intensity, stand-replacing fires are a natural part of the fire regime within these vegetation types. This puts homes and businesses built here at risk even from the natural fire regime. The location of Lake Elsinore, El Cariso, and other communities in the area puts them at extreme risk from wildfires, given Santa Ana wind conditions and extremely flammable (predominantly chaparral) fuels. In these areas, it is critical that community planning and vegetation treatments are conducted in a way that reduces the risk of loss of human life, structures, improvements, and natural resources from wildland fire.

USFS/CNF Safety: CNF notifies the public of any dangers in the national forest (https://www.fs.usda.gov/alerts/cleveland/alerts-notices) and maintains Smokey the Bear signage for visitors displaying the fire danger level for the day. The California Wildland Fire Coordinating Group (CWCG) also has started a public safety campaign called "One Less Spark," which aims to educate the public about human-caused wildfire and precautionary actions they can take (http://www.preventwildfireca.org/OneLessSpark/).

Community Safety: In 2002, the Riverside County Mountain Area Safety Taskforce (MAST) was formed as a coalition of local, state and federal government agencies, private companies and volunteer organizations in San Bernardino and Riverside counties to help prevent catastrophic wildfires. Multiple years of severe drought combined with drastically overstocked tree stands have resulted in tremendous rates of tree mortality due to bark beetles in Riverside and San Bernandino counties. CAL FIRE and cooperating MAST agencies have teamed up to focus on removing dead trees, hazardous fuels, and green forest thinning to promote healthy vigorous forests. To date, MAST members have removed more than 1.5 million dead, dying, or diseased trees from the mountainous regions of Riverside and San Bernandino counties (CAL FIRE 2018a).

Vegetation Management: Locally, the CAL FIRE Riverside Unit has a dedicated Vegetation Management Program (VMP) focused on implementing fire hazard/fuels reduction projects in the most appropriate areas of Riverside County. In 2014, a 42-acre fuel break was completed around the entire community of El Cariso Village (CAL FIRE 2018a). This fuel break helps reduce the fire hazard by modifying the fire environment and giving fire protection agencies points of access to initiate defensive and offensive control strategies around the community (CAL FIRE 2016b). Similar projects have been completed in the area, as can be seen in **Figure 18** (USFS 2016).

Transmission Lines and Occupational Safety and Health Administration (OSHA) Safety: Employees unqualified to work with electricity, as well as mechanical equipment, should remain at least 10 feet away from overhead power lines (OSHA 2002). If the voltage is more than 50,000 volts, the clearance increases by 4 inches for each additional 10,000 volts. When mechanical equipment is operated near overhead lines, employees standing on the ground should avoid contact with the equipment unless it is located outside the danger zone (OSHA 2002). When factoring the safe standoff distance, be sure to consider the equipment's maximum reach.

Transmission Lines and Firefighter Safety – Ground: In general, there are emergency responder guidelines that are in place to minimize the risk to emergency response personnel from transmission lines. In the fire area, powerlines should always be assessed, and any downed wires should be treated as if they were energized. Basic guidelines for firefighter safety include wearing the proper personal protective equipment (PPE), being trained in safe limits of approach for various voltages and being aware of the unique dangers involved with electrical infrastructure and wildland fire. These dangers may include swing and sag for electrical lines, downed powerlines and step and touch hazards, "open" energized equipment for facilities like substations, and other concerns. General precautions for firefighters responding to wildfire near transmission/power lines include:

- Assess the situation from a safe distance (i.e., approximately 35 feet) and determine voltage.
- Determine the safe limits of approach (depending on voltage – if unknown go with greatest voltage).
- Notify the electrical utility and inform other emergency responders of hazards, including the location of powerlines that are or may be involved in the incident.
- Escape routes, incident command centers, and crews should never be routed or stationed such that personnel are near/under power lines.
- Avoid applying water, foam, or gel. If necessary, only use a water fog pattern on pole-top equipment.

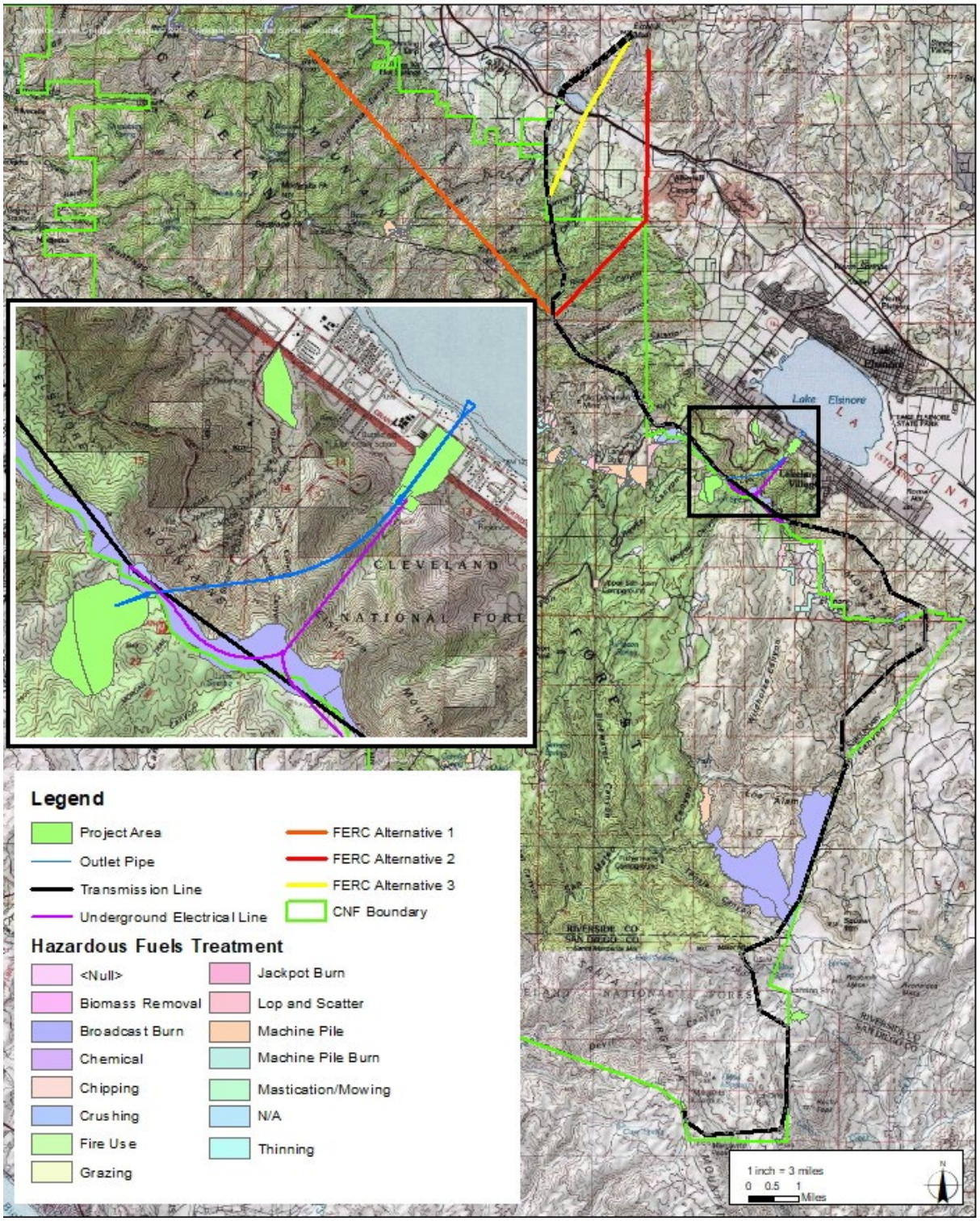

Figure 18. Completed Hazardous Fuels Treatments near the Proposed LEAPS Project (USFS 2016)

Heat from extreme fire activity ionizes the air and can act as a conductor, causing a line to arc to directly to ground. Smoke, fire retardant, foam, or water can contaminate insulators, causing a power line to arc across insulators, through poles or towers to ground. In addition, "Fire Shelter" material is conductive and may attract an arc if a power line faults to ground. Fallen wires from transmission lines can cause hazards that may block escape routes, equipment, or pose a hidden danger during mop up operations.

Transmission Lines and Firefighter Safety – Air: Aerial firefighting requires aircraft to fly "low and slow" in order to deliver water and flame retardants on-target, and low-level flights (i.e., below 500 feet), which can be extremely hazardous. Flight hazards at this elevation include power lines, cell towers, and radio towers, some of which may not be indicated on flight hazard maps. These hazards are especially prevalent in stream canyons, saddles, and along roads (Oregon Department of Forestry 2008). Low-level missions below 500 feet should only be flown after a high-level reconnaissance has been conducted to determine that the area is safe.

General safety guidelines to be employed by aerial firefighters are as follows:

- Be aware of all power lines in and around the fire area, including skylines; and
- Skylines run along the tops of transmission towers; they are single, ¼-inch steel wires that are very easy to overlook in contrast to the larger conductors on the same tower.

Power lines can be unknowingly struck by a pilot, as was the case in 2016, when a pilot in northern Idaho operating a single engine air tanker (SEAT) struck a powerline while on final approach for a water drop on a fire (Gabbert 2016). Investigations discovered that the strike occurred when the pilot was setting his/her own approach, without a lead plane. The new approach brought the SEAT over a powerline that was not previously identified on the flight hazard map, though the pilot was actively avoiding a known powerline nearby. The angle of the bank caused the nose and the right wing of the plane to create a blind spot, and the angle of the sun and the dark color of the powerlines impaired visibility further (Gabbert 2016). The pilot did notice a noise at the time of the strike, but was unaware of the cause; once the pilot was on the ground and saw marks on his plane confirming the strike, notifications were made to dispatch that hot wires may be on the ground posing a risk to firefighters (Gabbert 2016).

Wind-driven wildfires, such as the Camp Fire in 2018, make utilizing fixed-winged aircraft a challenge in extreme fire weather situations, with thick smoke and high winds being the major challenges (Serna and Kim 2019). Thick smoke poses a safety hazard due to limited visibility. High winds are also a safety hazard, but they also reduce the efficacy of flame retardants. Flame retardants dropped from fixed-wing aircraft must be applied "low and slow", and this approach is not possible during extreme fire weather with high winds (Serna and Kim 2019). This is less of a challenge for helicopters, which are able to operate in higher wind situations. Extreme fire weather grounded tankers during the 2018 Camp Fire (Serna and Kim 2019).

Transmission Lines and Electrical Company Safety: In December of 2017 the CPUC adopted new fire safety regulations related to the HFTDs outlined previously in **Section 6.3**. In a press release announcing

the new regulations, CPUC stated that the new policy includes significant new fire prevention rules for utility poles and wires, including major new rules for vegetation management. These recently-adopted fire safety regulations will require electric utilities to comply with the regulations outlined below. Lastly, the CPUC press release eluded that electric utilities may disconnect service to customers who refuse to provide access to their property for the removal of trees that pose an immediate threat for contacting a power line (CPUC 2017, 2019). The fire safety regulations issued by CPUC are as follows.

- Prioritize correction of safety hazards based, in part, on whether the safety hazard is located in a HFTD;
- Correct non-immediate fire risks in Tier 2 of the HFTD within 12 months, and in Tier 3 within 6 months;
- Maintain increased clearances between vegetation and power lines throughout the HFTD;
- Maintain more stringent wire-to-wire clearances for new and reconstructed facilities in Tier 3;
- Conduct annual patrol inspections of overhead distribution facilities in rural areas of Tier 2 and Tier 3; and
- Prepare a fire-prevention plan annually if overhead facilities are present in HFTD.

Nevada Hydro has enlisted the expertise of a third party to investigate wildfires and transmission lines in the area. Their findings were that no wildfires have been started by 500 kV transmission lines (Nevada Hydro Corporation 2019). This is in contrast to lower-voltage business and residential transmission and distribution lines, where fires can be more likely to start due to the shorter distance from conductors to the ground and because the conductor phases are closer together (SDG&E 2008). Additionally, Nevada Hydro maintains that the 500 kV transmission lines would be monitored constantly to detect any communication loss or net flow differences and that such an interruption will automatically de-energize the line in 1/10th of a second (Nevada Hydro Corporation 2019). This, coupled with the vegetation management planned for the 500 kV transmission line path (to be monitored by employees, drone, and/or camera), will reduce fuels and sparking risks in and around the transmission lines, reducing risk for wildfire in these areas (Nevada Hydro Corporation 2019).

As discussed above, the State of California has standards in place to prevent fires from electrical utilities. While regulations exist to keep vegetation away from transmission lines and equipment in good working order, inspections on electrical transmission lines for wildfire compliance are beyond the current capability of CPUC (Hudson 2019). CAL FIRE has notified the public of preemptive electrical outages initiated by utility companies in order to reduce the risk of sparking during dangerous wildfire weather (CAL FIRE 2018b). PG&E de-energized power lines in October 2018 in high risk areas under the threat of wildfire. Customers protested at being without electricity, but there was no fire at that time. When a similar wildfire threat occurred 1 month later, PG&E decided not to de-energize power lines, leading to a wildfire that became the extremely destructive and deadly Camp Fire (Trabish 2019). De-energizing power lines in order to prevent wildfire during times of high wildfire danger may be met with resistance

from power consumers but is becoming a commonly proposed strategy for utility companies coping with mitigating fire risk.

7.0 DISCUSSION

Due to its topography, vegetation, weather, infrastructure, and surrounding residential development, the CNF, where the proposed project is largely located, is a highly dynamic and challenging environment when it comes to wildland fires. This discussion aims to describe any changes to fire risk in the region from the proposed project, with recommendations or mitigation measures (e.g. biomass reduction and fire suppression efforts) included. As described in **Section 5.3**, wildfire in the region near the project area is rarely caused by electrical infrastructure. Causes of fire in the State of California vary, but are largely from undetermined ignitions, and often from people. The fire season in Riverside County is officially year-round, but fire danger days trend toward higher ratings of flammability in the area from summer through the end of the year (July – December), which also correlates with reduced fuel moisture in the chaparral vegetation that makes up the majority of the CNF and the Santa Ana winds.

7.1 Transmission Line Alternatives

This section aims to discuss and compare the fire risk for the three previously described alternative transmission line routes (**Section 4.1** and **Section 6.1**). The most obvious difference between the three alternative routes is topography. FERC Alternative 1 crosses a number of named canyons and areas of steep topography within the CNF. Of the three alternatives, FERC Alternative 3 appears to cross the fewest areas of steep topography.

Although the recent Holy Fire has consumed much of the fuel under the three alternative alignments, there are still some subtle differences in fire history and existing fuels in the area (**Section 6.1**). The only portions of the three alternative alignments that were not within the Holy Fire boundary appear to be the far northwest portion of FERC Alternative 1 and the portions of FERC Alternatives 2 and 3 that are north of I-15 (**Figure 8** and **Figure 9**). Of the three alternatives, the far northwest portion of FERC Alternative 1 presents the greatest risk of severe fire behavior since it has steep topography and has not burned since the 1980s, compared the northernmost portions of FERC Alternatives 2 and 3 which burned in the 1990s and as recently as the 2000s, respectively.

7.2 Hazardous Fuel Loading

Fuels within the vicinity of the project area are capable of producing intense and fast-spreading fires, especially in mature stands of chaparral. **Section 5.2** shows that NVC vegetation type chamise chaparral is by far the most dominant vegetation type (**Figure 4**) occurring in the project area. This vegetation type is extremely flammable, with stand-replacing fires being a natural occurrence. The California live oak vegetation type in the project area occurs in pockets throughout and is typically burned by low-intensity understory fires, but the other two dominant vegetation types – coastal sagebrush and

Californian annual grassland – are both fire prone, with the former being similar to chamise chaparral and the latter being a more frequently-burning grassland (every 2 years) with many non-native grasses and forbs. While chaparral vegetation in this region is thought to have burned every 50 years or so, with increased development these areas have seen their fire return interval grow shorter, to approximately every 30 years.

According to the CAL FIRE Riverside Unit, this area presents one of the greatest fire risks in Riverside County and consists primarily of Fuel Models #4, #5, and #6 (CAL FIRE 2018a). As discussed in **Section 5.3**, Model #4 is most prevalent in the transmission line path leading north from the pump station and reservoir, while Models #5 and #6 co-occur and are present throughout the project area (**Figure 4**). Fuel Model #4 is the most fire-prone, but Models #5 and #6 are younger or more open versions of Model #4 that will burn readily with dry, windy conditions.

The majority of fuels in this area have been ranked by CAL FIRE as either High or Very High (**Figure 6**), which means the area has a higher potential of severe fire behavior. Some areas near the end of the northern portion of the proposed transmission line and a stretch of the southern transmission line cross Moderate fuels, but extreme fire weather can overwhelm efforts to utilize moderate fuels and fire breaks during fire suppression efforts, as discussed in **Section 5.3**.

It is not possible to quantify the fuel load in the vicinity of the project area, in terms of tons per acre, without a more detailed fuel loading survey. However, it can be stated that fuels in the vicinity of the project area are very flammable and that proactive measures, such as vegetation management/fuels reduction, are not likely to be failsafe under the extreme fire weather that is typical of summer and fall conditions. However, fuel breaks and fuels management should be considered in key areas. Under dry, hot, Santa Ana wind conditions, chaparral wildfires burn through all age classes of fuels, and fuel management programs that aim to increase younger chaparral and/or fuel breaks into ecosystems do not act as barriers to fire spread under these conditions. Young fuels will have high winds drive the fire through them, and firebrands will carry the fire well beyond the live fire front. Strategic placement of younger stands of chaparral or fuel breaks near the wildland urban interface and around infrastructure is a more effective planning method, as these lighter fuel areas will provide defensible space to firefighters (Keeley et al. 1999). The hazardous fuels present in and around the proposed project will require planning so that the pumphouse, reservoir, and transmission lines are able to be protected to the extent possible during the fires that will inevitably burn in the area. As discussed in **Section 6.4.4**, the 500-kV transmission line is not expected to increase the likelihood of hazardous fuels igniting. Safety measures discussed in that same section, such as monitoring the lines for interruptions and monitoring maintaining rights-of-way to keep them clear of fuels and hazards, will also assist with preventing sparking and accidental wildfires.

7.3 Infrastructure Effects

The construction of the proposed LEAPS Project, particularly the 32-mile transmission line, could result in potential impacts to fire suppression efforts. At the very least, the additional infrastructure would increase the structures and resources that would need to be protected in the event of a wildfire. The main infrastructure topics are discussed below.

With the latest fire in the CNF - the Holy Fire, located on the Trabuco District – a notable challenge was the protection of critical infrastructure within and adjacent to the fire area. These types of challenges can increase risk and exposure to firefighting personnel and divert efforts away from perimeter control and containment. This is a matter of course for any additional infrastructure construction, including the LEAPS Project. The 32-mile transmission line would need to be taken off line and defended to the extent possible during a wildfire, and this transmission line runs over very flammable vegetation types throughout most of its path (**Section 7.1**). Wildfire management plans would need to be in place by Nevada Hydro, and close communication and coordination among the various firefighting agencies and the management of the proposed Project would need to be implemented.

Insert additional USFS-provided information regarding the Holy Fire response. (Publically available information [e.g., news reports, brief agency summary reports, etc.] has been incorporated.)

7.3.1 Fire Management Operations

7.3.1.1 Ground Operations

Insert USFS-provided information about existing roads and potential shortcomings or gaps in the transportation network.

Road improvements in this area of the CNF for the purpose of accommodating fire equipment and providing safe public access was cited as a topic of emphasis in the national forest planning documents. To this end, there could be many positive impacts to fire suppression efforts as a result of the LEAPS Project. If the proposed 32-mile transmission line is constructed, approximately 5.2 miles of permanent access roads would be constructed to aid in access to towers substations and other various pieces of the infrastructure. In the event of a wildfire, these roads may be able to provide the responding units with additional access to fires burning in the area. They would also provide increased defensible space. Precautions would need to be put in place to prevent public access to these roads in order to prevent accidental fires from tow-chains or arson and unauthorized usage by Off Road Vehicles (ORVs) and hikers.

Ground operations must take into account numerous safety protocols, such as those mentioned in **Section 6.4.4**, when working near powerlines. Although these safety protocols are important for the safety of emergency responders it is possible that they could cause a delay or limit the immediate effectiveness of ground operations. For example, many safety protocols recommend minimizing

firefighter operations near powerlines. Following the necessary safety protocols takes time and could limit the immediate effectiveness of ground operations, such as initial attack resources, should a fire start very near the proposed transmission line routes.

7.3.1.2 Aerial Operations

Aircraft used in fire suppression efforts must often utilize a low flight path to either refill with water or discharge water/fire retardant. It is impossible to predict where exactly a fire will be burning at the time an aircraft is needed for suppression efforts, but there is a possibility that low flight paths may not be possible (or may be limited) due to the height of the proposed transmission line. A delay in applying water or retardant via aircraft could result in the fire growing larger and needing more resources. In addition, fire retardant cannot be applied in a manner in which it will contact powerlines for safety concerns, which could limit the effectiveness of the application.

In addition to the low flight paths necessary for firefighting, Santa Ana winds and extreme fire danger can ground aerial operations for safety reasons. High winds can also make fire retardant ineffective. The project area is located experiences these conditions on a regular basis (**Sections 5.2** and **6.4.4**), and regional fire planning should take this into consideration.

7.3.1.3 Water Sources

The updated design for the upper reservoir (**Figure 1**) that is analyzed in the 2007 EIS remains lined and within the CNF but it now has a smaller footprint while retaining the original storage capacity. It is proposed to be located in Decker Canyon, in CNG. In addition to the benefit of having the reservoir closer to Lake Elsinore, the upper reservoir's presence in CNF will provide a source of water to fight fires within the CNF. In the event of a wildfire any nearby, firefighting units would have access to draw water from the upper reservoir for this purpose.

USFS to provide input on requested communication protocols with Nevada Hydro and/or logistics for coordination.

The various types of aircraft employed to fight fires by CAL FIRE include helicopters and other aircraft that could refill their tanks at the upper reservoir (CAL FIRE 2000). In addition, ground-operated wildland fire vehicles, such as engines and water tankers, could utilize the reservoir for water needed to prevent and contain wildland fires. Overall, the presence of a reservoir within the CNF would be beneficial to firefighting efforts and would not increase the danger of wildfire in the area.

7.4 Wildfire Risk

Wildfires can start at transmission lines or substations for a variety of reasons. Fires are more likely to start along small transmission and distribution lines due to the shorter distance from conductors to the ground, and because the conductor phases are closer together (California Public Utilities Commission and Bureau of Land Management 2008).

USFS to provided suggested fire risk reduction measures (e.g., vegetation management, powerline fire patrol, etc.).

Transmission Lines

In support of the larger community, there are many infrastructure components located in the national forests of Southern California, including utility corridors, communication sites, dams, diversions, and highways. National forests must balance utilizing lands as resources to help meet energy needs (i.e. transmission) while preserving the character of the landscape. In Southern California, renewable energy resources (e.g., solar, wind and hydro-electric energy) are supported by national forests in order to help meet growing energy needs while protecting other resources.

Fire prevention measures are in place from the partially buried transmission lines, vegetation management and monitoring along power lines, and the lack of evidence that fires are caused by high kV (i.e., 500 kV) powerlines. Further, utility companies may consider de-energizing power lines on extreme fire danger days. For example, SCE initiates Public Safety Power Shutoffs (PSPS) in high fire risk areas to reduce fire risk during extreme and potentially dangerous fire weather conditions. In addition to PSPS, a powerline fire patrol is put into action to monitor for wildfires during periods of increased fire danger. Given that the proposed 500-kV line will be constantly monitored, there is a possibility that Nevada Hydro may take a similar approach on fire danger days when this is advisable. It is anticipated that a firebreak will be constructed under the entire length of the 32-mile transmission line to meet, at a minimum, firebreak clearance standards outlined in the Fire Prevention Standards For Electrical Utilities, 2004 Adopted Rule Language (Final Rule Language Approved by the California Office of Administrative Law [OAL] on October 24, 2005) (CAL FIRE 2005). This firebreak would help prevent sparks from igniting flammable fuels under the transmission line, and, depending on the fire weather, it could help slow the spread of fires that occur in the area. Lastly, the proposed transmission line would be subject to the recently updated CPUC Fire Safety Regulations, mentioned in **Section 6.4.4**, which would require Nevada Hydro to prepare an annual fire prevention plan, conduct patrol inspections, and complete vegetation management to maintain required clearance. Given that the fire return interval of the most dominant vegetation type in the project area (i.e., chamise chaparral) is roughly 30 years, fires should be expected, and plans should be in place.

8.0 RECOMMENDATIONS

It is recommended that local communities, USFS, and Nevada Hydro collaborate on the use of new and improved existing roads in order to improve access by firefighting equipment and to increase defensible space for the WUI. Precautions should be discussed to avoid mis-use of these assets, such as ORVs, careless fire use by national forest visitors, or vehicle-induced sparks on these roads.

In addition, vegetation management along the transmission line corridors should proceed with the precautions outlined in the descriptions provided by Nevada Hydro. If appropriate, it would likely be

useful to allow for review by CNF USFS personnel in order to ensure that they are appropriate to the vegetation types and fire behaviors typically seen in the region.

Finally, consideration should be given to reviewing the defensible space currently present in the wildland-urban interface area near the project area. Proper planning and fuel management in key areas can help with defending infrastructure and communities from the wildfires that area a natural part of this ecosystem.

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Lake Elsinore Advanced Pumped Storage Project

FERC Project No. 14227

Study 28 (Fire Study) Response Matrix

Comment #	Document	Date	Page	Paragraph	Line	Sentence	Comment	Reviewer/Author Name, Title (Organization)	Receipient of Review Document Name (Organization)	Name of Responder (Organization)	Action Taken to Address the Comment AND LOCATIONS OF CHANGES IN THE DOCUMENT:	Notes
1	Word Document: Forest Service Comments on Additional Studies for LEAPS Project	09/13/2018	-	-	-	-	Information from the recent Holy Fire, which burned in areas proposed for use by LEAPS could provide valuable insight and the opportunity to assess how fire-fighting response would have been impacted by the project.	Darrel Vance (USFS)	David Kates	Jarrod Armstrong & Kari Morehouse (Wood)	Reference to the Holy Fire was added in Section 6.1 (Fire History) and Section 6.3 (Wildfire Danger)	
2	Email: From Darrel Vance to Nick Meisinger	11/08/2018	-	-	-	-	The Cleveland National Forest is a highly dynamic and challenging environment when it comes to wildland fires. The Cleveland has experienced several large fires, most recently the Holy Fire, located on the Trabuco District. There were several unique challenges, most notably critical infrastructure within and adjacent to the fire area. These types of challenges can increase risk and exposure to firefighting personnel and divert efforts away from perimeter control, which should be included in the fire risk study.	CNF Fire Chief Brian Rhodes (USFS)	N/A	Jarrod Armstrong & Kari Morehouse (Wood)	See response to Comment 1, above. Existing infrastructure in the area is addressed in Section 4.5 (Existing Infrastructure), the surrounding communties for the proposed project area are addressed in Section 4.1 (Location), and resources and firefighter response are addressed in Section 6.4 (Wildfire Preparedness). Infrastructure additions resulting from the proposed Project and their impacts to fire management operations are addressed in Section 7.3 (Infrastructure Effects).	
3	Email: From Darrel Vance to Nick Meisinger	11/08/2018	-	-	-	-	Proposed utility corridors on the National Forest will need to include several assessments to determine their impacts. The assessments will need to investigate effects to both ground and aerial firefighting operations, given powerline avoidance requirements for personnel safety.	CNF Fire Chief Brian Rhodes (USFS)	N/A	Jarrod Armstrong & Kari Morehouse (Wood)	Ground and aerial firefighting operations are addressed in Section 6. 4 (Wildfire Preparedness and Response). Analysis of impacts from the proposed transmission line route(s) are addressed in Chapter 7, specifically in Section 7.3 (Infrastructure Effects), which includes effects both to ground and aerial firefighting operations.	
4	Email: From Darrel Vance to Nick Meisinger	11/08/2018	-	-	-	-	An assessment will need to be done to include potential disruption of service to an area due to the effects of a wildfire.	CNF Fire Chief Brian Rhodes (USFS)	N/A	Jarrod Armstrong & Kari Morehouse (Wood)	These issues are addressed in Section 7.4 (Wildfire Risk), which references de-energizing proposals, schedules, and technologies. ***Additionally, Wood still awaiting information from USFS (see list of questions) to more fully understand the data available to comprehenisvely address local issues known by CNF staff.***	
5	Email: From Darrel Vance to Nick Meisinger	11/08/2018	-	-	-	-	Last but not least, an assessment will need to be conducted to address the threat and risk associated from utilities that ignite a wildfire due to high winds or other impacts.	CNF Fire Chief Brian Rhodes (USFS)	N/A	Jarrod Armstrong & Kari Morehouse (Wood)	Power line and associated utilities and the threat they pose to surrounding areas through potential sources of wildland fires are addressed Sections 6.1 (Fire History), 7.1 (Transmission Line Alternatives), and 7.4 (Wildfire Risk).	
6	PDF Letter: FERC_LEAPS Fire Study Plan Response_04-10-2019	04/10/2019	-	-	-	-	The Forest Service has communicated concerns regarding the Fire Plan, and provided TNHC with written comments[1], however none of of our concerns or comments appear to have been incorporated, acknowledged, or addressed in the plan recently submitted to FERC. We do not disagree or object to certain elements TNHC has proposed in the Fire Study, however the plan lacks the analysis we've requested to determine how the proposed project could impact fire risk and fire management activities within the Cleveland National Forest.	Darrel Vance (USFS)	N/A	Jarrod Armstrong & Kari Morehouse (Wood)	See response to Comments 1-5, above. The comments USFS provided on the Draft Fire Study Plan have been incorporated. ***Additionally, Wood still awaiting information from USFS (see list of questions) to more fully understand the data available to comprehenisvely address local issues known by CNF staff.***	
7	PDF Letter: FERC_LEAPS Fire Study Plan Response_04-10-2019	04/10/2019	-	-	-	-	As proposed, the transmission lines could significantly limit and impede our fire management options and operations, and increase the risk and impacts of wildland fires in this area. Such impacts could include:	Darrel Vance (USFS)	N/A	Jarrod Armstrong & Kari Morehouse (Wood)	This issue is addressed in Sections 6.4 (Wildfire Preparedness) and 7.1 (Transmission Line Alternatives). However, ***Wood is still awaiting information from USFS (see list of questions).***	

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8	PDF Letter: FERC_LEAPS Fire Study Plan Response_04-10-2019	04/10/2019	-	-	-	-	increasing risk and exposure of our firefighting personnel;	Darrel Vance (USFS)	N/A	Jarrod Armstrong & Kari Morehouse (Wood)	Addressed in Safety, Section 6.4.4 (Safety Measures), and discussed in Section 7.3.1 (Infrastructure Effects). ***Additionally, Wood still awaiting information from USFS (see list of questions) to more fully understand the data available to comprehenisvely address local issues known by CNF staff.***	
9	PDF Letter: FERC_LEAPS Fire Study Plan Response_04-10-2019	04/10/2019	-	-	-	-	reducing the effectiveness of fuel management projects within the project area;	Darrel Vance (USFS)	N/A	Jarrod Armstrong & Kari Morehouse (Wood)	Plans to research and analyze impacts to fuels and fuel moisture are addressed in Sections 5.2 (Vegetation) 5.3 (Fuels and Fuel Moisture). Specifically, we have added language in Section 7.2 (Hazardous Fuel Loading), and would **welcome input from USFS to provide additional analysis to address the comment.**	
10	PDF Letter: FERC_LEAPS Fire Study Plan Response_04-10-2019	04/10/2019	-	-	-	-	decreasing our ability to manage the land in accordance with our LMP direction;	Darrel Vance (USFS)	N/A	Jarrod Armstrong & Kari Morehouse (Wood)	Information has been added to Section 4.2 (Regional Land Use), to more explicitly incorporate the CNF LMP text cited in this letter. Analysis and discussion is addressed Chapters 6 (Fire Study Elements) and 7 (Discussion).	
11	PDF Letter: FERC_LEAPS Fire Study Plan Response_04-10-2019	04/10/2019	-	-	-	-	or increasing fire incidents and risk to the surrounding communities through project operations.	Darrel Vance (USFS)	N/A	Jarrod Armstrong & Kari Morehouse (Wood)	The potential for increased hazardous fuel loading is addressed in Section 7.2 (Hazardous Fuel Loading) and 7.4 (Wildfire Risk).	
12	PDF Letter: FERC_LEAPS Fire Study Plan Response_04-10-2019	04/10/2019	-	-	-	-	In order to assess these impacts, the Forest Service requests that the LEAPS Fire Plan investigate: • Establishing a baseline analysis of existing vegetative conditions and fire recurrence intervals for the project area,	Darrel Vance (USFS)	N/A	Jarrod Armstrong & Kari Morehouse (Wood)	A spatial analysis of existing vegetative conditions is comprehensively addressed in Sections 5.2 (Vegetation) and 5.3 (Fuels & Fuel Moisture).	
13	PDF Letter: FERC_LEAPS Fire Study Plan Response_04-10-2019	04/10/2019	-	-	-	-	compare: • The proposed transmission lines with alternative LEAPS transmission configurations (tower size and voltage, clearances, and corridors from the proposed) and their respective effects on: o Powerline avoidance requirements for personnel safety- including aerial limitations.	Darrel Vance (USFS)	N/A	Jarrod Armstrong & Kari Morehouse (Wood)	Addressed in Sections 6.4 (Wildfire Preparedness) 7.3 (Infrastructure Effects). ***Additionally, Wood still awaiting information from USFS (see list of questions) to more fully understand the data available to comprehenisvely address local issues known by CNF staff.***	
14	PDF Letter: FERC_LEAPS Fire Study Plan Response_04-10-2019	04/10/2019	-	-	-	-	Potential and frequency of disruption to services, due to the effects of wildfire or other wildfire management activities.	Darrel Vance (USFS)	N/A	Jarrod Armstrong & Kari Morehouse (Wood)	Fire recurrence intervals are addressed in Sections 5.2 (Vegetation), 6.1 (Fire History), 6.2 (Fire Season), and 6.3 (Wildfire Danger).	
15	PDF Letter: FERC_LEAPS Fire Study Plan Response_04-10-2019	04/10/2019	-	-	-	-	Risks associated with various configurations, and their potential to ignite wildfire due to high winds or other impacts.	Darrel Vance (USFS)	N/A	Jarrod Armstrong & Kari Morehouse (Wood)	Addressed in Section 7.1 (Transmission Line Alternatives) and Section 7.4 (Wildfire Risk).	
16	PDF Letter: FERC_LEAPS Fire Study Plan Response_04-10-2019	04/10/2019	-	-	-	-	Land, fuel, or fire management operation limitations due to infrastructure concerns	Darrel Vance (USFS)	N/A	Jarrod Armstrong & Kari Morehouse (Wood)	Addressed in Sections 4.5 (Existing Infrastructure) and 7.3 (Infrastructure Effects).	
17	PDF Letter: FERC_LEAPS Fire Study Plan Response_04-10-2019	04/10/2019	-	-	-	-	Response time impediments or impacts on initial attack for fire and all risk incident	Darrel Vance (USFS)	N/A	Jarrod Armstrong & Kari Morehouse (Wood)	Addressed in Section 6.4 (Wildfire Preparedness). ***Additionally, Wood still awaiting information from USFS (see list of questions) to more fully understand the data available to comprehenisvely address local issues known by CNF staff.***	

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18	PDF Letter: FERC_LEAPS Fire Study Plan Response_04-10-2019	04/10/2019	-	-	-	-	Impacts on fuelbreak or fuels reduction project effectiveness	Darrel Vance (USFS)	N/A	Jarrod Armstrong & Kari Morehouse (Wood)	Addressed in Section 7.3 (Infrastructure Effects).	
19	PDF Letter: Reference: Review of Additional Information and Study Plans_5-13-2019	5/13/2019	-	-	-	-	The study are for the fire study must include the full extent of proposed project, including the proposed transmission lines.	Timothy Konnert, Chief (FERC)	Rexford Wait (Nevada Hydro)	Jarrod Armstrong & Kari Morehouse (Wood)	Description of the proposed transmission line routing alternatives is included in the Revised Draft Fire Study Plan and is specifically discussed in Section 7.1 (Transmission Line Alternatives). See also response to Comment 7, above.	
20	PDF Letter: Reference: Review of Additional Information and Study Plans_5-13-2019	5/13/2019	-	-	-	-	On April 11, 2019, the Forest Service filed a letter outlining specific elements that sould be included in the Fire Study Plan. The Forest Service states that the Fire Study Plan should establish a baseline analysis of existing vegetation conditions and fire recurrence intervals. Additionally, the Forest Service states that the study should analyze the proposed transmission lines and alternative configurations and their effects on powerline avoidance requirements for personnel safety (including effects on aircraft), fire risk and the potential for project transmission lines to ignite wildfire due to high winds or other impacts, limitations on any fire management operations due to project infrastructure, impacts on response time for fire incidents, and impacts on fuelbreak or fuels reduction effectiveness. Commission staff agrees with the Forest Service that this information is necessary, and, therefore please modify your proposed Fire Study Plan accordingly.	Timothy Konnert, Chief (FERC)	Rexford Wait (Nevada Hydro)	Jarrod Armstrong & Kari Morehouse (Wood)	These topics are included in the Revised Draft Fire Study Plan, as outlined with reference to the same USFS letter in responses to Comments 6 - 18, above.	

Document Content(s)