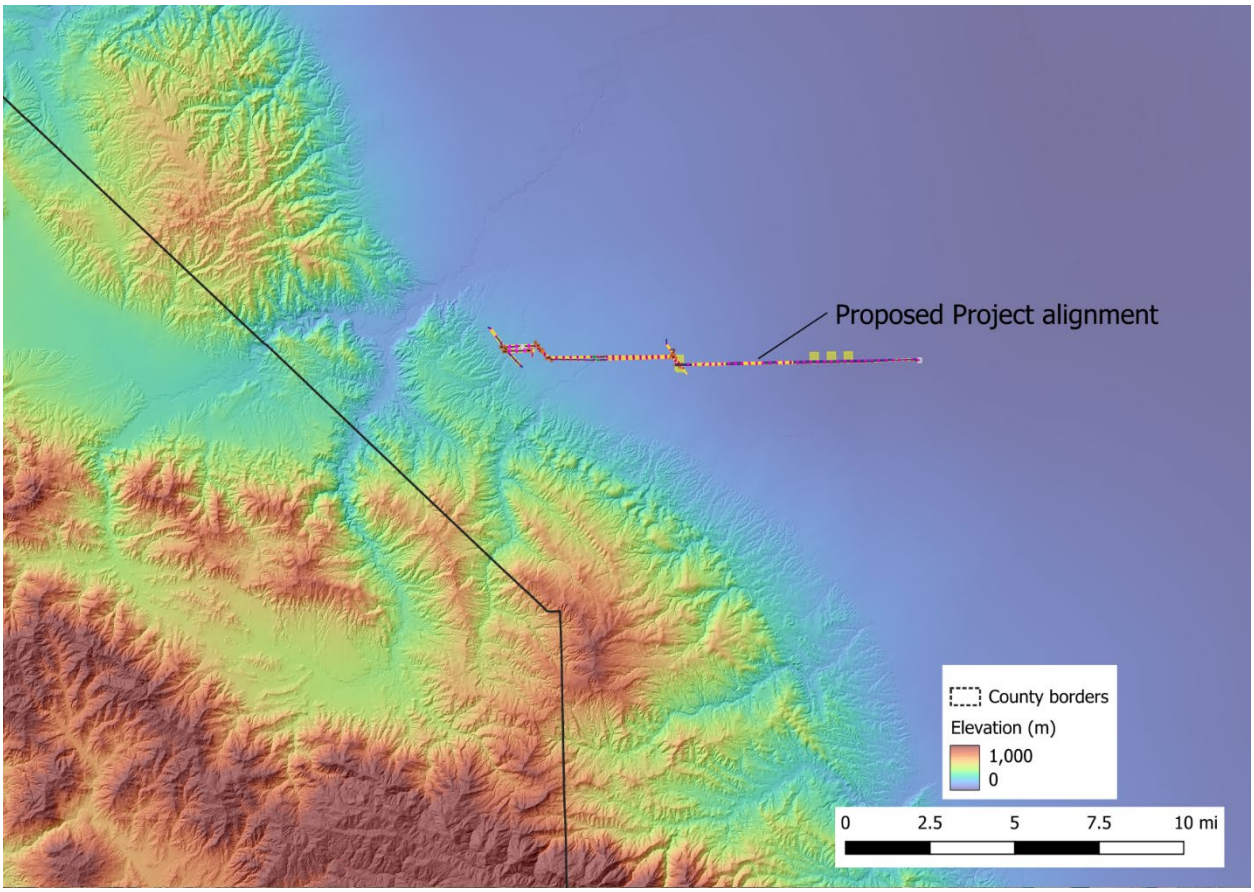
Appendix G

Wildfire Analysis Report

Manning 500/230 kV Substation Project - Wildfire Analyses



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CloudFire

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1.0 INTRODUCTION

CloudFire Inc. (CloudFire) has been retained by Insignia environmental (Insignia) to provide a wildfire risk analysis of the proposed Manning 500/230 kilovolt (kV) Substation Project (Proposed Project). This analysis addresses components outlined in Section 5.20.1 of the California Public Utilities Commission (CPUC) "Guidelines for Energy Project Application Requiring CEQA Compliance"[1], hereafter "CPUC guidelines". This report presents the findings of this analysis.

[1] https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/c/6442463239-ceqa-pre-filing-guidelines-pea-checklist-nov-2019.pdf

2.0 HIGH FIRE RISK AREAS AND STATE RESPONSIBILITY AREAS

CPUC guidelines Section 5.20.1.1 requires identification of Wildland Urban Interface (WUI) areas and high fire risk areas within the Proposed Project area. To meet this requirement, CloudFire analyzed the following maps developed by the Federal Government and State of California:

1. CAL FIRE State Responsibility Areas[2] - See Figure 1.
2. 1990-2020 wildland-urban interface of the coterminous United States[3] - see Figure 2.
3. CPUC High Fire Threat District map[4] - see Figure 3.
4. Currently adopted Fire Hazard Severity Zone maps[5] - see Figure 4.
5. Fire Resource Assessment Program (FRAP) Fire Threat map[6] - see Figure 5.

Figure 1 shows Local Responsibility Area (LRA), State Responsibility Area (SRA), and Federal Responsibility Area (FRA) relative to the Proposed Project Alignment. East of Interstate 5 the Proposed Project is in Local Responsibility areas and west of Interstate 5 it is in State Responsibility areas. Figure 2 shows that the predominant WUI classifications in the Proposed Project area are "very low density" and "low density," with a small amount of "medium density" WUI approximately 4 miles north and 8 miles southeast of the Proposed Project alignment.

As shown collectively in Figure 3 – Figure 5, the Proposed Project is sited in a generally low fire risk area. The Proposed Project is not located within or near CPUC high fire threat districts. West of Interstate 5, the Proposed Project is in a moderate fire hazard severity zone. Fire threat along the alignment is not rated, meaning it is less than the minimum fire threat category (low).

[2] https://gis.data.ca.gov/datasets/3991e5168faf47dfa0953caa1fe53bae_0
[3] https://www.fs.usda.gov/rds/archive/catalog/RDS-2015-0012-4
[4] https://www.cpuc.ca.gov/industries-and-topics/wildfires/fire-threat-maps-and-fire-safety-rulemaking
[5] https://osfm.fire.ca.gov/divisions/community-wildfire-preparedness-and-mitigation/wildfire-preparedness/fire-hazard-severity-zones/fire-hazard-severity-zone-maps/
[6]https://34c031f8-c9fd-4018-8c5a-4159cdff6b0d-cdn-endpoint.azureedge.net/-/media/calfire-website/what-we-do/fire-resource-assessment-program---frap/gis-data/fire-threat-v14_2.zip?rev=6e6841d8777b429397875c25b9bb696c&hash=A2667077F81E905061931642470112CF

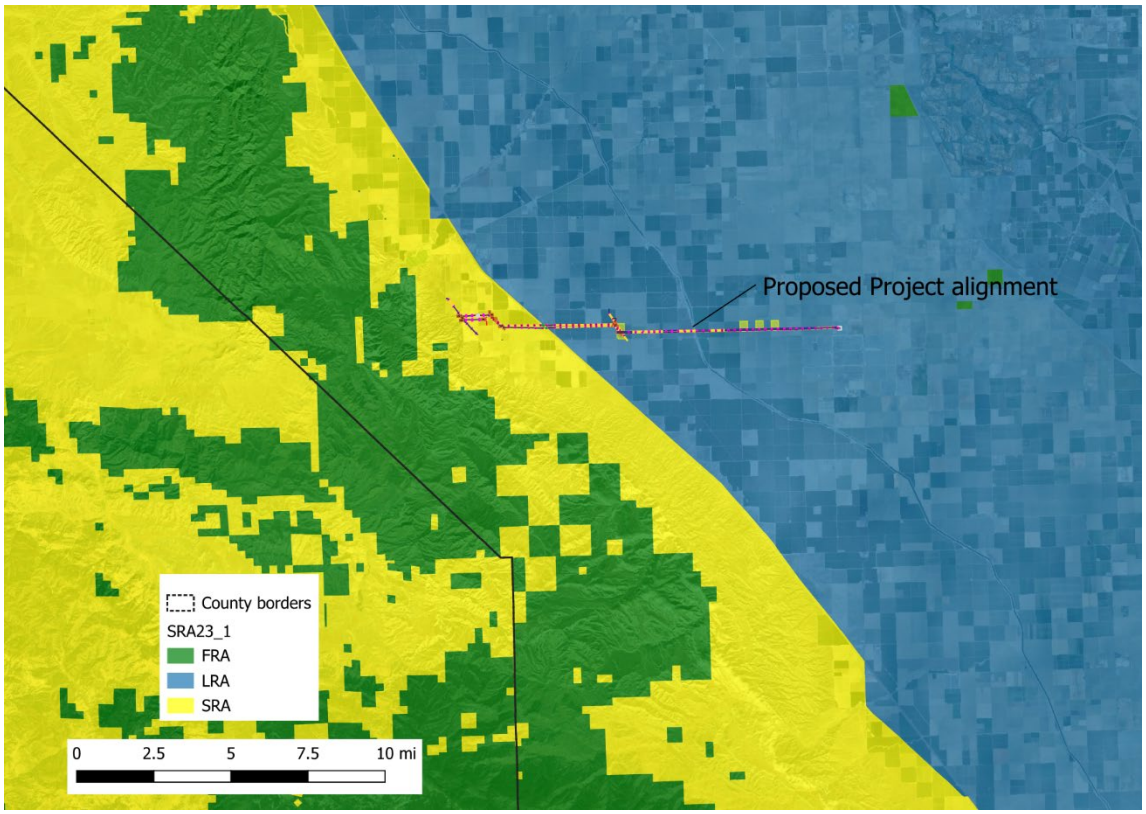

Figure 1. Local, State, and Federal responsibility areas relative to Proposed Project.

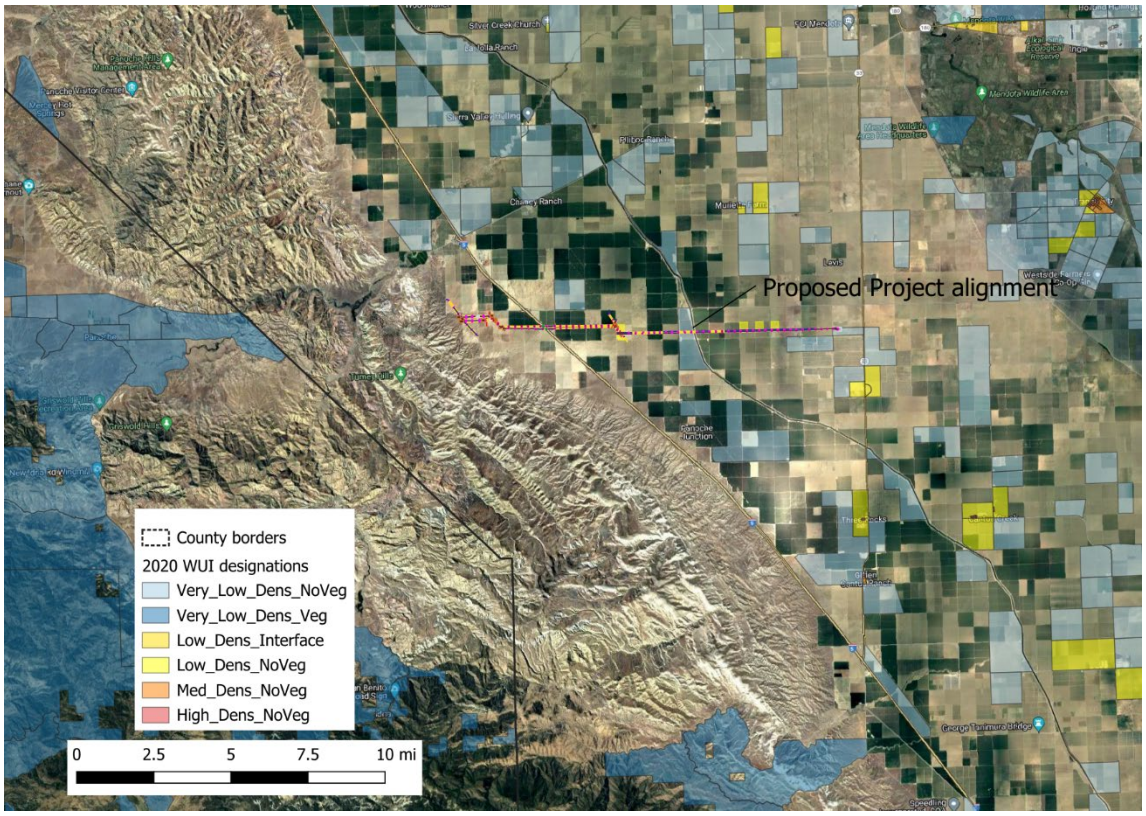

Figure 2. Wildland urban interface areas relative to Proposed Project area.

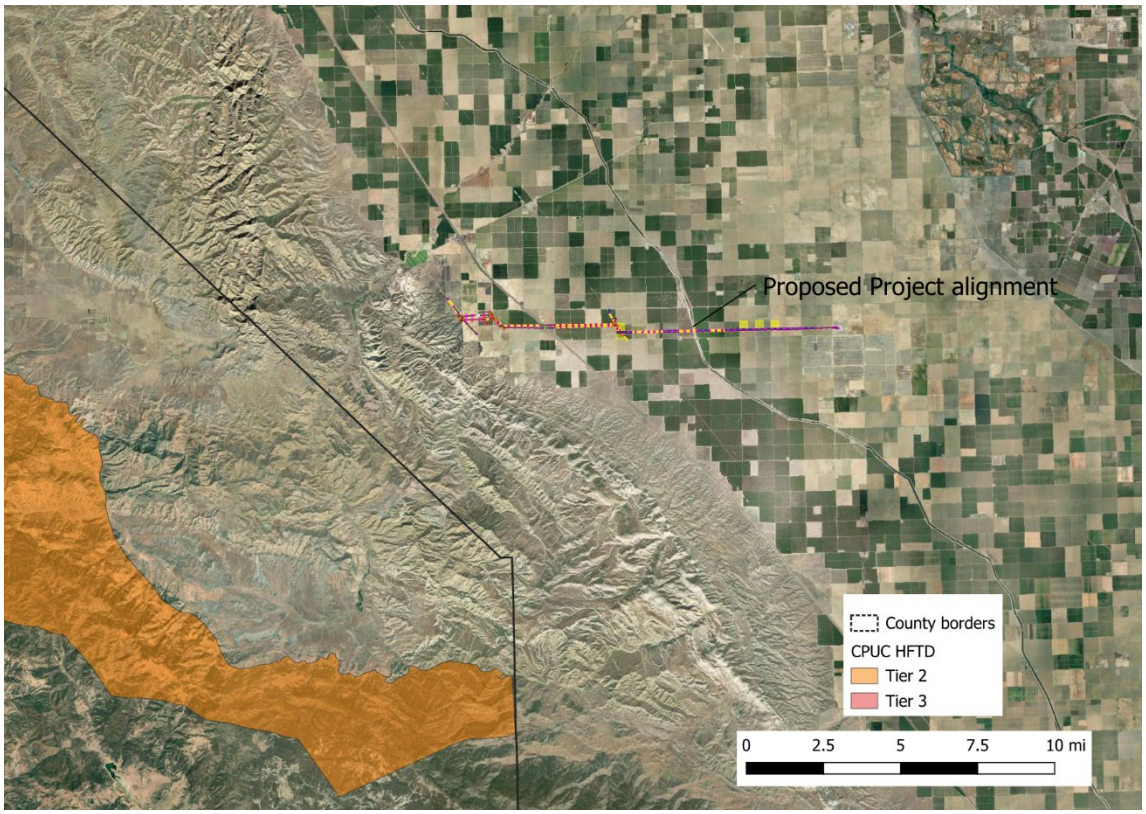

Figure 3. CPUC High Fire Threat District map relative to Proposed Project area.

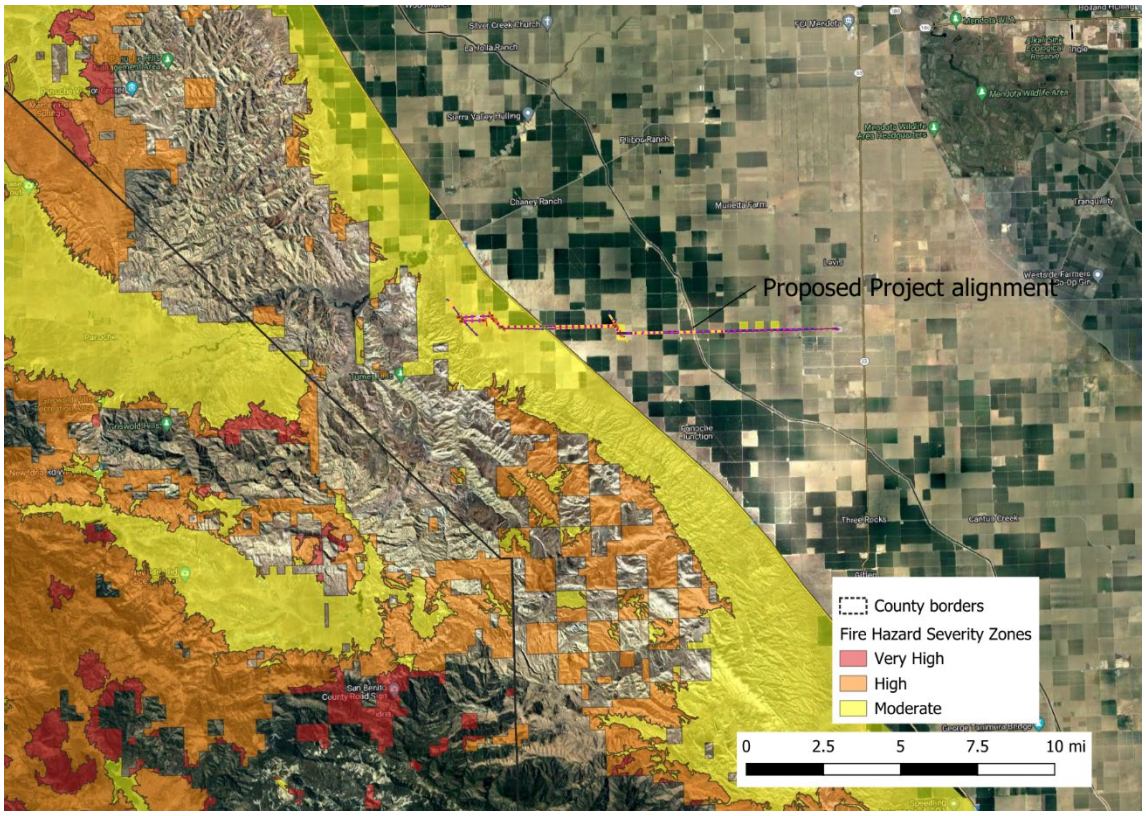

Figure 4. Fire Hazard Severity Zone map relative to Proposed Project area.

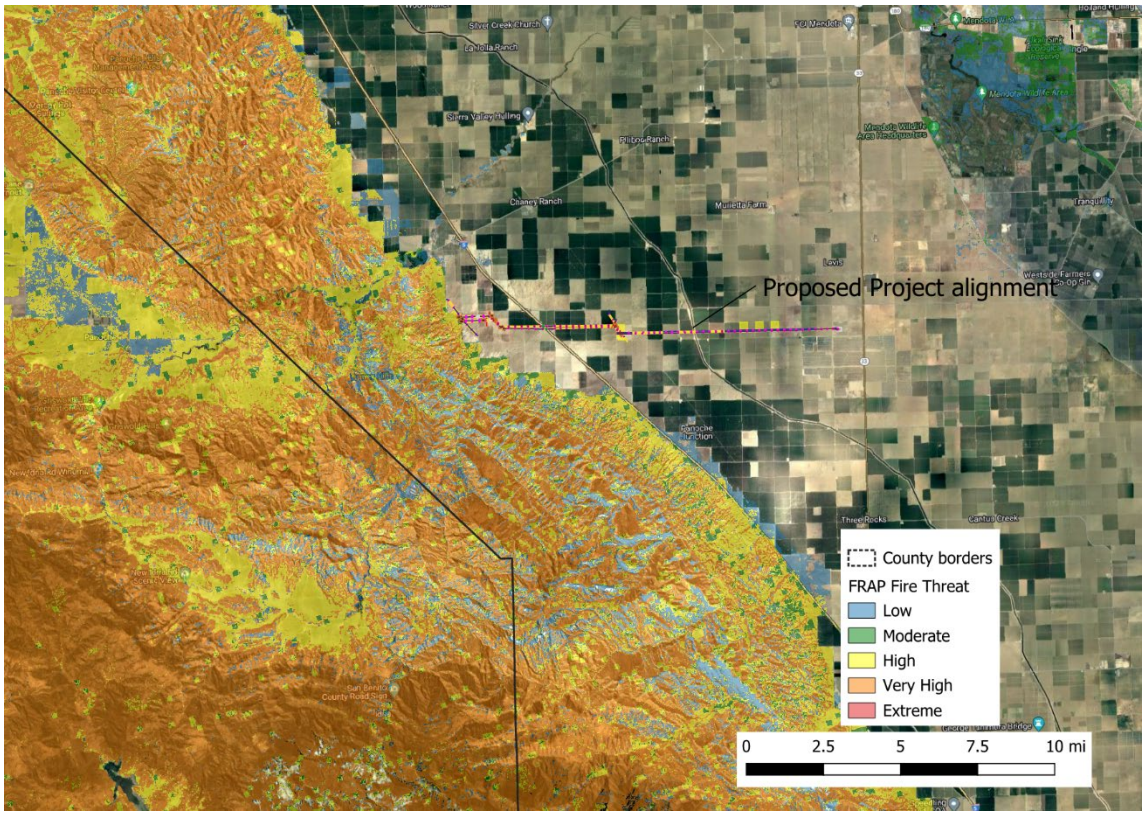

Figure 5. Fire Threat Map relative to Proposed Project area.

3.0 HISTORICAL FIRE OCCURRENCE

CPUC guidelines Section 5.20.1.2 require identification of recent (within the last 10 years) large fires that have occurred within the Proposed Project vicinity. Figure 6 shows 10 years (2013 – 2022) of fire history per CAL FIRE's fire perimeter database[7].

The three largest fires in the Proposed Project area are as follows:

1. 2016 Hill Fire – 190 acres, caused by lightning.
2. 2017 Tumey Fire – 160 acres, miscellaneous fire cause.
3. 2016 Panocho – 53 acres, miscellaneous fire cause.

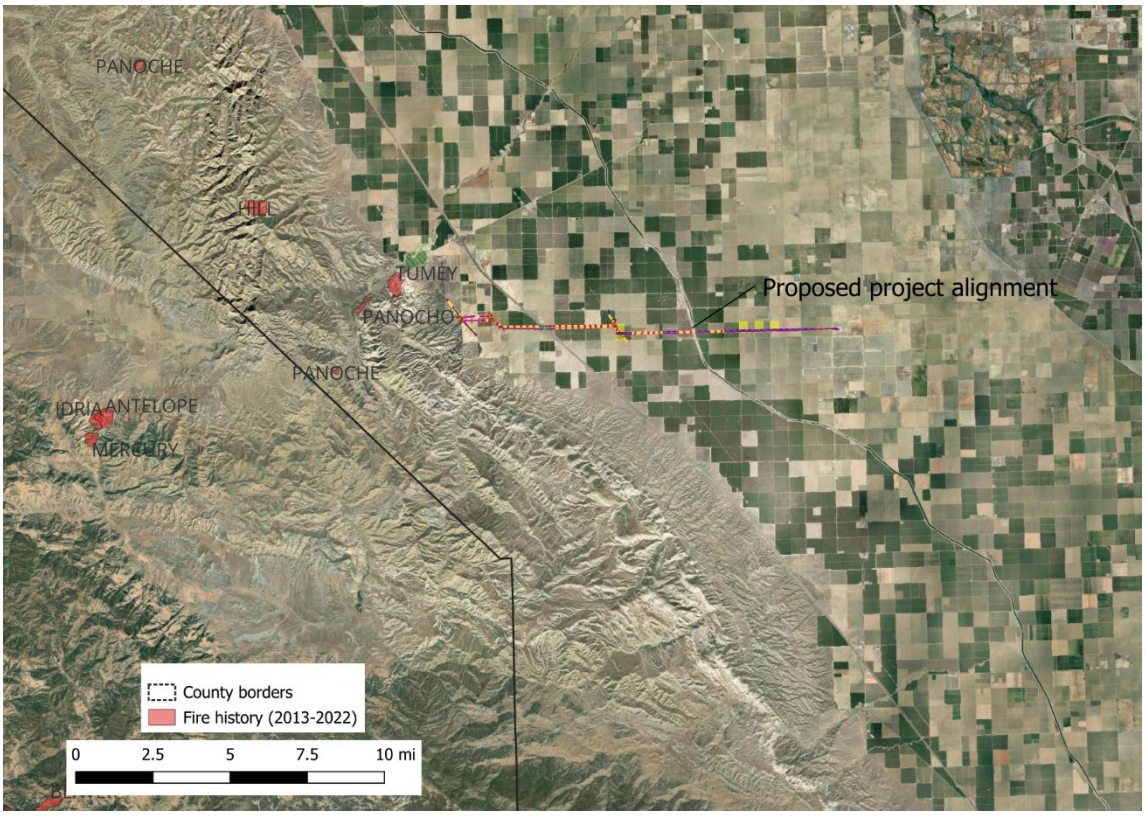

Figure 6. Historical fire occurrence (2013-2022) relative to Proposed Project area.

[7] https://gis.data.ca.gov/datasets/CALFIRE-Forestry::california-fire-perimeters-all-1/explore

4.0 BASELINE FIRE RISK

4.1 Surface fuels

CPUC guidelines section 5.20.1.3(a) requires "… fuel modeling using Scott Burgan fuel models…" For that reason, surface fuel models in the Scott & Burgan system from LANDFIRE 2022 are shown in Figure 7 near the Proposed Project. The predominant surface fuel models in the Proposed Project area are agricultural; low load, dry climate grass; and moderate load broadleaf litter. West of the Proposed Project, fuels are primarily low load, dry climate grass and grass-shrub.

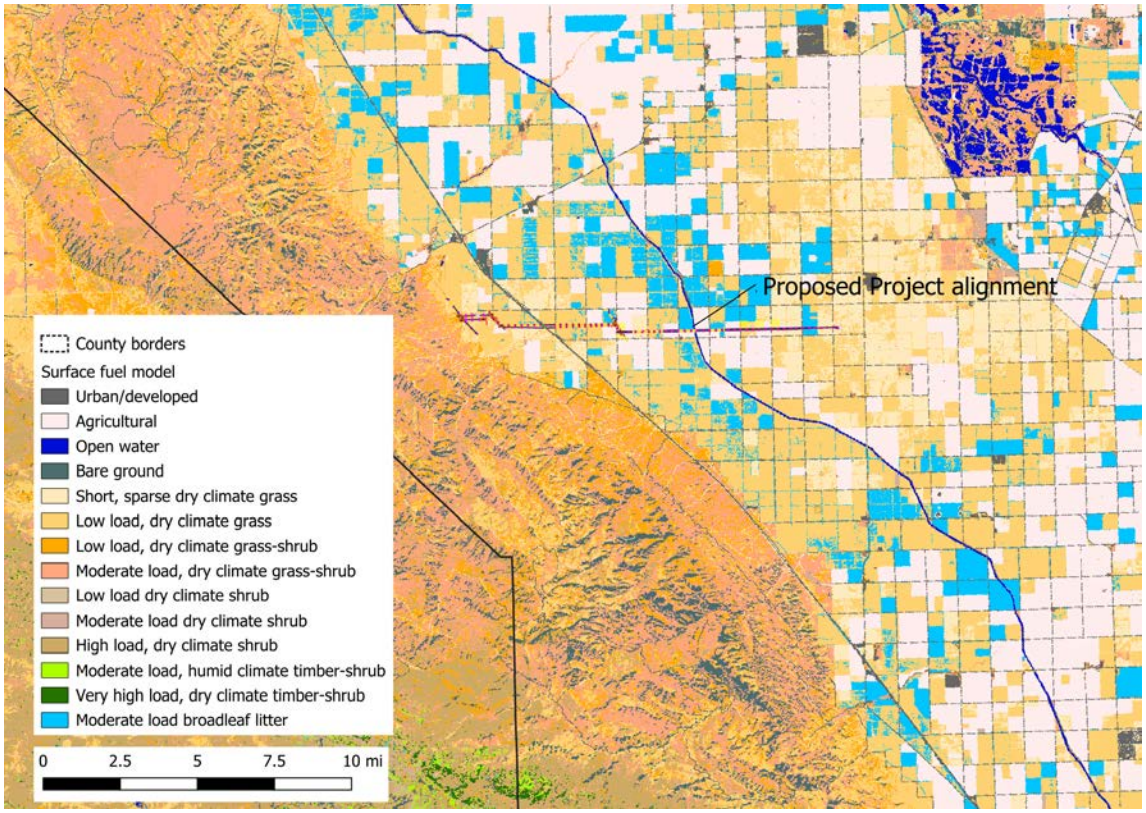

Figure 7. LANDFIRE 2022 Scott & Burgan surface fuel models near Proposed Project area.

4.2 Fire weather

CPUC guidelines section 5.20.1.3(b) requires "…values of wind direction and speed, relative humidity, and temperature for representative weather stations along the alignment for the previous 10 years, gathered hourly." Fire weather climatology is typically conducted using data from Remote Automated Weather Stations (RAWS). The closest RAWS station, Panoche Road, is located approximately 12 miles northwest of the western extent of the Proposed Project. Its available period of record is 1994-current. Figure 8 shows a wind rose for Panoche Road RAWS calculated from 10 years (2013-2022) of hourly observations with no seasonal or diurnal filtering.

Yearly variations in daily maximum temperature, daily minimum relative humidity, and wind gust speed are shown in Figure 9 - Figure 11. These data show that peak winds occur “off season”, meaning during the wetter months. Temperatures of over 100 °F are reached during the summer months, with minimum relative humidity typically below 20%. Between May 1 and October 1, peak wind gusts approach 40 mph with occasional excursions above 40 mph.

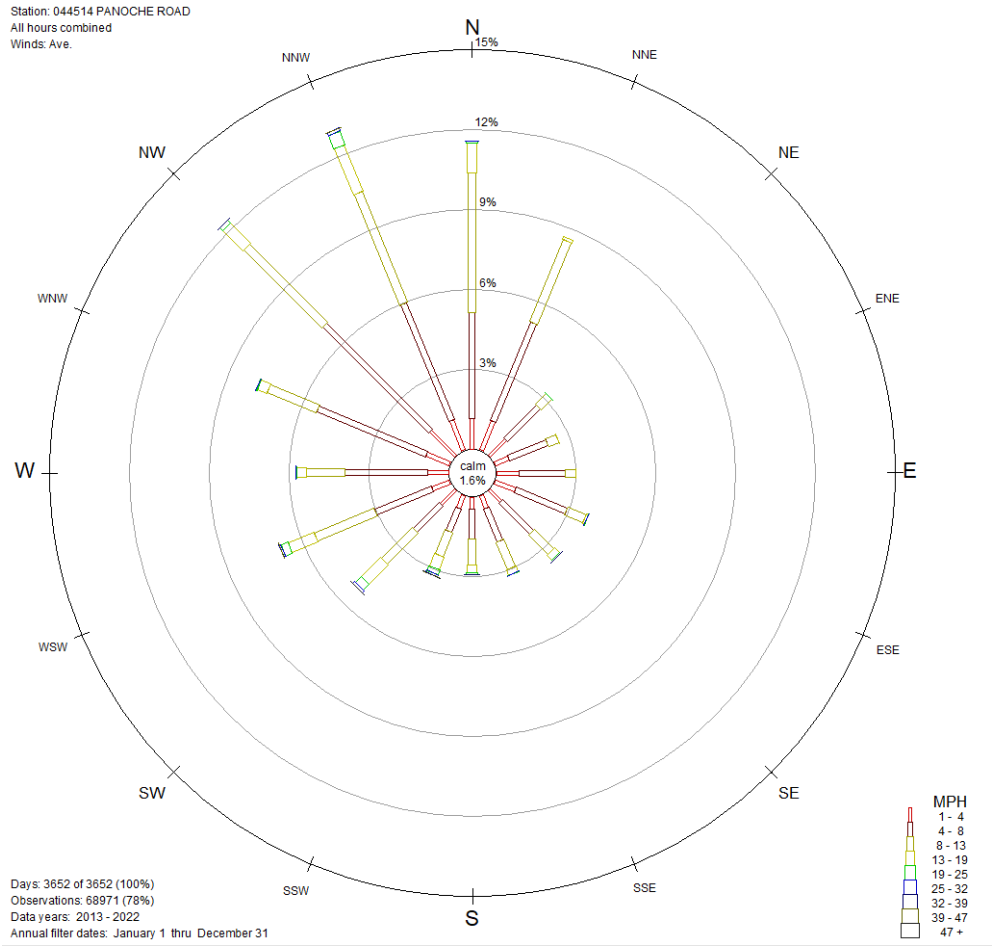

Figure 8. Panoche Road RAWS wind rose.

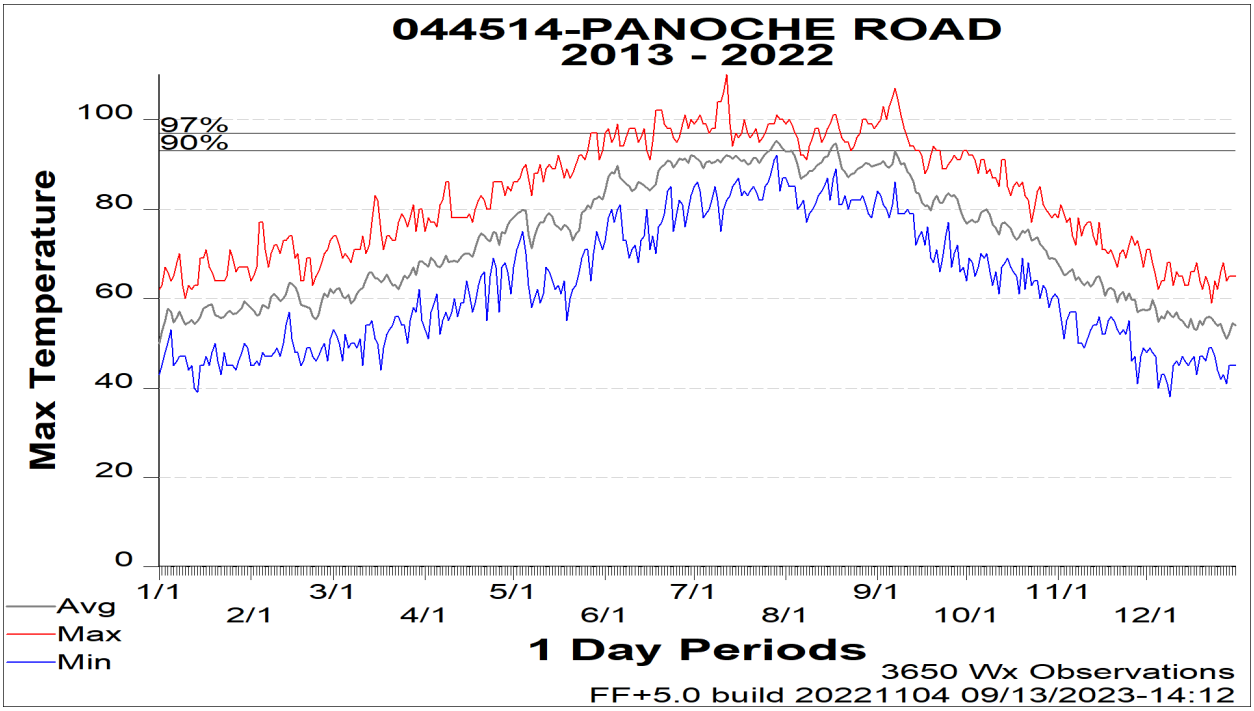

Figure 9. Panoche Road RAWS daily maximum temperature.

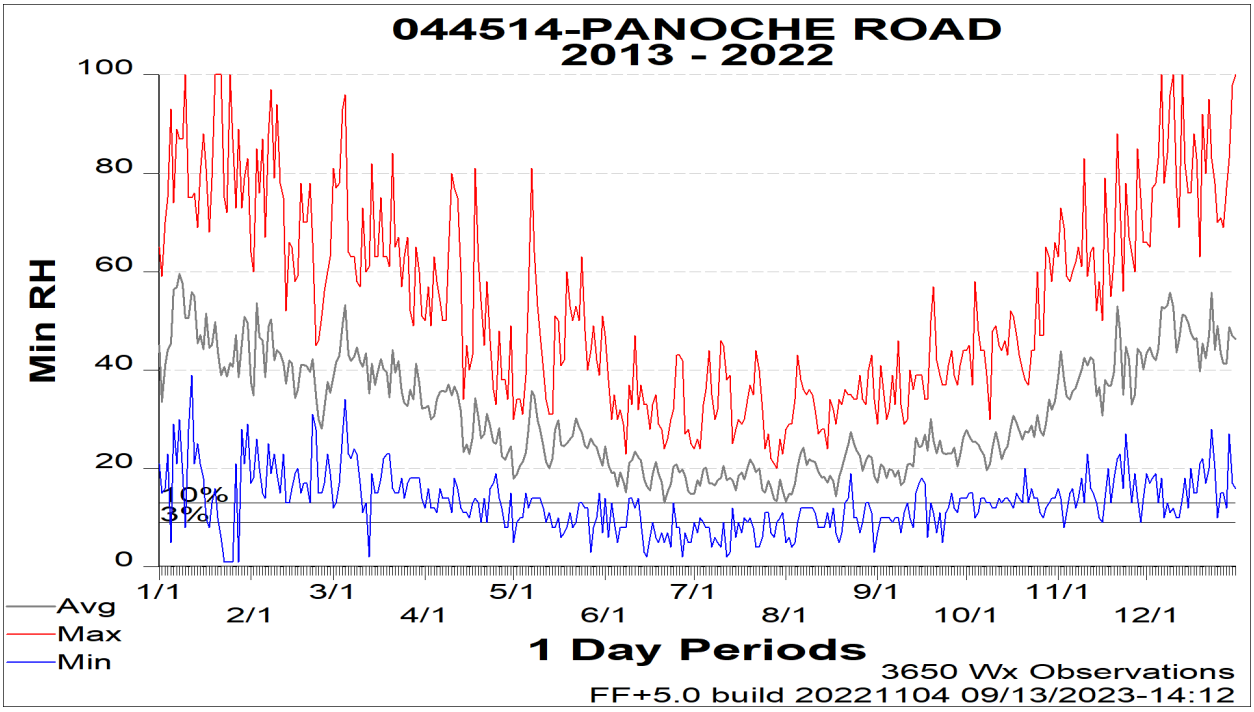

Figure 10. Panoche Road RAWS daily minimum relative humidity.

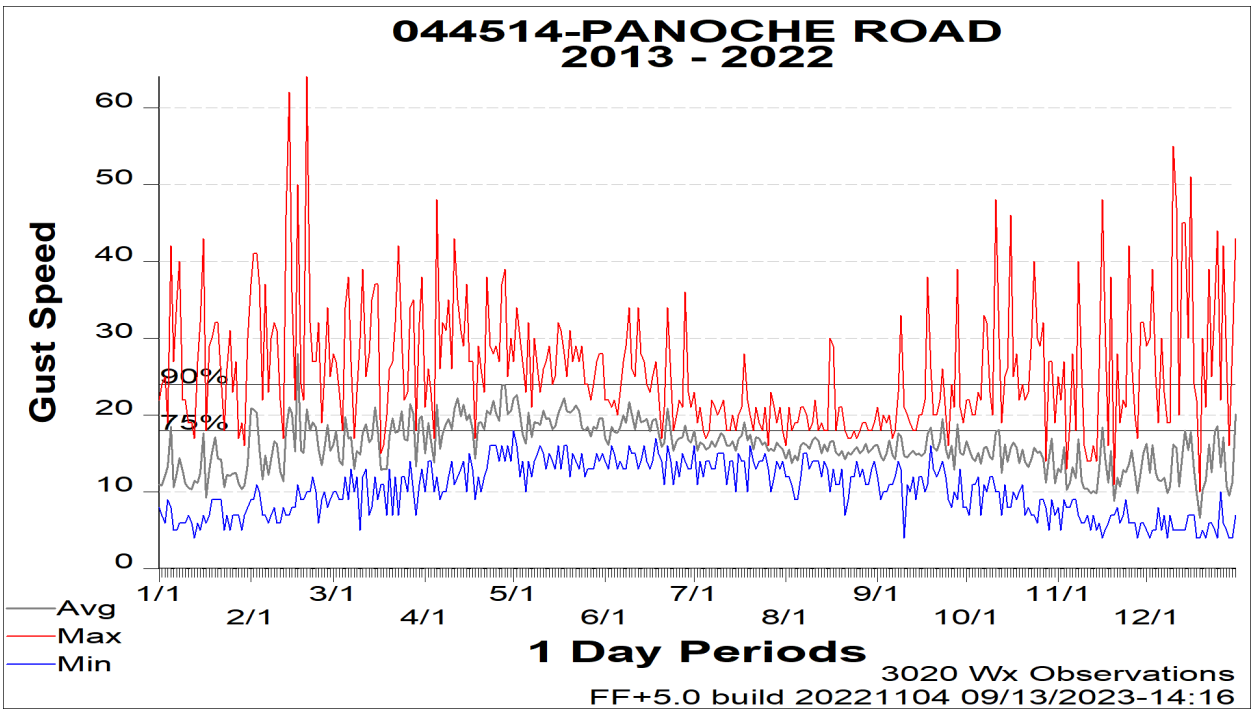

Figure 11. Panoche Road RAWS wind gust.

4.3 Topography analysis

CPUC guidelines section 5.20.1.3(c) requires "Digital elevation models for the topography in the project region…" To meet this requirement, Figure 12 shows a hybrid hillshade/digital elevation model near the Proposed Project. The easternmost part of the Proposed Project is located at an elevation of approximately 215 ft. Moving west along the Proposed Project alignment, elevation reaches a peak of approximately 770 ft. This corresponds to an average grade of < 1% along the length of the Proposed Project alignment. Higher elevations are reached and topography becomes more complex west of the Proposed Project alignment.

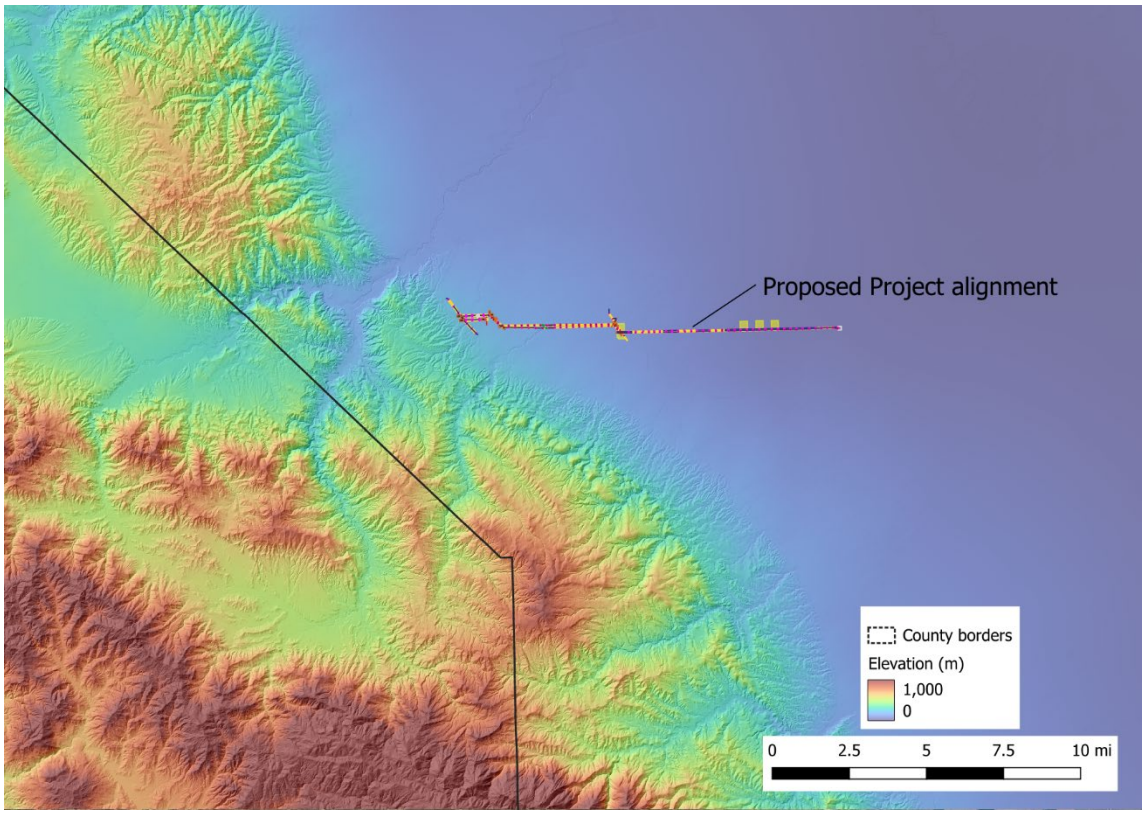

Figure 12. Hybrid hillshade/digital elevation model near Proposed Project area.

4.4 Vegetation description

CPUC guidelines section 5.20.1.3(d) requires a description of "vegetation fuels within the project vicinity". This is redundant with surface fuel models and the reader is referred to Section 4.1.

5.0 VALUES AT RISK

CPUC guidelines Section 5.20.1.4 requires identification of values at risk. To meet this requirement, CloudFire mapped the following values at risk:

1. Structures[8] – See Figure 13.
2. Transmission lines[9] – See Figure 14.
3. Roads[10] – See Figure 15.
4. Crops[11] - See Figure 16.
5. Habitat[12] - See Figure 17.

In general, the Proposed Project area is sparsely populated with few structures. The primary value at risk is agricultural areas / crops. Several steel-tower 500 kV transmission lines are in the Proposed Project area, with additional 115 kV and 230 kV transmission lines. There is no significant sensitive habitat near the Proposed Project.

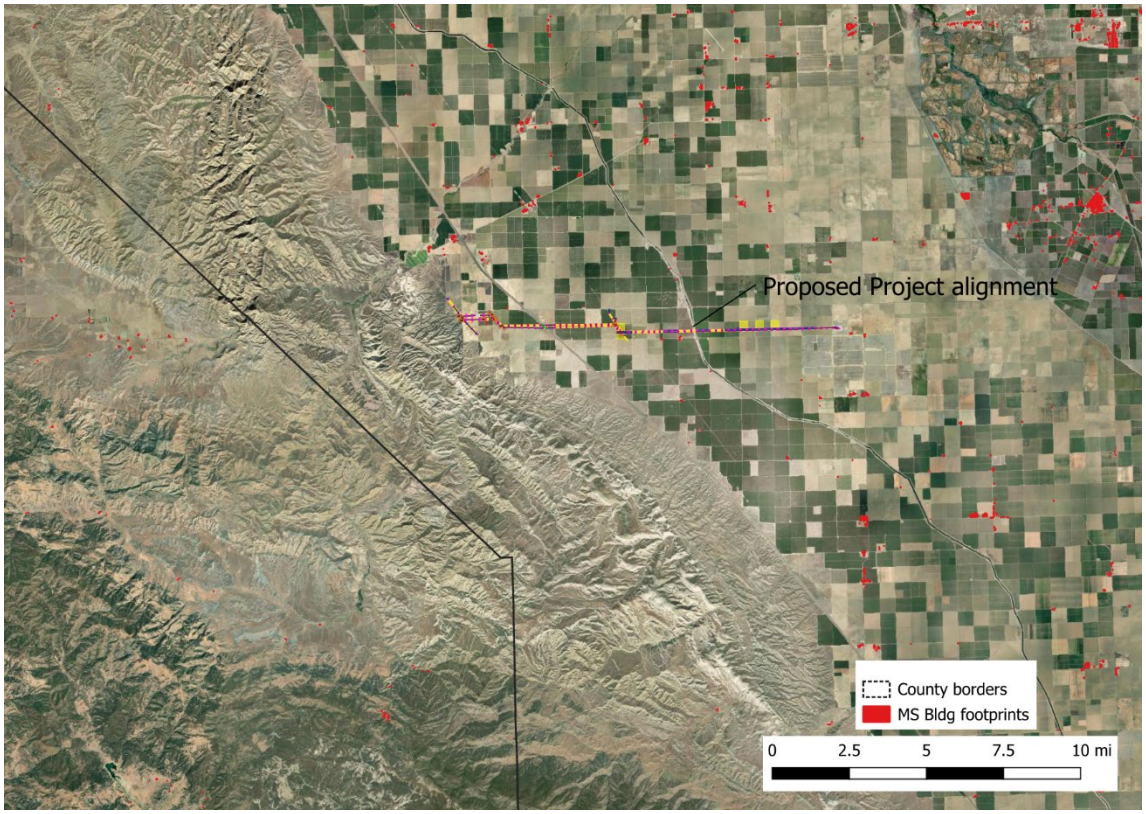

Figure 13. Structures near Proposed Project area.

[8] https://github.com/Microsoft/USBuildingFootprints
[9] https://data.ca.gov/dataset/california-electric-transmission-lines
[10] https://download.geofabrik.de/north-america/us/california.html
[11] https://data.cnra.ca.gov/dataset/statewide-crop-mapping
[12] https://ecos.fws.gov/ecp/report/table/critical-habitat.html

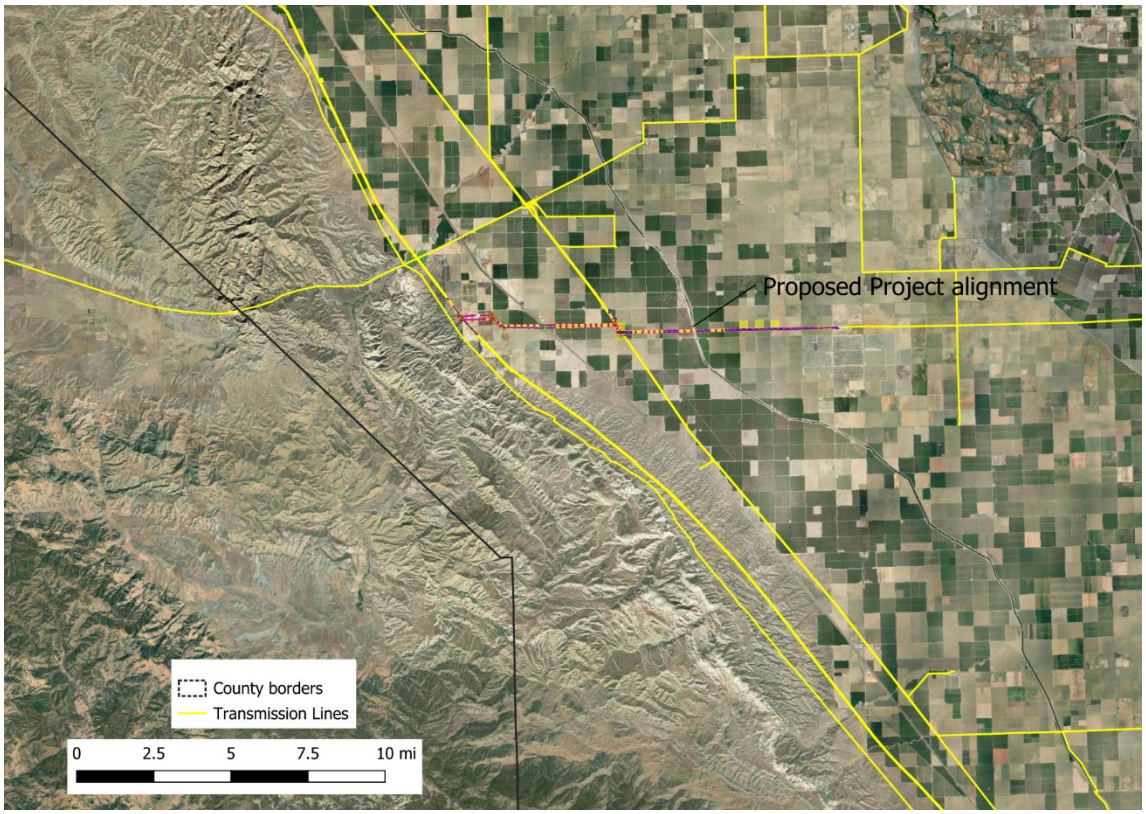

Figure 14. Transmission lines near Proposed Project area.

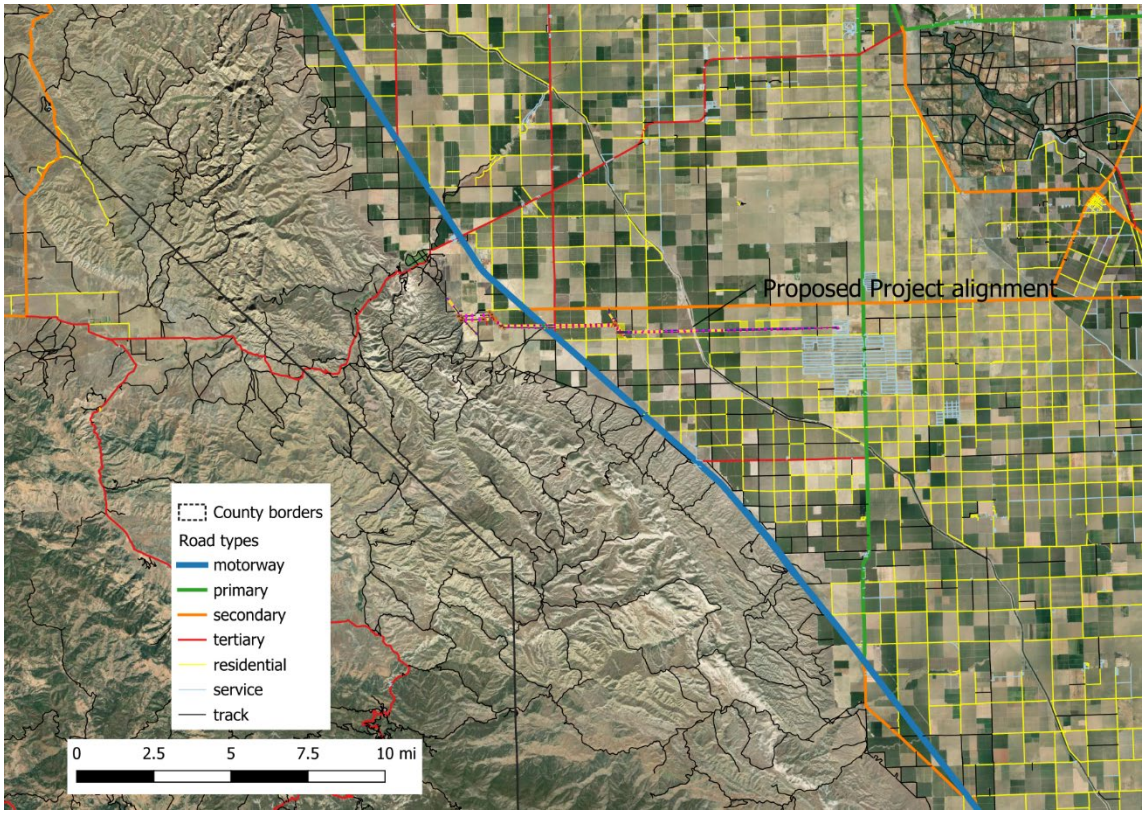

Figure 15. Roads near Proposed Project area.

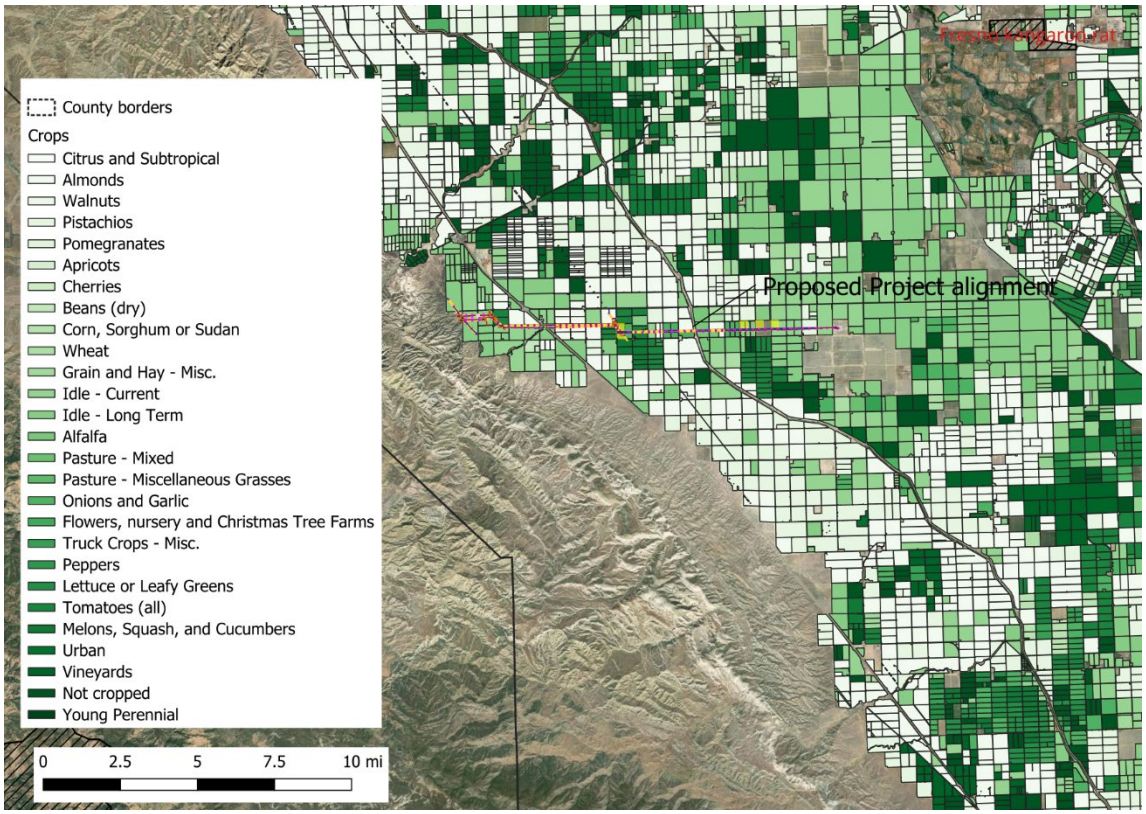

Figure 16. Crops near Proposed Project area.

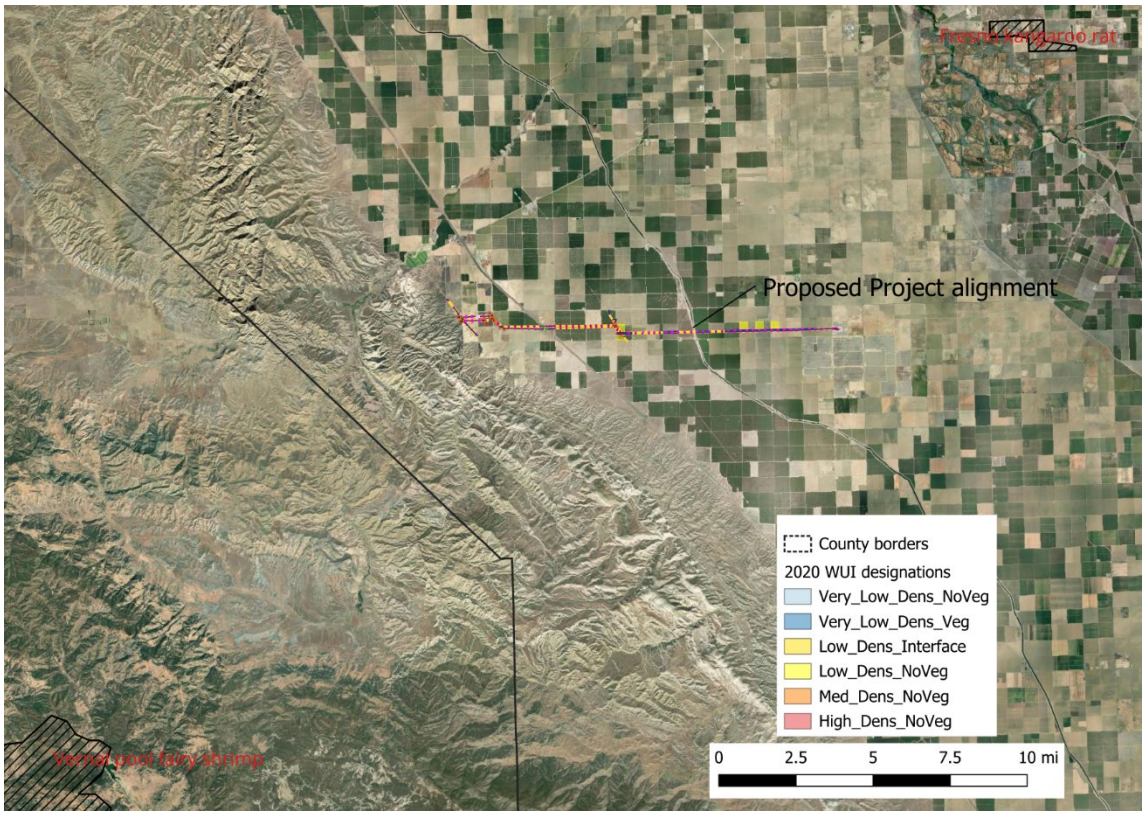

Figure 17. Habitat near Proposed Project area.

6.0 EVACUATION ROUTES

CPUC guidelines section 5.20.1.5 requires identification of evacuation routes and areas that lack a secondary point of egress. As shown in Figure 15, roads in the Proposed Project area are laid out on a grid to provide access to agricultural areas. This arrangement provides good means of ingress and egress with no dead ends.

7.0 IMPACT ANALYSES

CPUC guidelines Section 5.20.4.2 requires fire behavior modeling to support the analysis of wildfire risk. To meet this requirement, CloudFire conducted fire potential modeling using the ELMFIRE open-source operational fire spread model[13,14,15]. Based on the climatological analysis presented earlier, head fire spread rate and flame length were modeled across the Proposed Project area under near-worst case conditions as follows:

- 1-hour fuel moisture: 2%
- 10-hour fuel moisture: 3%
- 100-hour fuel moisture: 4%
- Live herbaceous fuel moisture: 30%
- Live woody fuel moisture: 60%
- 20-ft sustained wind speed: 20 mph

Figure 18 (spread rate) and Figure 19 (flame length). These results indicate that along the Proposed Project alignment, spread rate and flame length are expected to be low. Flame length and spread rate southwest of the Proposed Project are considerably higher, but the predominant wind direction and fire history indicates that the probability of a fire igniting in the Proposed Project area and spreading to these locations is low.

[13] https://doi.org/10.1016/j.firesaf.2013.08.014
[14] https://elmfire.io
[15] https://github.com/lautenberger/elmfire

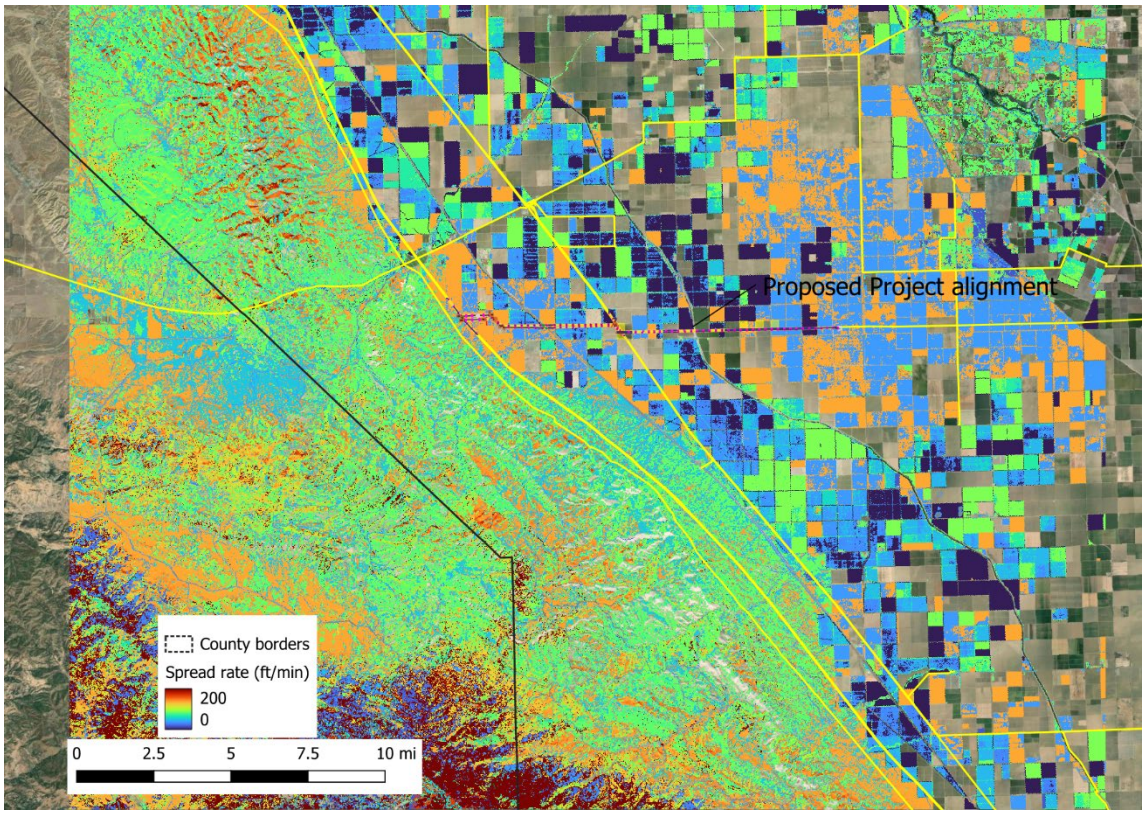

Figure 18. Modeled head fire spread rate near Proposed Project area.

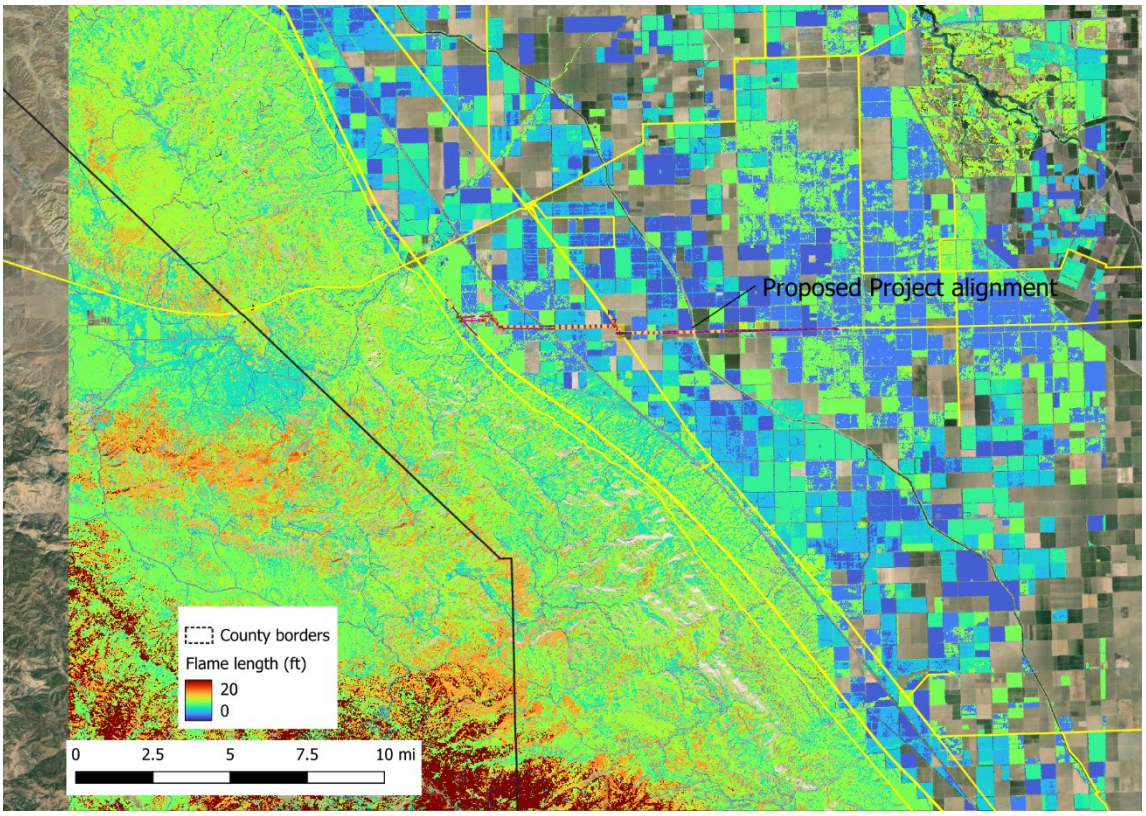

Figure 19. Modeled head fire flame length near Proposed Project area.

8.0 CONCLUSIONS

The analyses presented above show that the Manning 500/230 kV Substation Project presents a very low fire risk. Most of the Proposed Project alignment is east of Interstate 5 where there is no fire history due to discontinuous fuels and good means of ingress allowing for rapid suppression of incipient fires while they are still small. Risk is slightly higher for the portions of the Proposed Project west of Interstate 5 and there are some problematic fuels located southwest of the western extent of the Proposed Project area. However, fire history and the predominant wind direction suggest the probability of a fire starting in the Proposed Project area and spreading to these areas is very low. Additionally, there are very little assets at risk in the area, indicating that the consequence of such fires is expected to be low.