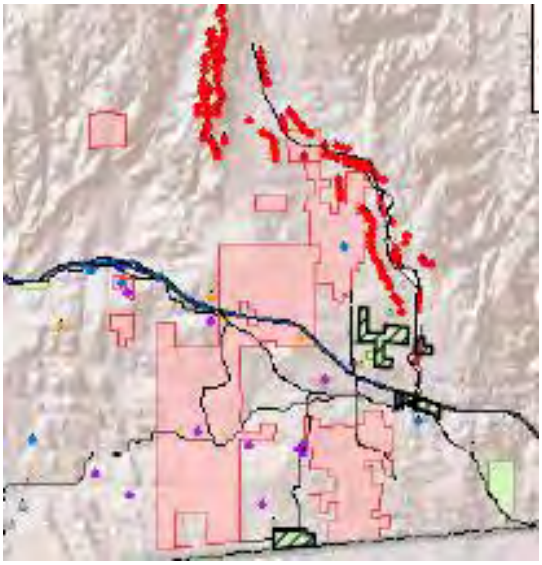
SOITEC SOLAR PORTFOLIO PROJECT

Emergency Service Capabilities Assessment and Cumulative Impact Mitigation



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Soitec Solar Portfolio Project
Emergency Services Capabilities Assessment and Cumulative Impact Mitigation

EXECUTIVE SUMMARY

Dudek and Hunt Research Corporation, Inc. were commissioned by Soitec Solar to perform a fire and emergency services cumulative impact assessment of the Soitec Solar Portfolio Project (Proposed Project) located in southeast San Diego County, and to review the regional emergency response capability and how it may be affected by foreseeable projects. Soitec Solar is in the process of finalizing Environmental Impact Reports (EIR) for the Proposed Project within the Boulevard area, primarily in San Diego County Fire Authority's jurisdiction. The projects are known as Rugged Solar, Tierra Del Sol, Lan West and Lan East. Soitec Solar initiated this study as a proactive measure to determine the potential cumulative impacts from solar facility development on the emergency response system and to determine what types of measures would effectively mitigate identified potential impacts.

This Emergency Services Capabilities Assessment and Cumulative Impact Mitigation study (Study) is provided as a forward thinking approach to Soitec's Proposed Project along with other foreseeable projects in southeastern San Diego County (Study Area). This plan focuses on describing the fire environment associated with the area's fuel bed, the risk presented by the Proposed Project and other foreseeable projects in the Study Area, review of the existing emergency resources capabilities in the region, and an analysis of the cumulative impacts that may be experienced by the fire response resources. Lastly, this assessment provides recommendations for mitigating potential cumulative impacts through a strategic, redundant and layered system of fire prevention and fire suppression measures that work together to provide for on- and off-site fire risk mitigation.

The Proposed Project includes solar facilities that would produce up to 250 megawatts (MW) of solar energy and would consist of approximately 10,600 concentrating photovoltaic (CPV) trackers on some 2,700 acres in southeastern San Diego County, near the unincorporated community of Boulevard, California. Inclusive of these projects, some 3,000 acres would be converted from wildland fuels to solar farm use. Each of these solar facilities would include CPV tracker panels that track the sun, moving throughout the day and resetting overnight. Individual solar tracker dimensions are approximately 48 feet across by 25 feet tall.

Fire protection in the Project area is shared by several agencies, with the San Diego County Fire Authority (SDCFA) and California Department of Forestry and Fire Protection (CalFire) providing significant resources for structure/medical and wildland fire protection, respectively.

Other fire agencies that may respond to the area include San Diego Rural Fire Protection District, United States Forest Service, Bureau of Land Management, and Tribal Fire Agencies.

The Proposed Project includes solar facilities along with electrical transmission lines and ongoing maintenance activities in a rural setting that currently includes semi-disturbed and undisturbed wildland fuels. The Proposed Project may increase potential ignition sources in the area during construction and with the ongoing operation and maintenance over the life of the facilities, but will also reduce the available wildland fuels over large areas and will, with the implementation of several layers of complimentary mitigation measures, result in a higher level of fire monitoring and awareness than currently exists, improved fire and emergency medical response capabilities, and enhanced fire prevention throughout the area.

The Study area is currently exposed to various ignition sources including: existing electrical transmission line easements, a major freeway, numerous remote 2-lane roads, rural residential development, regular U.S. Border Patrol vehicle traffic, illegal immigrant and illegal drug trafficking through the area, dry-lightning and other natural sources, and numerous accidental sources.

This Study is not a comprehensive Standards of Cover Analysis. Instead, this assessment focuses on the firefighting and emergency medical resources configuration in the Study Area and including fire stations, staffing, apparatus, and response efficiency and considers the potential fire service impacts that the Proposed Project, and other foreseeable projects in the Study area, may have on the ability to maintain or improve the currently acceptable levels of fire protection and emergency medical aid.

This assessment is based on available information obtained through public information requests, interviews with County, Rural Fire Protection District, Monte Vista Dispatch, and CAL FIRE staff, GIS response modeling, and understanding of basic response standards. Our methods include data gathering from public agency Web sites, detailed analysis of call volume statistics, Study area reconnaissance, and substantial interpretation of resulting information. Response coverage from the Study Area Fire Stations (includes multiple fire agencies) was modeled using a GIS-based program that, based on Study area-specific inputs, analyzes the road network and determines the extents that can be reached by engines traveling at 35mph (ISO standard) or higher, depending on road type. This modeling results in illustrative graphics depicting the achievable response areas, the overlap areas, and most importantly, the gaps where service may be delayed.

ES.1 Summary of Findings

The following findings are considered key factors for framing and understanding the Proposed Project and other foreseeable project potential cumulative impact issues and then for formulating the targeted mitigation measures we present in the Recommendations section.

- Large renewable energy projects in southeastern San Diego County are under construction and several more have been proposed, including the applicant Soitec Solar, which proposes to construct up to four projects (Proposed Project) in the greater Boulevard area. A combined fire service cumulative impact has been anticipated from the renewable energy projects, but has not been quantified to date. Quantification of the impact is provided within this report along with targeted mitigation measures that consider the renewable energy projects along with the region's broader fire service needs.
- Additional Study Area projects include residential development, high occupancy structures (churches), and communications facilities. Foreseeable projects are limited to projects with formal County submittals. It is anticipated that additional projects will occur in the Study Area, especially as the economy rebounds. Though not all foreseeable projects can be accounted for within this study, the recommendations are provided such that they include all future projects.
- The fire environment in southeastern SD County is considered one of several areas that are classified as "wildfire corridors". The wildfire corridor includes a consistent and continuous fuel bed that extends from extreme east county to urban areas of Alpine, El Cajon, and Chula Vista to the west. Although the area is subject to occasional wildfire ignitions, including the September 2012 Shockey Fire in the direct vicinity of the Proposed Project, a large portion of the fuel bed has not burned in 40 or more years. This situation is considered to result in the potential for catastrophic wildfire under extreme weather conditions.
- The type of solar tracker and the solar facilities encompassed by the Proposed Project includes new technology that does not rely on heating oil or turbines to create energy. These older technologies are much higher risk for fires. Instead, the trackers/panels convert sun energy to direct current electricity that is fed through inverters that convert the current to AC and feed it into the SDG&E grid.
- There is a lack of specific information at the local, state, and national level documenting solar related fires or other emergencies. The category for solar has not been distinguished from electrical or other structure or industrial fires, so it is difficult to analyze and determine what are the primary sources for calls at solar facilities.

- Based on available solar facility statistics, the number of emergency calls is extremely low, averaging 0.8 calls per year per facility (Riverside County), and this includes data from the older technology, oil based solar facilities. Likewise, rooftop solar panels have a very low fire incidence rate. It is expected that newer technology panels, such as the CPV trackers used on the Soitec Solar Portfolio projects, will be less prone to fires based on the use of non-combustible/ignition resistant materials and the low-fuel characteristics of the sites.
- In summary, it was determined that the local fire agencies have the capacity to respond to the Proposed Project and other foreseeable projects in the southeastern SD County area, but will need specific resource improvements to be able to provide reliable service on a 24/7/365 basis.
- Both during and following construction, the primary call type from solar facilities is expected to be medical emergencies. The highest likelihood of a wildfire originating from the solar facilities is expected to be during the construction period.
- During construction and at build out, it is anticipated that the current ambulance service will be overloaded and will experience higher levels of stacked calls and need for out of area ambulance assignment. Delayed responses will require additional resources to provide reliable service.
- The topography and lack of improved roads in southeastern SD County are the primary limiting factors for emergency response. However, the existing fire stations are located roughly where they provide the greatest good, with the ability to respond to the highest population areas (which are low by urban standards) within reasonable time frames.
- A standards of cover study conducted by Citygate (2010) analysis indicates that in less populated areas of eastern SD County, a "modest" increase in the number of fire stations, even in rural areas with few residents, cannot likely improve the wildfire initial attack times as the undeveloped areas are too large and fires may start anywhere. There is no economic source to provide additional stations in areas with low populations.
- Conversations with SDCFA and confirmed in Citygate's report (2010) indicate that although station distribution is considered adequate, current staffing levels and reliability require improvement. Adequate staffing combined with early detection and a simultaneous aerial response, will provide quick control to most wildfires.
- The rural areas are considered to lack sufficient staffing for initial attack to provide a response to meet the needs of a serious incident. However, as confirmed by the recent Shockey Fire (September 2012), there are sufficient firefighting resources from all nearby

fire agencies to respond to large fires, but if multiple fire events occur simultaneously, this may not be the case.

- Within an approximately two-year timeframe, Boulevard Fire Station and CAL FIRE Whitestar station will be co-located at a new station within Boulevard. The existing Whitestar station will be retained, but will not be staffed. The new fire station offers opportunities for bolstering the resources in the Study Area.
- Solar projects help facilitate a reduction in population of the rural areas by converting large areas to solar fields with few on-site staff vs. if the same areas were used for rural residential or a more dense master-planned community.
- Solar facilities introduce new challenges to firefighting such as fighting fires in and around energized facilities and protecting the millions of dollars' worth of solar equipment while performing ground and aerial attack wildfire operations.
- The Solar Facilities are monitored 24/7/365 via a SCADA system that includes central point monitoring and on-line camera monitoring.
- Mitigation of the potential cumulative impacts needs to consider both the fire prevention and the operational components of the fire service. Fire prevention and Operational assistance are provided focused attention in the project FPPs, but are considered on a regional, more robust level in this study.
- Regional issues currently include staffing deficiencies and reliance on volunteer firefighters at some stations, inadequate firefighting water in the area, long response travel times anywhere beyond the population centers, communication connectivity issues in some areas, numerous Proposed Projects that will include population spikes during construction, exposures to wildland fuels, a continuous fuel bed potentially impacting some 17,000 structures, small percentage of residents with little or no means or ability to provide fuel modification or structural hardening, and a fire environment that facilitates wildfire spread during certain weather conditions.
- Fire awareness in the southeast SD County communities is relatively high. Fire hardening of structures and landscapes based on the fire awareness level varies, but can be characterized generally as having mixed potential, with both financial and physical limits on residents. Organization of residents in the communities toward identifying and addressing potential fire hazards is in its infancy with the relatively recent formation of the Boulevard/La Posta/Jacumba FireSafe Council.
- Each new project in the Study area with a County or fire district nexus will be required to prepare a Fire Protection Plan by the San Diego County Fire Authority or the Fire

Protection District. The Fire Protection Plans will need to demonstrate compliance with applicable fire codes, but because as of today there are no specific, detailed solar or wind facility fire and building codes, the FPPs should memorialize each project's ability to meet a system of "performance measures",. If each future project demonstrates that it meets the performance measures, as detailed in this assessment, then it is expected that project direct impacts will be mitigated. Fair-share funding of additional measures, as recommended herein, will focus on mitigating cumulative project impacts.

- Primary cumulative impacts are related to: medical call multiple queuing and response to medical emergencies and unacceptable response times; potential for increased ignition sources and chance for fire coinciding with Santa Ana winds; potential for tactical firefighting changes due to the presence of energized facilities and the potential risks to responding firefighters; and potential for delayed response due to fire engine access issues.
- Effective mitigation of direct impacts and cumulative impacts will require a redundant system of both passive and active fire prevention and fire protection features. The features work together to complement and augment each other. The system is designed such that should one of the features be breached or fail to fully function, the other features compensate by providing redundant layering, enabling another built-in or on- or off-site project-provided resource to function as a "safety net."

ES.2 Summary of Recommended Measures

Recommended cumulative impact mitigating measures for the demands generated by the Proposed Project and other foreseeable projects in the southeastern portion of San Diego County are summarized below. The measures are direct responses to potential cumulative impacts identified during the analysis of: Project size, anticipated population increase and service demand, current and forecasted call volumes, agreements with neighboring fire agencies, type of land use vs. typical rural land use, available resources, and potential funding. The measures introduced in the following list are provided as concepts for consideration by the Study Area fire agencies. Fair-share funding would be provided by each Study Area project and the fire agencies would determine the best use of that funding for offsetting any potential cumulative impacts. More detailed discussion of these measures is provided in Chapter 10 of this report.

The following measures have been developed with due consideration of the existing fire protection system that has been strategically developed in San Diego County over the last decade. A layered, redundant system of prevention, planning and protection is in place and many enhancements of that system have been provided based on real-world, after-fire assessments. The measures below are aimed at further enhancing the system, providing more

robust prevention and operations capabilities while integrating seamlessly into the existing system. Fire Authorities in the Study Area have a solid understanding of their strengths and weaknesses and where available funding would be best applied. This study provides analysis and recommendations focused primarily on solar energy projects and offers a variety of measures that will address the identified cumulative impacts. The following recommendations were reviewed for their overall positive impact:

- **Measure 1)** Require Projects to Meet or Exceed Minimum Performance Measures within a Fire Protection Plan or Similar Document, regardless of jurisdiction.
- **Measure 2)** Fund an augmented AMR contract to include a second ambulance that remains in the Boulevard area.
- **Measure 3)** Provide fair-share funding for full-time, career firefighter position (Captain) at Study Area volunteer stations currently staffed by two volunteer firefighters.
- **Measure 4)** Provide fair share funding for a mobile training facility that can be moved from station to station, agency to agency or, provide location or funding for a permanent facility including a training center and electrical infrastructure props for firefighter training.
- **Measure 5)** Provide smaller and more maneuverable Type VI engines for use by Study Area Fire Agencies.
- **Measure 6)** Provide fair share funding for Paramedic positions at SDRFPD Lake Morena and Pine Valley Stations, to provide Paramedic Assessment Engines for the region.
- **Measure 7)** Fair share annual funding toward a Study Area (southeastern San Diego County) hazard reduction grant program, administered by SDCFA for the sole purpose of assisting residents in need with defensible space and/or structural hardening.
- **Measure 8)** Fair share funding for Life Flight Helicopter to help ensure its continued operation and reliable availability to the Study Area.
- **Measure 9)** Project funded basic medical training for all renewable energy facility employees including basic life support, CPR and use of Automated External Defibrillator.
- **Measure 10)** Provide funding toward implementation of the County's Wildfire Risk Assessment Program (WRAP) publicly available Web interface.
- **Measure 11)** Fair share funding toward a regional solution to the varying water capacities and stored water availability in the Study Area.

- **Measure 12)** Provide a helipad with a dip tank for firefighter use at a protected location on one or more of the foreseeable projects, including the Proposed Project sites or at the future co-location site of the Boulevard Fire Department/CAL FIRE Whitestar site in Boulevard.
- **Measure 13)** Provide strategically located heat detecting devices at each facility for early detection of wildfires.
- **Measure 14)** Cooperation with local cell phone and internet providers, as possible, to enhance the area's communications reliability, which will improve firefighter training and communications as well as residents' ability to report emergencies and receive notifications regarding emergencies.
- **Measure 15)** Provide funding toward reserve fire apparatus and equipment.
- **Measure 16)** Provide solar facility incident response data collection procedures and include the data within the response types so that solar emergencies can be more accurately tracked over time.

1.0 INTRODUCTION

This Emergency Services Capabilities Assessment and Cumulative Impact Mitigation study (Study) has been prepared to assist Soitec Solar, LLC in determining how the Soitec Solar Portfolio Project (Proposed Project) and other foreseeable projects affect the local fire agency's ability to respond to existing and anticipated fire and medical emergencies within the southeastern San Diego County regional area (Study Area). Further, this Study is designed to assist the San Diego County Fire Authority (SDCFA) and other rural fire agencies (CAL FIRE, San Diego Rural Fire Protection District, BLM, USFS) in southeastern San Diego County in understanding the scope of the Proposed Project, the potential effects, the unique ignition sources, and the precautions that will be necessary when responding to a renewable energy facility. Achievement of these objectives requires that this Study include a review of the fire agencies' current capability for responding to the projected renewable energy project load planned for the greater Boulevard area and the Study Area.

The purpose of this study is to assess what cumulative impacts may occur from development of rural areas with a land use type, primarily large solar energy facilities, that has not been the normal type of development in San Diego County, and that represents an emergency response that may stretch the existing resources both in terms of ability to respond with the appropriate "weight" and the ability to respond with appropriate equipment and trained staff. Ultimately, this report provides recommended mitigating measures for potential cumulative impacts on the fire service delivery system. As part of the assessment, this Study has considered the Study Area's topography, geology, demographics, risk factors, current call types and volume, resource distribution and concentration, automatic aid agreements, and standards for response coverage. Additionally, this analysis includes extensive evaluation of the types of risks associated with solar facilities, typical response scenarios, critical tasking for each scenario, and how well the current response configuration meets required levels. This analysis is not based upon the concept of meeting established service level goals for the types of emergencies routinely responded to in this part of San Diego County. Rather, it is based on how the presence of large solar facilities may change how routine emergency response is defined and what measures would result in successful response to the changing call volume and type while at least maintaining, and improving where possible, the current response effectiveness.

Detailed financing analysis for the implementation of the recommendation(s) has not been conducted as part of this study. The final decision on the measures that are implemented, the amount of funding and the ultimate way that funding is provided, whether through required fees and assessments or through another agreement, will be negotiated between the applicant and the fire agencies.

The following sections provide an overview of the Study area, the Proposed Project and foreseeable

1.1 Methods and Assumptions

The fire and fuels Study Area includes lands that may be affected by construction and operation of the Proposed Project and foreseeable projects. The Study Area includes land underlying and adjacent to the Proposed Project and foreseeable large solar and wind projects as well as other projects within the Study Area. Wildfire-related impacts require analysis of a larger area than that directly associated with a given project, as defined by the area's fuel bed, beyond the projects' immediate footprint and influence area. As such, this analysis incorporates a greater Study Area fire environment assessment.

Information utilized for this assessment was based on numerous sources, including:

- Site visit to the general project areas
- Aerial image review
- Vegetation coverage map review
- Available EIR reviews for proposed and approved renewable energy projects including individual fire protection plans, as available.
- State Fire Marshal's Office solar energy fire statistics
- Riverside County Fire Department's solar energy fire statistics
- CAL FIRE, SDCFA, and San Diego Rural Fire Protection District (SDRFPD) interviews
- Reviews of applicable national, state, and local codes and standards for electrical energy facilities and where available, solar panels and equipment
- Solar engineer-provided materials and safety data sheet reviews
- Personal interviews with Kern County Fire, San Luis Obispo County Fire, and others regarding solar facility fire protection
- California Department of Forestry and Fire Protection's (CAL FIRE's) Fire and Resource Assessment Program (FRAP) data (CAL FIRE 2010b)

1.2 Fire Environment

Locations for several renewable energy projects, including the Proposed Project, are proposed in southeastern San Diego County. This area includes a largely rural, sparsely

populated landscape stretching from roughly Alpine in the west to Jacumba in the east and from the U.S./Mexico border in the south to the In-Ko-Pah and southern Laguna Mountains to the north. The projects are generally near the unincorporated communities of Tierra Del Sol, Boulevard, Jacumba, and Campo. Figure 1, Regional Location Map, illustrates the Proposed Project and foreseeable projects' relative locations within southeastern San Diego County. Figure 2, Proposed Project Location Map, presents the individual projects that comprise the Soitec Solar Portfolio Project and illustrates their relationship to the communities of Tierra Del Sol, Boulevard, and Jacumba. Figure 3, Study Area fire environment map, illustrates the location of the Proposed Project in context to local geography/vegetation and major landforms/points of interest.

According to the "San Diego County Fire Severity Zones in SRA" map, the Proposed Project and foreseeable projects would be located within a variety of fire hazard severity zones with Very High Fire Hazard Severity Zone classification dominating the Study Area (CAL FIRE 2007a). CAL FIRE uses Fire Hazard Severity Zones to classify the anticipated fire-related hazard for state responsibility areas (SRAs). Fire hazard measurements take into account the following elements: vegetation, topography, weather, crown fire production, and ember production and movement. The very high fire hazard severity designation can be attributed to a variety of factors including highly flammable, dense, drought-adapted chaparral vegetation, seasonal, strong winds, and a Mediterranean climate that results in vegetation drying during the months most likely to experience Santa Ana winds. Santa Ana winds are winds originating from the Great Basin that create extreme fire weather conditions characterized by low humidity, sustained high speeds, and extremely strong gusts. Santa Ana winds typically blow from the northeast over the Peninsular Range. As the air is forced through coastal mountain passes, wind speeds of 40 miles per hour (mph) can be maintained for hours with gusts from 70 to 115 mph possible (Schroeder et al. 1964). Winds can exceed 100 mph, particularly near the mouth of canyons oriented along the direction of airflow; this situation can lead to serious fire suppression problems, resulting in temporary closure of sections of main highways (BLM 2007). These conditions can lead to extremely intense and fast moving fires that cannot be contained until winds shift or wane. Figure 4, Fire Hazard Severity Zone Map, identifies the CAL FIRE hazard zone designations in relation to the Proposed Project and foreseeable projects in the Study Area.

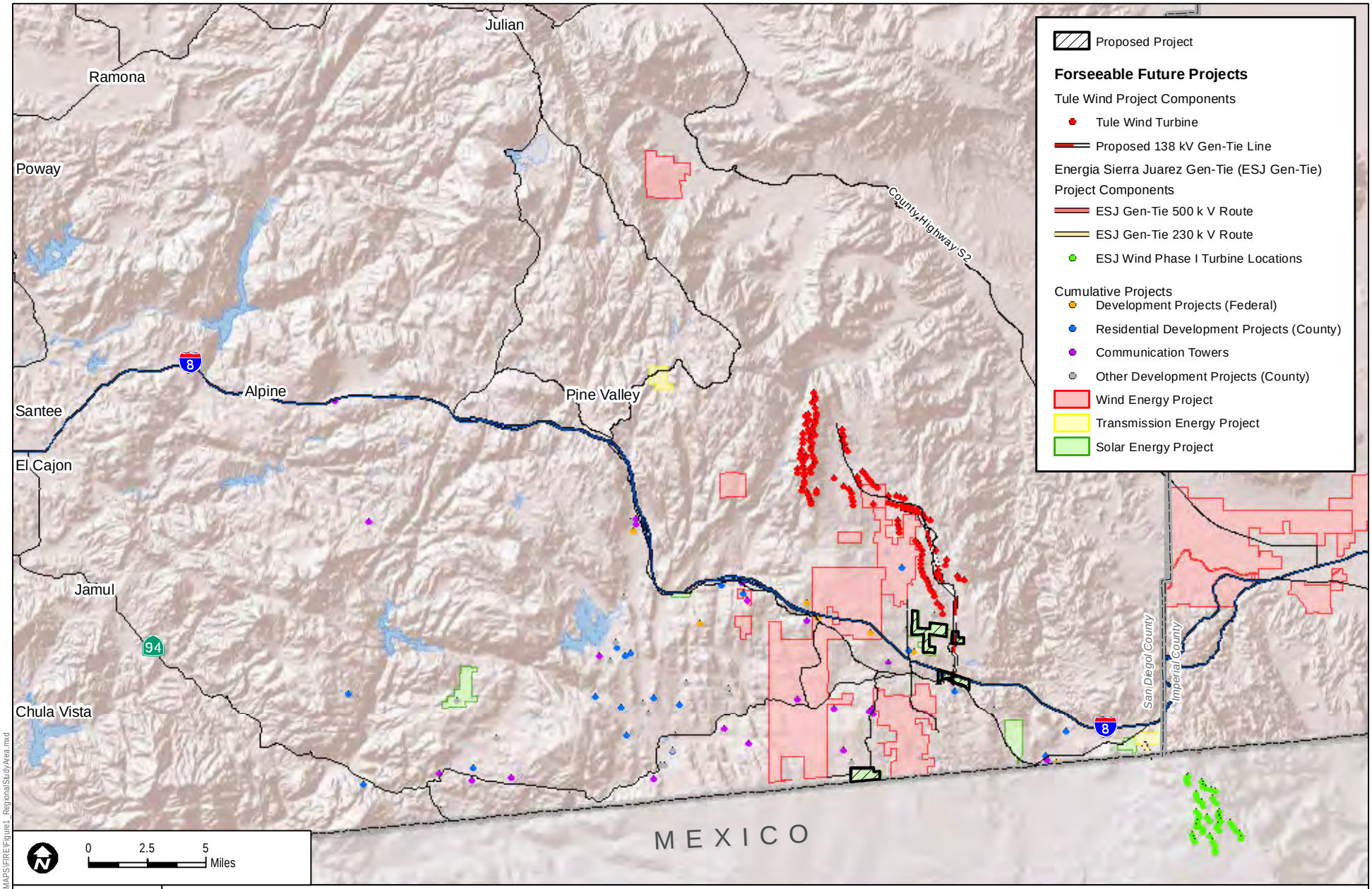
1.2.1 Vegetation, Topography and Weather

The Study Area includes large, continuous blocks of seasonally flammable native vegetation as well as large expanses of disturbed areas with invasive, non-native grasses. The vegetation mosaic across the landscape is conducive to ignitions and resulting wildfires. The topography

throughout the Study Area varies from gentle rolling terrain to steep, rugged mountains and canyons. Study Area topography facilitates wildfire spread through alignments with seasonal wind patterns, steep terrain that accelerates spread rates, and inaccessible and remote areas where fire is difficult to contain. The Study Area is subject to above average winds throughout the year with especially high winds (over 60 mph) possible during Santa Ana weather events. Wind facilitates wildfire spread by promoting lower fuel moisture and sending embers well ahead of the flaming front, creating new spot fires. Exponential growth of a wildfire is possible under these conditions. Santa Ana winds typically correspond with a few to several days of low humidity and high temperatures and often follow a long period where native fuels have not received precipitation, resulting in very low fuel moistures and ignition susceptibility. Therefore, the Study Area's fire environment is considered to include conditions that are expected to result in occasional wildfires with large, containment-challenging wildfires occurring, but at a lower rate and coinciding with Santa Ana weather events.

1.2.2 Wildfire Corridor

A wildfire corridor, as defined in this report, can be characterized by areas with large expanses of open space including similar, continuous plant communities that enable wildfire spread, especially under extreme conditions. Wildfire corridors are not unique to San Diego County, but San Diego County includes defined fuel corridors, delineated by land features which include east-west trending valleys from the undeveloped east County to the wildland urban intermix and interface areas, north-south trending canyons that align with seasonal high wind events and preservation of natural open space that in many San Diego County communities, extends into and through communities, exposing large areas to potential fire pathways. Wildfire corridors are strongly associated with watersheds. Watersheds are typically delineated by topography and drainage patterns. These same drainages can funnel fire as they do water, especially since the drainages may also funnel winds during off-shore wind events. Wildfire corridors include large expanses of natural vegetation but often also include large polygons of non-native, flashy fuel vegetation. The vegetation composition, distribution, mosaics, and terrain influence and form what can be called "fuel beds." Each wildfire corridor includes a variety of fuel beds that are characterized by their dominant vegetation type, understory components, accumulated dead material, densities, and continuousness.



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SOURCE: SANGIS 2012; Bing Maps

FIGURE 1

Regional Study Area

7345-01

NOVEMBER 2012

SOITEC SOLAR PORTFOLIO EMERGENCY SERVICE CAPABILITIES ASSESSMENT

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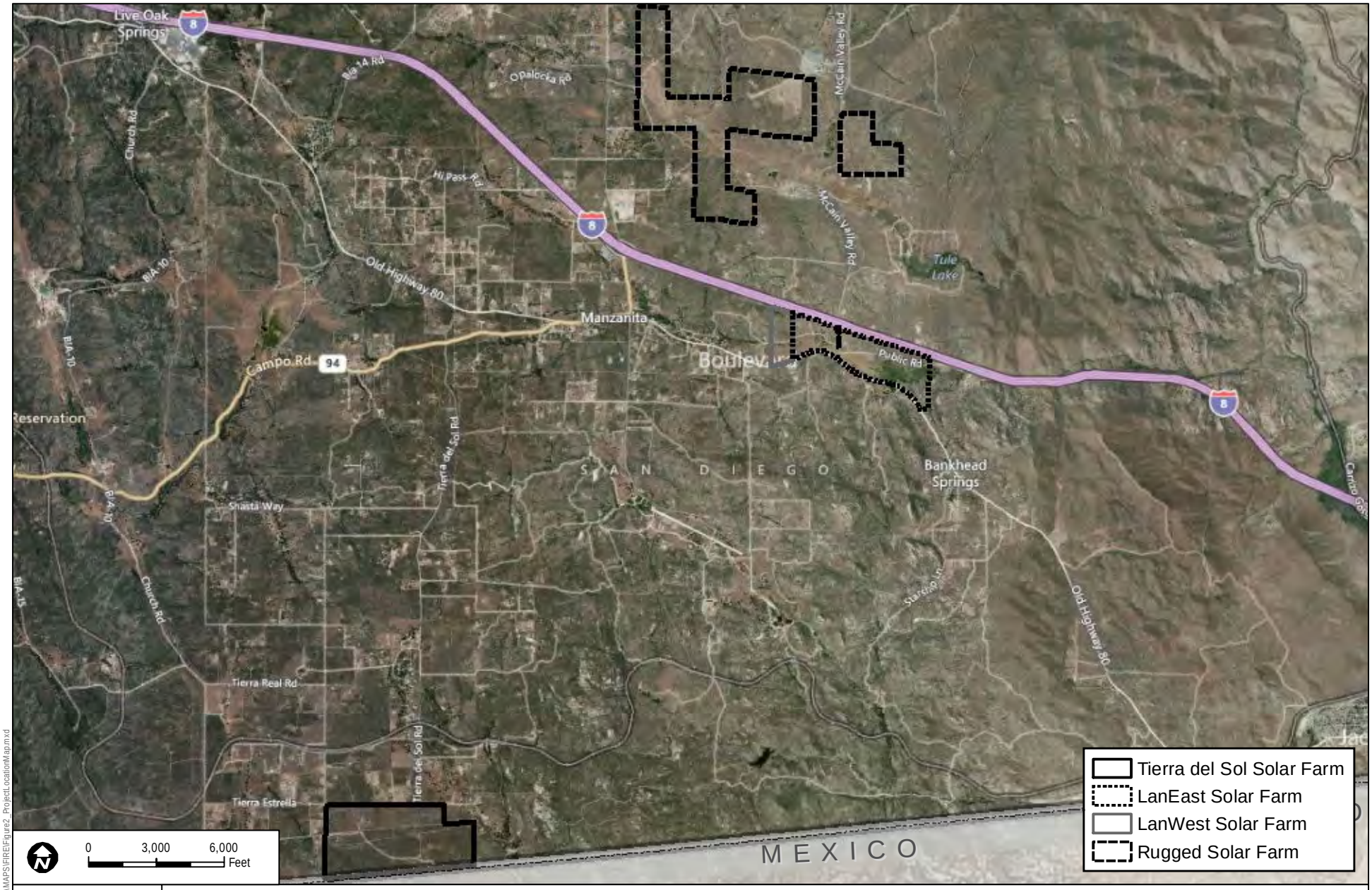

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SOURCE: USGS 7.5-Minute Series Jacumba, Live Oak Springs, Tierra Del Sol Quadrangles.

FIGURE 2

Proposed Project Location Map

7345-01

NOVEMBER 2012

SOITEC SOLAR PORTFOLIO EMERGENCY SERVICE CAPABILITIES ASSESSMENT

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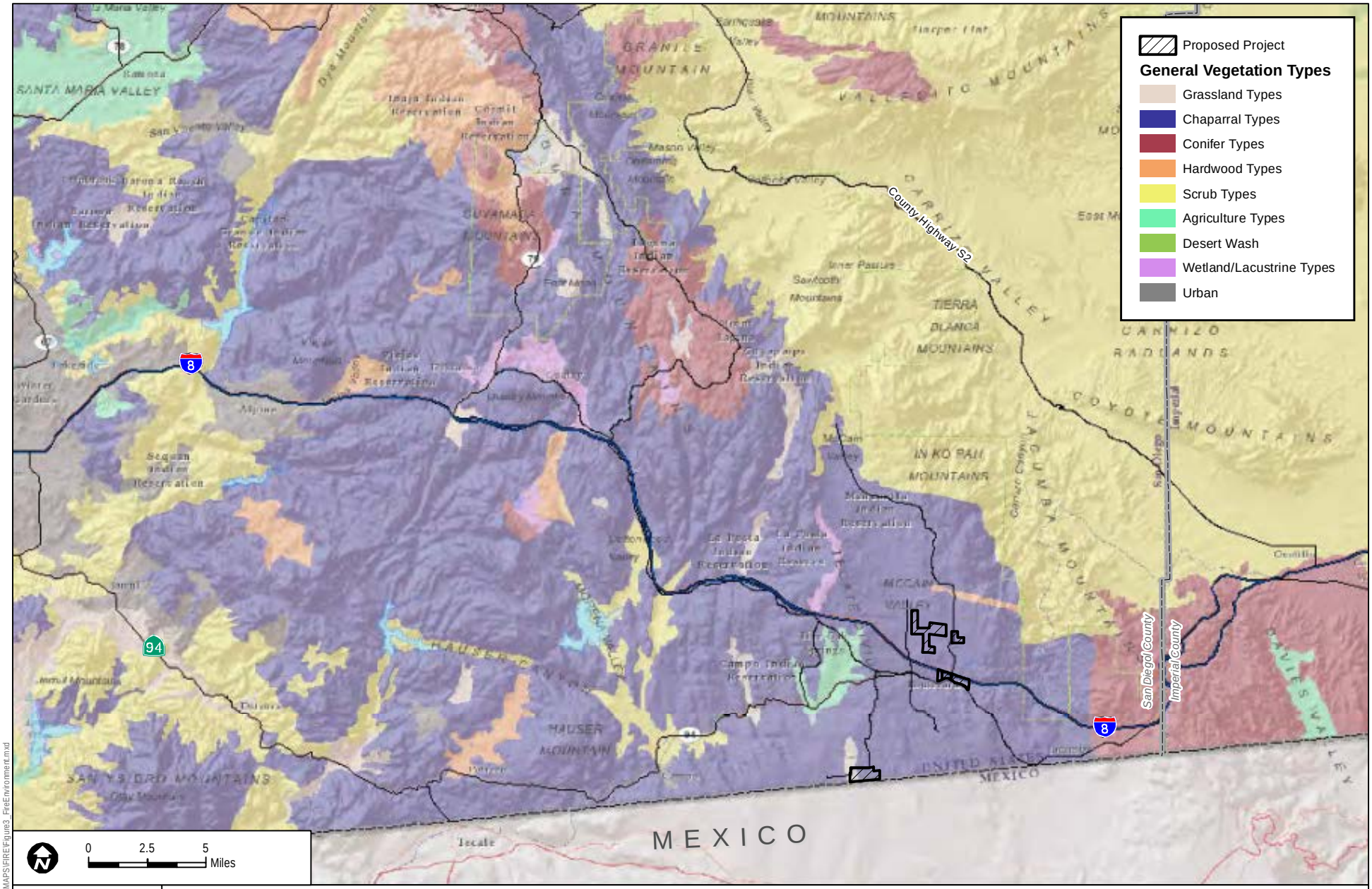

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SOURCE: SANGIS 2012; FRAP 2012

FIGURE 3

Study Area Fire Environment

7345-01

NOVEMBER 2012

SOITEC SOLAR PORTFOLIO EMERGENCY SERVICE CAPABILITIES ASSESSMENT

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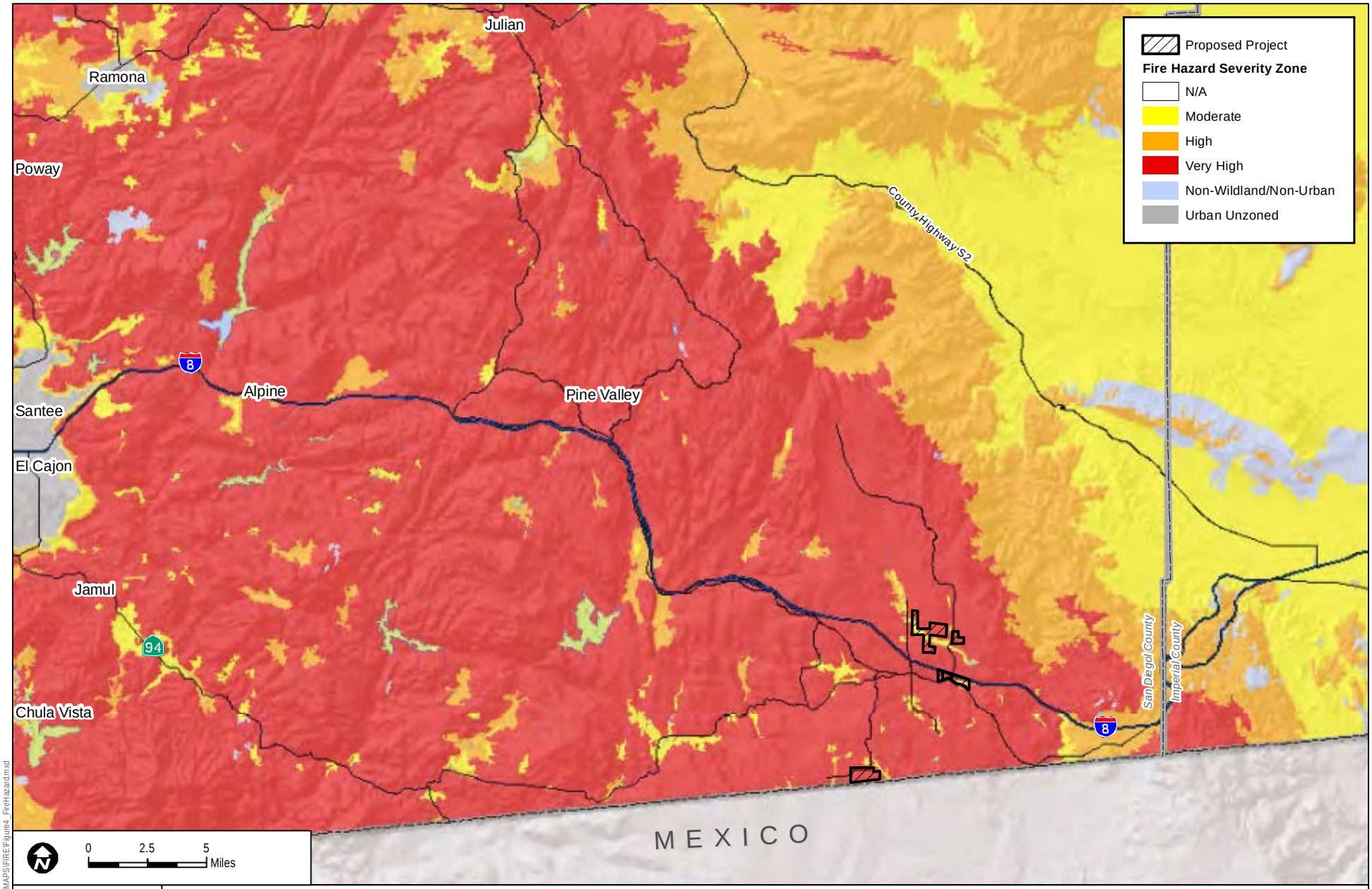

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SOURCE: SANGIS 2012; FRAP 2012

FIGURE 4

Study Area Fire Hazard Severity Zones

7345-01

NOVEMBER 2012

SOITEC SOLAR PORTFOLIO EMERGENCY SERVICE CAPABILITIES ASSESSMENT

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However, during extreme fire weather, it has been demonstrated that the numerous fuel beds occurring within a wildfire corridor will burn as one fuel bed with similar average fire behavior. Individual fuel types may burn to varying degrees, with some burning completely over large areas and others burning in a very patchy, incomplete manner, such as when wildfire burning through older age class fuels intersects with relatively recently burned areas with younger fuels. Despite how the fire burns through the mosaic of fuels, the fuel bed is advancing the fire by providing receptive fuels for continued spread via the flame front and ember-generated spot fires.

Furthermore, an individual wildfire corridor can encompass more than one watershed as areas with similar fire risk and receptive fuel beds may burn during a large fire event. The wildfire corridor and fuel bed concept is one way to evaluate fire risk across a given landscape and in relation to the Proposed Project and foreseeable projects. A depiction of the Study Area's fuel ages is provided in Figure 5. As depicted, the immediate area around Boulevard includes primarily fuels that are at least 40 years old along with a large percentage of area with fuels that have never experienced wildfire and a significant polygon to the east/southeast considered non-burnable (SDCFA 2011).

The Proposed Project and foreseeable projects occur within the San Diego County southeastern wildfire corridor. The Boulevard area is located in the extreme southeastern corner of San Diego County and encompasses the Proposed Project. Nearby communities include Manzanita, Jacumba, Boulder Grove, Live Oak Springs and La Posta, all receiving designation as communities at risk of wildfire (California Fire Alliance 2010; CAL FIRE 2001). Terrain varies throughout the corridor with elevations ranging from below 1,700 feet above mean sea level (amsl) to nearly 6,000 feet amsl. Vegetation throughout the wildfire corridor varies, but large portions are dominated by sparse, semi-arid vegetation including desert scrub, chaparral, juniper woodland, and oak woodland while other large expanses include dense chaparral vegetation communities and non-native grasses. There is also coniferous forest at the higher elevations of the Study Area. Land ownership within the Study Area includes State of California, United States Forest Service (USFS), Bureau of Land Management (BLM), County of San Diego, City of San Diego, SDG&E, Native American Reservation, and private holdings. Population density is a sparse 34 to roughly 60 people per square mile.

1.2.3 Fire History

As discussed in the Draft Multi-Jurisdictional Hazards Mitigation Plan Update prepared by San Diego County's Office of Emergency Services (2010), wildland fires have prompted

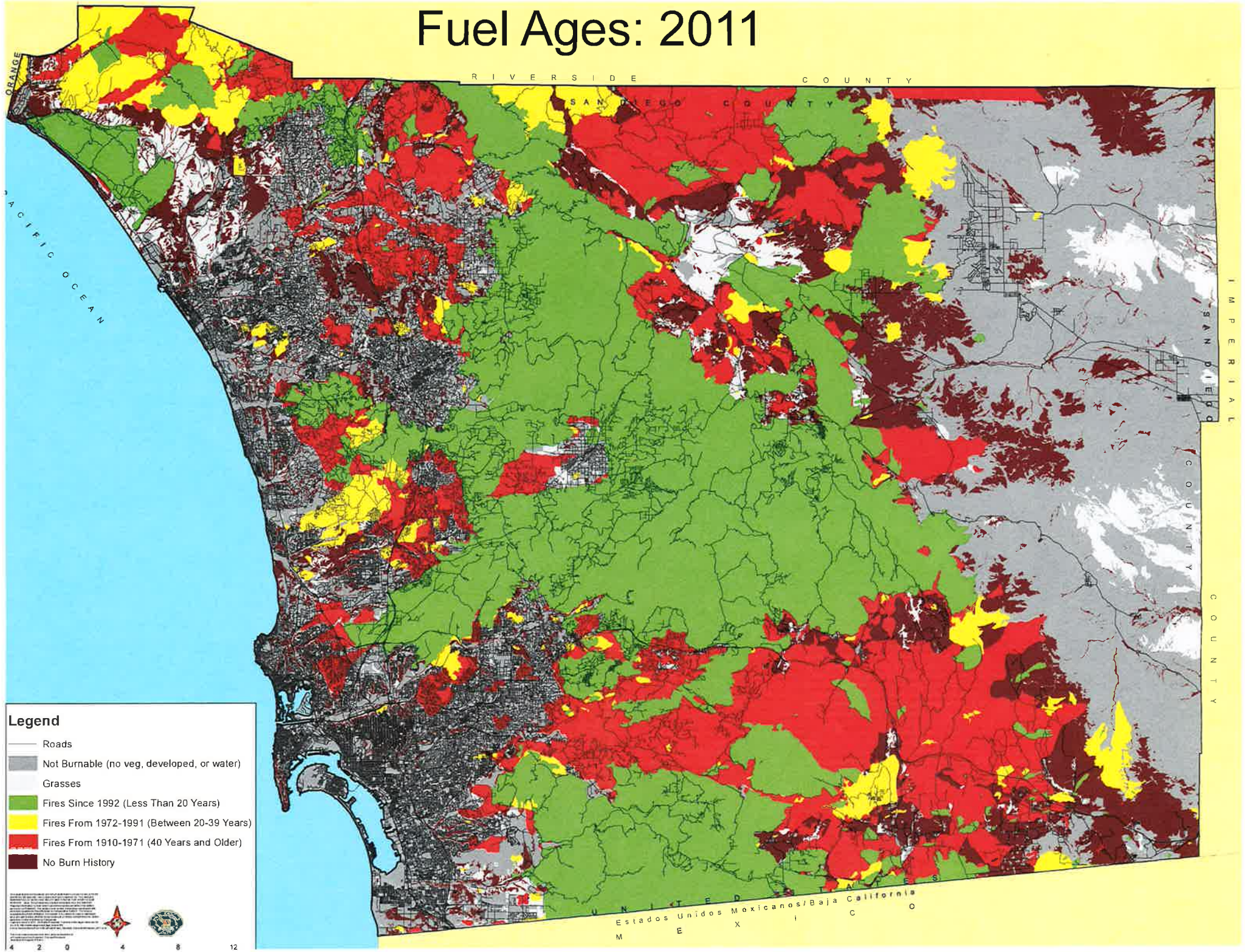
five Proclaimed States of Emergency and wildland–urban interface fires have prompted three Proclaimed States of Emergency within the County between 1950 and 2007 (County of San Diego 2010a). The worst wildfires in the County's history occurred within the last decade, including in October 2003 and again in October 2007. The 2007 fires included the Witch Creek Fire along with six other smaller fires that burned throughout the County resulting in the burning over of 369,000 acres of land, 2,670 structures, 239 vehicles, 2 commercial properties, and subsequent costs exceeding $1.5 billion. The fires were responsible for 10 civilian deaths, 23 civilian injuries, and 10 firefighter injuries. The second worst wildland fire occurred during October in 2003 and consisted of the Cedar, Paradise, Otay, and Roblar fires. All together these fires were responsible for burning 332,766 acres of land and 3,239 structures, and they resulted in 17 deaths.

Fire history of an area is an important indicator of a fuel bed's propensity to burn, fire frequency, fire type and behavior, most vulnerable project areas, and significant ignition sources, amongst others. Figure 6 presents fire history for the Study Area. As presented, there have been several recorded wildfires in the Study Area's wildfire corridor. Fire history data was obtained from Cal Fire's Fire and Resource Assessment Program[1] database. As illustrated by the data, the majority of the Proposed Project sites have not been subject to wildfire. Wildfires burning on the Proposed Project sites include:

- An un-named fire in 1940 burned approximately 47 acres of the northern portion of the Los Robles II site
- The 1995 McCain Fire burned approximately 49 acres of the eastern section of the Rugged Solar site.
- An unnamed fire in 1972 burned approximately 105 acres of the southern portion of the western section of the Rugged Solar site.
- The 1974 Ribbonwood Fire burned approximately 92 acres of the southern portion of the western section of the Rugged Solar site.
- The 2012 Shockey Fire burned a small portion of the western portion of the Tierra Del Sol site.

[1] Cal Fire – Fire and Resource Assessment Program (http://frap.cdf.ca.gov/).

Fuel Ages: 2011



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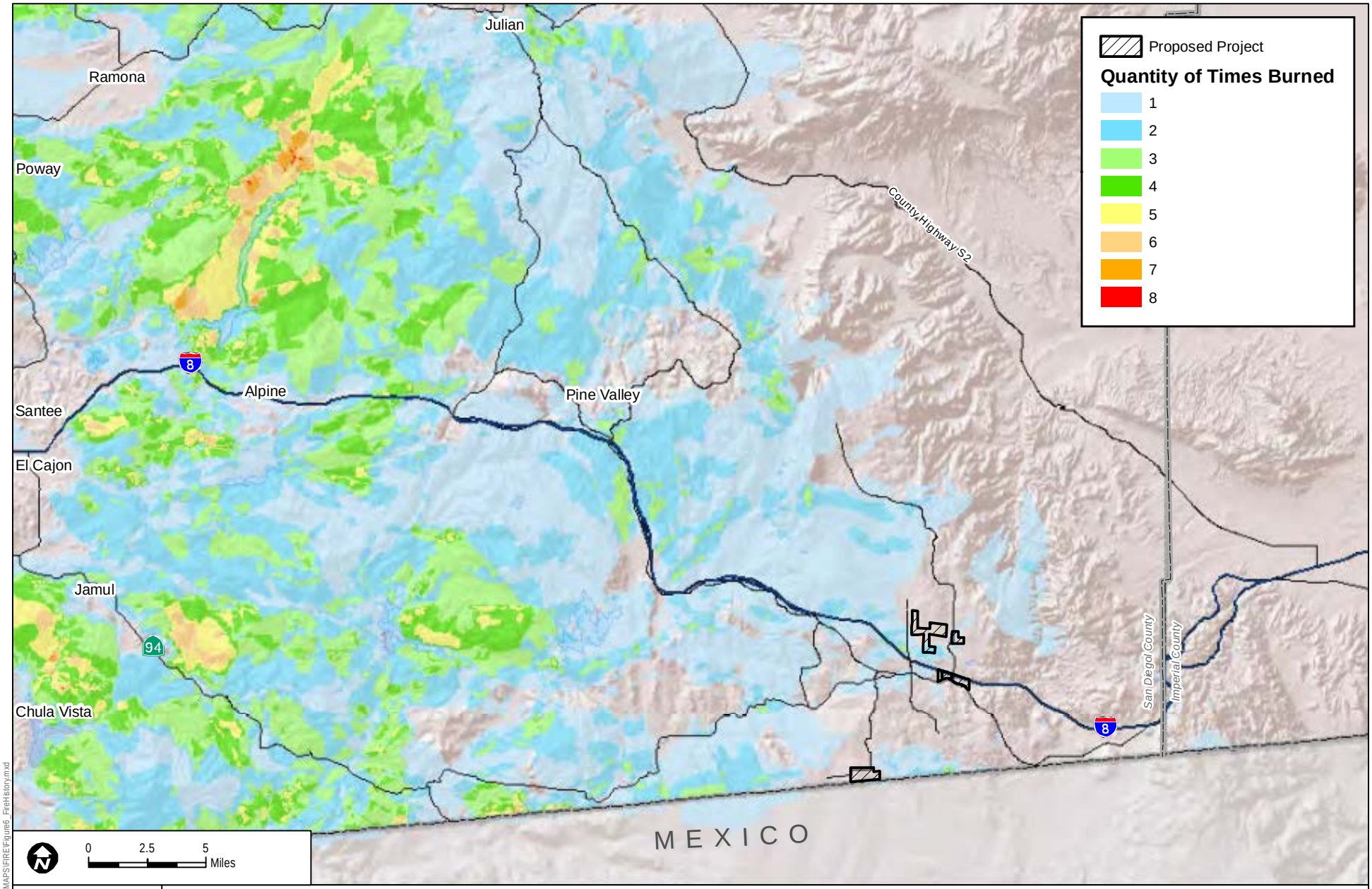

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SOURCE: SANGIS 2012; FRAP 2012

FIGURE 6

Study Area Fire History

7345-01

NOVEMBER 2012

SOITEC SOLAR PORTFOLIO EMERGENCY SERVICE CAPABILITIES ASSESSMENT

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While fire history on the Proposed Project site is relatively limited, the Study Area's wildfire corridor has experienced repeated burning in the past. The following summarizes the historic fires burning within 1 mile of the Proposed Project:

- An Un-named Fire in 1911 (146 total acres burned)
- An Un-named Fire in 1940 (3,135 total acres burned)
- An Un-named Fire in 1944 (64,419 total acres burned)
- The 1950 Pueblo Siding Fire (315 total acres burned)
- The 1953 Hi Pass Fire (331 total acres burned)
- An Un-named Fire in 1958 (175 total acres burned)
- An Un-named Fire in 1972 (451 total acres burned)
- An Un-named Fire in 1972 (676 total acres burned)
- The 1974 Outside Origin #2 Fire (2,039 total acres burned)
- The 1974 Ribbonwood Fire (510 total acres burned)
- The 1995 McCain Fire (302 total acres burned)
- The 1996 White Fire (62 total acres burned)
- The 2000 Border #6 Fire (75 total acres burned)
- The 2002 Manzanita #2 Fire (215 total acres burned)
- The 2004 Border #10 Fire (89 total acres burned)
- The 2005 Ribbonwood Fire (36 total acres burned)
- The 2010 Border #10 Fire (144 total acres burned)

Based on a review of this information, fire return intervals in the Study Area region have occurred on average about every 6 years, with intervals ranging from 0 to 29 years.

1.2.4 Wildfire Behavior and Solar Farm Projects

The wildfire corridor and its fuel beds were modeled (CPUC and BLM. 2008a) for fire behavior, burn probability, and escape potential for an energy project in 2008. Based on those results, and independent San Diego County fire behavior modeling confirmations (Dudek 2012), the wildfire corridor includes the potential for large-scale, intense and fast-moving wildfire. Supporting this conclusion is CAL FIRE's Fire Threat ranking, which

indicates the level of fire threat based on the potential fire behavior (fuel rank) and expected fire frequency (fire rotation). The Proposed Project and foreseeable projects occur in a variety of classification areas, but generally occur within areas ranked high, very high, or extreme (CAL FIRE 2007a).

The September 2012 Shockey Fire burned within roughly a mile of the Proposed Project's Tierra Del Sol Solar site, which is located adjacent to the US/Mexico border. The wildfire burned nearly 3,000 acres, destroying 11 homes, 14 outbuildings, and 11 vehicles, and leading to the death of an elderly man (CAL FIRE 2012). The fire resulted in the evacuation of a large number of area residents. The fire is thought to have been ignited at a shooting range near the Shockey Truck Trail east of Campo on the Campo Indian Reservation. At the fire's height, 1,402 firefighters from Cal Fire and other agencies were actively fighting the fire. The fire burned in a variety of fuel bed types and resulted in flame lengths of 50 to 60 feet through some of the heavier chaparral communities and jackpot fuels located at ridgetops near the point of origin produced up to 100 foot tall flame lengths (personal communication with CAL FIRE firefighter October 2012). Non-native, grass-dominated areas, as would be expected, resulted in fast moving fire with lower flame lengths and fire intensity. The conditions during this wildfire were typical for summertime weather with winds in the 12 to 20 mph range. Fuel moistures were low due to hot dry conditions. Although a Red Flag Warning had not been issued, conditions are estimated to have been close to those levels.

1.2.4.1 Fire Behavior Interpretation

Fire behavior is often discussed in terms of flame length (feet) in existing and proposed site conditions during Summer and Peak weather scenarios. Flame length, the length of the flame of a spreading surface fire within the flaming front, is measured from midway in the active flaming combustion zone to the average tip of the flames[2]. It is a somewhat subjective and non-scientific measure of fire behavior, but is extremely important to fireline personnel in evaluating fireline intensity and is worth considering as an important fire variable[3]. The information in Table 1 presents an interpretation of flame length and its relationship to fireline intensity.

[2] Andrews, Patricia L., Collin D. Bevins, and Robert C. Seli. 2004. BehavePlus fire modeling system, version 3.0: User's Guide. Gen. Tech. Rep. RMRS-GTR-106 Ogden, UT: Department of Agriculture, Forest Service, Rocky Mountain Research Station. 132p.

[3] Rothermel, Richard C. 1991. Predicting behavior and size of crown fires in the northern Rocky Mountains. Research Paper INT-438. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station.

Table 1
Fire Suppression Interpretation

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

Source: BehavePlus 3.0.2 fire behavior modeling program (Andrews, Bevins, and Seli 2004)

Fire behavior includes flame length, but it also includes fire intensity, fire spread and spotting. Each of these variables is highly dependent on the fuels, topography and weather. It is typical to observe more manageable fires during the summer, absent windy conditions than it is during the fall. Lack of rain during the typical spring and summer in southern California results in vegetation drying. Late fall also coincides with the occurrence of Santa Ana winds, which further reduce plant moisture due to extremely low humidity, high temperatures and high winds. Fires occurring during these conditions are considered responsible for burning some 90% of the acreage burned in California. Wind driven fires occurring in moderate to heavy fuels in rugged terrain, like that found throughout the Study Area, are difficult or impossible to contain until the winds shift or the Santa Ana condition ceases. The importance of fire behavior for determining cumulative impacts and appropriate mitigations associated with projects in the Study Area is that it forces mitigations that are focused on preventing ignitions, especially during Santa Ana (Red Flag Warning) conditions since this is the most likely period when fire ignitions may become large wildfires.

1.2.5 Assets at Risk

Assets at risk from wildfire within the Study Area's wildfire corridor include all structures, infrastructure, persons, and property and natural resources within approximately 40 miles to the west of the Proposed Project, stretching from the Cleveland National Forest to urbanized areas to the west. This wildfire corridor, as previously mentioned, includes terrain, vegetation, and climate that has historically supported wildfire spread. Some of the area has no recorded fire history, other areas haven't burned for over 40 years, since the Laguna Fire in 1970, indicating that fuels may be heavy and may readily spread fire. The result of an ignition under worst-case conditions (Santa Ana/Red Flag Warning Weather) would be

wildfire threat to all structures and communities to the west of the project in east and southeast San Diego County. SDCFA estimates that nearly 17,000 residences (and other structures) may be at risk of loss during a wind driven wildfire within this southeastern San Diego County wildfire corridor (County of San Diego 2011).

1.2.6 Fire Risk

Fire risks must be assessed based upon the potential frequency (probability of an incident occurring) and consequence (potential damage should an event occur). For example, a terrorist act has a low probability in the Study Area; however, if a terrorist act occurs, the damage and the psychological impact on the Study Area's residents are potentially very high. This same outlook regarding risk assessment can also be applied to natural disasters. For example, an earthquake generally does not occur along the same fault, affecting the same communities every year; but, if it does occur, the damage can be great. Conversely, medical emergencies happen every day. The overall potential damage from medical emergencies to the Study Area communities as a whole is not nearly as significant as that from an earthquake or other natural disaster, though the individual incidents greatly affect those requiring the service. Planning future deployment strategies requires comparing the potential frequency and potential damage of events that may affect the projects, communities and service area.

The evaluation of fire risks must take into account the frequency and severity of fires and other significant incidents. Determining risk by analyzing past incident statistical information and projected and type of growth in the fire service area is essential to the development of a workable fire agency strategic plan. This document is not intended to be used as a strategic plan by the SDCFA or other Study Area fire agencies, but does provide insight into the type of risks that occur within the study area, the frequency at which they occur, the ability to respond and how or if changes are necessary to accommodate the development of the proposed renewable energy facilities. The relationships between probability and consequence and the Study Area's adopted service level goals determine the needed concentration and distribution of resources. Distribution is the number of firefighting and emergency response resources placed throughout the area. Concentration is the number of firefighting and emergency response resources needed in a given area within the Study Area. This varies depending on many factors including the number of incidents (calls) for service; the risk factors of the area; the availability, reliability, and timely arrival of secondary responding units. The challenge facing any fire agency is funding the proper balance for the distribution and concentration of resources needed, especially in rural areas with low and widely spread populations. The cost of providing additional fire protection resources cannot typically be justified (based on the low populations) in these areas and a lower level of service (i.e., longer response times, smaller responding force, etc.) is typically accepted.

The Study Area includes common risk types as well as heightened sources of risk. Common risks that result in emergency calls include accidental injuries (residential, vehicle, other), medical related incidents including heart attacks, strokes and other serious conditions and illnesses, accidental vegetation fires, and occasional structure fires. The study area also includes a major transportation corridor risk category that has a higher occurrence rate than commonly realized in other areas. Vehicle related incidents, including accidents and "over-the side" rescues and hazardous spills along the I-8 freeway, are likely to occur at higher levels in the study area than in areas without a major freeway and numerous 2-lane circulatory roadways that are winding, narrow, and in some cases, include steep-sided drop-offs. Roadside fires are also a significant risk with spread into the adjacent wildlands probable.

An additional risk category that may occur in any fire agency area, but that has an elevated potential to become extreme (low probability, high consequence) within the study area is uncontrollable wildfire. As previously discussed, the area's terrain, native fuels, climate, and wildland exposures have resulted in CAL FIRE and SDCFA designating the area as one of San Diego County's wildfire corridors. Most of the area has not experienced a large wildfire for at least 40 or more years and some naturally vegetated areas have no recorded fire history (100 years or more). Although wildfires are possible, CAL FIRE's goal (with assistance from other fire agencies) is to contain all wildfires within the first two hours to 10 acres or less 95 percent of the time. They have performed very well toward this goal, with the average in San Diego County over the last 10 years indicating that of 402 fires per year, successful containment of 95% of these fires to 10 acres or less has been achieved. Statewide statistics are very similar based on several thousand wildfire starts per year.

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2.0 APPLICABLE REGULATIONS, PLANS, AND STANDARDS

This section discusses federal, state, and regional energy facility regulations, plans, and standards applicable to the Study Area projects. Although there are currently no national, state, or local standards or codes that specifically apply to solar farms in wildland areas, the following regulations must be adhered to at each facility and are based on transmission lines, substations, power plants, and other existing energy facilities. Where gaps in these regulations are identified, or where the standard provided in the regulation is considered inadequate for fire protection within the Study Area and for solar projects as defined by the Proposed Project, additional measures have been identified in the recommendations section of this report.

2.1 Federal and Other Regulations

2.1.1 Federal Energy Regulatory Commission

The Federal Energy Regulatory Commission (FERC) requires utilities to adopt and maintain minimum clearance standards between vegetation and transmission voltage power lines. These clearances vary depending on voltage. In most cases, the minimum clearances required in state regulations are greater than the federal requirement. In California for example, the state has adopted General Order 95 rather than the North American Electric Reliability Corporation (NERC) Standards as the electric safety standard for the state (CPUC and BLM 2008a). Therefore FERC regulations are not discussed any further.

2.1.2 National Fire Protection Association (NFPA) Codes, Standards, Practices, and Guides

NFPA codes, standards, recommended practices, and guides ("NFPA Documents"), are developed through a consensus standards development process approved by the American National Standards Institute (ANSI). This process brings together professionals representing varied viewpoints and interests to achieve consensus on fire and other safety issues. NFPA standards are recommended guidelines and nationally accepted good practices in fire protection but are not law or "codes" unless adopted as such or referenced as such by the California Fire Code or the Local Fire Agency.

- **NFPA 850, Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations, 2010:** NFPA 850 was prepared for the guidance of those charged with the design, construction, operation, and protection of electric generating plants and high voltage direct current converter stations that are covered by the scope of

this document. This document provides fire hazard control recommendations for the safety of construction and operating personnel, the physical integrity of plant components, fire protection systems and equipment, and the continuity of plant operations. NFPA 850 is the national standard on Power Plant Fire Protection, and includes a Chapter regarding fire protection for Solar Thermal installations, focuses on those solar installations that are heating heat transfer fluid which is a different process than the Proposed Project's CPV trackers. In the section on loss experience, no solar installations are included.

- **NFPA 10, Fire Extinguishers**: A long-standing standard, which specifies the types, sizes, rating, and locations for portable fire extinguishers. It also provides information on how to calculate the number and size of portable fire extinguishers needed.
- **NFPA 11, Fire Fighting Foam (Low, Medium, and High Expansion Foam)**: NFPA 11 is a longstanding standard, which provides recommendations for design and installation of firefighting foam systems and portable equipment. It also provides recommendations regarding calculating the amount of foam concentrate and solution needed on a flammable or combustible liquid fire.
- **NFPA 13, Standard for Installation of Sprinkler Systems**: NFPA 13 is the standard for design and installation of fire sprinkler systems in a building. It provides the requirements for the type of system needed in a particular occupancy, water supply, sprinkler head flow and pressures, the locations of sprinkler heads, and installation of the system. This standard is referenced by the California Fire Code.
- **NFPA 22, Standard for Water Tanks for Private Fire Protection**: Provides recommendations for the design, construction, and installation of water storage tanks for private fire protection systems.
- **NFPA 30, Flammable and Combustible Liquids Code**: This standard provides recommendations for storage, use, and handling of flammable and combustible liquids. It provides detailed information regarding tank storage, spacing, dispensing of liquids, portable containers, and other related operations. NFPA 30 is referenced by the California Fire Code.
- **NFPA 70, National Electrical Code**: NFPA 70 is the standard for the design and installation of electrical systems. It includes recommendations for various types of occupancies and also provides recommendations and criteria for the location and installation of "explosion proof" electrical systems.
- **NFPA 72, National Fire Alarm and Signaling Code**: NFPA 72 is the standard for the design, installation, and operation of fire alarm systems in various occupancies. This

standard is used by fire alarm system designers when designing and installing a system. It is utilized also by fire agencies when reviewing plans for new systems.

- **NFPA 497, Classification of Flammable Liquids, Gases, and Vapors, and for Electrical Area Installations in Chemical Process Areas:** NFPA 497 is the standard, which is utilized along with NFPA 70 to determine flammable gas, flammable liquid, and combustible liquid hazards and to recommend the areas that require explosion-proof electrical systems. It also sets forth the extent of the classified areas. Although the title says chemical process areas, it is used as a standard for explosion-proof electrical as it defines various risks and contains numerous diagrams to help the electrical system designer.

2.1.3 Federal Wildland Fire Management Policy

The Federal Wildland Fire Management Policy was developed in 1995 and updated in 2001 by the National Wildfire Coordinating Group, a federal multi-agency group that establishes consistent and coordinated fire management policy across multiple federal jurisdictions. An important component of the Federal Wildland Fire Management Policy is the acknowledgement of the essential role of fire in maintaining natural ecosystems. The Federal Wildland Fire Management Policy and its implementation are founded on the following guiding principles:

- Firefighter and public safety is the first priority in every fire management activity.
- The role of wildland fire as an essential ecological process and natural change agent will be incorporated into the planning process.
- Fire management plans, programs, and activities support land and resource management plans and their implementation.
- Sound risk management is a foundation for all fire management activities.
- Fire management programs and activities are economically viable, based upon values to be protected, costs, and land and resource management objectives.
- Fire management plans and activities are based upon the best available science.
- Fire management plans and activities incorporate public health and environmental quality considerations.
- Federal, state, tribal, local, interagency, and international coordination and cooperation are essential.

Standardization of policies and procedures among federal agencies is an ongoing objective.

2.1.4 National Fire Plan

The National Fire Plan was a Presidential directive in 2000 as a response to severe wildland fires that had burned throughout the U.S. The National Fire Plan focuses on reducing fire impacts on rural communities and assurance for sufficient firefighting capacity in the future (National Park Service 2010). It is a long-term investment that will help protect natural resources in addition to communities. The plan is a long-term commitment based on cooperation and communication among federal agencies, states, local governments, tribes and interested publics. There are five key areas addressed under the National Fire Plan:

- Firefighting and Preparedness
- Rehabilitation and Restoration
- Hazardous Fuels Reduction
- Community Assistance
- Accountability.

2.1.5 International Fire Code

Created by the International Code Council, the International Fire Code addresses a wide array of conditions hazardous to life and property including fire, explosions, and hazardous materials handling or usage (although not a federal regulation, but rather the product of the International Code Council). The International Fire Code places an emphasis on prescriptive and performance-based approaches to fire prevention and fire protection systems. Updated every 3 years, the International Fire Code uses a hazards classification system to determine the appropriate measures to be incorporated in order to protect life and property (often times these measures include construction standards and specialized equipment). The International Fire Code uses a permit system (based on hazard classification) to ensure that required measures are instituted.

2.1.6 International Wildland–Urban Interface Code

The International Wildland–Urban Interface Code is published by the International Fire Code, and is a model code addressing wildfire issues.

2.1.7 National Electric Safety Code 1977, 2006, 2012

The National Electric Safety Code covers basic provisions related to electric supply stations, overhead electric supply and communication lines, and underground electric supply and communication lines. The code also contains work rules for construction, maintenance, and operational activities associated with electric supply and communication lines and equipment. The code, which must be adopted by states on an individual basis, is not applicable in the State of California. As stated previously, the State of California has adopted its own standard (General Order 95) rather than a general national standard. The National Electric Safety Code is not discussed further.

2.1.8 North American Electric Reliability Corporation Standards

The NERC is a nonprofit corporation comprising 10 regional reliability councils. The overarching goal of NERC is to ensure the reliability of the bulk power system in North America. To achieve its goal, the NERC develops and enforces reliability standards, monitors the bulk power systems, and educates, trains, and certifies industry personnel (NERC 2010). In order to improve the reliability of regional electric transmission systems and in response to the massive widespread power outage that occurred on the Eastern Seaboard, NERC developed a transmission vegetation management program that is applicable to all transmission lines operated at 200 kV and above to lower voltage lines designated by the Regional Reliability Organization as critical to the reliability of the electric system in the region. The plan, which became effective on April 7, 2006, establishes requirements of the formal transmission vegetation management program, which include identifying and documenting clearances between vegetation and any overhead, ungrounded supply conductors, while taking into consideration transmission line voltage, the effects of ambient temperature on conductor sag under maximum design loading, fire risk, line terrain and elevation, and the effects of wind velocities on conductor sway (NERC 2006). The clearances identified must be no less than those set forth in the Institute of Electrical and Electronics Engineers Standard 516-2003 (*Guide for Maintenance Methods on Energized Power Lines*) (NERC 2006).

2.1.9 Institute of Electrical and Electronics Engineers Standard 516-2003

The Institute of Electrical and Electronics Engineers is a leading authority in setting standards for the electric power industry. Standard 516-2003, *Guide for Maintenance Methods on Energized Power Lines*, establishes minimum vegetation-to-conductor clearances in order to maintain electrical integrity of the electrical system.

2.2 State Regulations

2.2.1 California Fire Code

The California Fire Code is contained within Chapter 9 of Title 24 of the California Code of Regulations (CCR). Based on the International Fire Code, the California Fire Code is created by the California Buildings Standards Commission and regulates the use, handling, and storage requirements for hazardous materials at fixed facilities. Similar to the International Fire Code, the California Fire Code and the California Building Code use a hazards classification system to determine the appropriate measures to incorporate to protect life and property. There is not a hazard classification system in the Fire Code that includes wind or stand-alone solar facilities.

2.2.2 California Health and Safety Code

State fire regulations are established in Section 13000 of the California Health and Safety Code. The section establishes building standards, fire protection device equipment standards, high-rise building and childcare facility standards, interagency support protocols, and emergency procedures. Also, Section 13027 states that the state fire marshal shall notify industrial establishments and property owners having equipment for fire protective purposes of the changes necessary to bring their equipment into conformity with, and shall render them such assistance as may be available in converting their equipment to standard requirements.

2.2.3 2010 Strategic Fire Plan

The 2010 Strategic Fire Plan is the statewide plan for reducing the risk of wildfire. The basic principles of the Fire Plan are as follows:

- Involve the community in the fire management planning process
- Assess public and private resources that could be damaged by wildfires
- Develop pre-fire management solutions and implement cooperative programs to reduce community's potential wildfire losses.

One of the more important objectives of the plan regards pre-fire management solutions. Included within the realm of pre-management solutions are fuels breaks, the establishment of Wildfire Protection Zones, and prescribed fires to reduce the availability of fire fuels. In addition, the Fire Plan recommends that clearance laws, zoning, and related fire safety requirements implemented by state and local authorities address fire-resistant construction standards, hazard reduction near structures, and infrastructure (California Board of Forestry 2000). The Fire Plan

does not contain any specific requirements or regulations. It acts as more of an assessment of current fire management practices and standards and makes recommendations on how best to improve the practices and standards in place.

2.2.4 California Public Utilities Commission General Order 95: Rules for Overhead Transmission Line Construction

General Order 95 was initially adopted in 1941 and was most recently updated in 2009 for Southern California (http://162.15.7.24/PUBLISHED/Graphics/112890.PDF). General Order 95 governs the design, construction, and maintenance of overhead electrical lines. Rule 31.1 generally states that design, construction, and maintenance of overhead electrical lines should be done in accordance with accepted good practices for the given location conditions known at the time by the persons responsible for the design, construction, and maintenance of the overhead electrical lines and equipment. Rule 35 of General Order 95 (Tree Trimming) requires the following:

- 4 feet radial clearances for any conductor of a line operating at 2,400 volts or more, but less than 72,000 volts
- 6 feet radial clearances for any conductor of a line operating at 72,000 volts or more, but less than 110,000 volts
- 10 feet radial clearances for any conductor of a line operating at 110,000 volts or more, but less than 300,000 volts (this would apply to the project)
- 15 feet radial clearances for any conductor of a line operating at 300,000 volts or more.

Under California Public Utilities Code Section 1708.5, interested persons are permitted to petition the CPUC to adopt, amend, or repeal a regulation. In response to the 2007 wildfires in San Diego County, on November 6, 2007, SDG&E submitted a petition to the CPUC requesting that the CPUC issues an Order Instituting Rulemaking to determine whether General Order 95 should be amended or if more rules should be adopted to address disaster preparedness, including damage from Santa Ana wind-driven firestorms (CPUC and BLM 2008a). The petition requested that the CPUC consider several items, including the following:

- Operating rural electrical lines differently during severe fire weather
- Mitigating potential hazards associated with rural lines including undergrounding line, using steel poles in place of wood, and shortening spans between poles
- Better coordinating disaster management efforts among agencies, municipalities, local jurisdictions, and utilities

- Maintaining electrical line rights-of-way (ROWs) free of vegetation
- Adopting a state-wide Disaster Management Plan.

2.2.5 California Department of Forestry and Fire Protection (CAL FIRE)

CAL FIRE is tasked with reducing wildfire-related impacts and enhancing California's resources. CAL FIRE responds to all types of emergencies including wildland fires and residential/commercial structure fires. In addition, CAL FIRE is responsible for the protection of approximately 31 million acres of private land within the state and, at the local level, is responsible for inspecting defensible space around private residences. CAL FIRE is responsible for enforcing State of California fire safety codes included in the CCR and California Public Resources Codes. Public Resources Code 4291 states generally that any person operating any structure located on brush-covered lands or land covered with flammable material is required to maintain defensible space around the structure. CCR Title 14 Section 1254 identifies minimum clearance requirements required around utility poles. In SRAs within the jurisdiction of CAL FIRE, the Fire Safety Inspection Program is an important tool for community outreach and enforcement of state fire codes.

CAL FIRE also inspects utility facilities and makes recommendations regarding improvements in facility design and infrastructure. Joint inspections of facilities by CAL FIRE and the utility owner are recommended by CAL FIRE so that each entity may assess the current state of the facility and the successfully implement fire prevention techniques and policies. Violations of state fire codes discovered during inspections are required to be brought into compliance with the established codes. If a CAL FIRE investigation reveals that a wildfire occurred as a result of a violation of a law or negligence, the responsible party could face criminal and/or misdemeanor charges (CAL FIRE 2007b). In cases where a violation of a law or negligence has occurred, CAL FIRE has established the Civil Cost Recovery Program, which requires parties liable for wildfires to pay for wildfire-related damages.

In the section of Southern California where the project is proposed, the power line hazard reduction standards are applicable year-round due to the scope of the fire season. More detailed descriptions of the applicable codes and regulations and images of exempt and non-exempt power line structures may be found in the *CAL FIRE Power Line Fire Prevention Field Guide* (CAL FIRE 2008).

These regulations are discussed in further detail as follows:

- **Public Resource Code 4291** requires a reduction of fire hazards around buildings, requiring 100 feet of vegetation management around all buildings, and is the primary mechanism for conducting fire prevention activities on private property within CAL FIRE jurisdiction.
- **Public Resources Code 4292** states a that a minimum firebreak of 10 feet in all directions from the outer circumference of such pole or tower be established around any pole which supports a switch, transformer, lightning arrester, line junction, or end or corner pole. All vegetation shall be cleared within the firebreak.
- **Public Resources Code 4293** establishes the minimum vegetation clearance distances (between vegetation and energized conductors) required for overhead transmission line construction. Minimum clearances are discussed as follows:
    - A minimum radial clearance of 4 feet shall be established for any conductor of a line operating at 2,400 or more volts but less than 72,000 volts.
    - A minimum radial clearance of 6 feet shall be established for any conductor of a line operating at 72,000 or more volts but less than 110,000 volts.
    - A minimum radial clearance of 10 feet shall be established for any conductor of a line operating at 110,000 or more volts but less than 300,000 volts.
    - A minimum radial clearance of 15 feet shall be established for any conductor of a line operating at 300,000 or more volts.

Specific requirements applicable to the construction and operation of the Proposed Project include those from Public Resources Code, Division 4, Chapter 6:

- **Section 4427 –** Operation of fire-causing equipment
- **Section 4428** – Use of hydrocarbon-powered engines near forest, brush, or grass-covered lands without maintaining firefighting tools
- **Section 4431** – Gasoline-powered saws, etc.; firefighting tools
- **Section 4442** – Spark arrestors of fire prevention measures, requirements, exemptions.

2.2.6 California Code of Regulations Title 14 Section, Sections 1252, 1253, and 1254

CCR Title 14 Sections 1252 and 1253 state that in San Diego County, power line hazard reduction standards are applicable year round. Power lines reduction strategies includes pole brush clearing and in southeastern San Diego County, and CAL FIRE is responsible for inspecting local implementation of these strategies.

CCR Title 14 Section 1254 states that the fire break minimum clearance requirements of California Public Resources Code 4292 are applicable within an imaginary cylindroidial space surrounding each pole or tower on which a switch, fuse, transformer, or lightning arrester is attached. The radius of the cylindroid is 3.1 meters (10 feet) measured horizontally from the outer circumference of the specified pole or tower with height equal to the distance from the intersection of the imaginary vertical exterior surface of the cylindroid with the ground to an intersection with a horizontal plane passing through the highest point at which a conductor is attached to such pole of tower. Flammable vegetation and materials located wholly or partially within the firebreak space shall be treated as follows:

- At ground level: remove flammable materials, including but not limited to, ground liter, duff, and dead or desiccated vegetation that will allow fire to spread
- From 0–2.4 meters (0–8 feet) above ground level: remove flammable trash, debris, or other materials, including grass, herbaceous, and brush vegetation. All limbs and foliage of living trees shall be removed up to a height of 2.4 meters (8 feet)
- From 2.2 meters (8 feet) to horizontal plane of highest point of conductor attachment: remove dead, diseased, or dying limbs and foliage from living sound trees and any dead, diseased, or dying trees in their entirety.

2.2.7 CAL FIRE Civil Cost Recovery Program

The California Legislature has ruled that since wildland fires cost taxpayers millions of dollars per year, taxpayers should not be responsible for costs associated with suppressing fires caused by an act of human carelessness. The CAL FIRE Civil Cost Recovery Program was established to recover firefighting costs when the fires are a result of people (or entities) violating the law or being negligent in their actions. For overhead electric lines, these violations are generally related to non-compliance with vegetation clearance requirements.

Examples of cost recovery related to transmission lines include the following (CAL FIRE 2004):

- In 1996, Southern California Edison was billed $7.9 million for fire suppression costs for the Calabasas Fire. A settlement was negotiated for $6.55 million just prior to trial in 2003. CAL FIRE determined that the fire was caused when a eucalyptus branch was bent by the wind into a lightning arrestor.
- The largest amount ever billed by CAL FIRE to date was to Pacific Gas & Electric (PG&E) in 1990 for $8.2 million. The Campbell Fire burned over 125,000 acres and destroyed 27 structures in Tehama County. CAL FIRE determined that the fire was caused by a tree limb that made contact with a 500 kV powerline. PG&E had not maintained the 10-foot clearance around its powerline as required by law. PG&E eventually agreed to a negotiated settlement of $5 million.

2.3 Regional Policies/Plans

2.3.1 Eastern San Diego County Resource Management Plan

Section 2.8 of the Eastern San Diego Resource Management Plan establishes goals, objectives, and management actions associated with wildland fire management on BLM-managed lands. The following goals and objectives are applicable to the Proposed Project.

- **WFM-01:** Protect human life (both firefighters and public) and communities, property, and the natural resources on which they depend. Firefighter and public safety are the highest priority in all fire management activities.
- **WFM-02:** Reduce hazardous fuels around communities at risk within the wildland–urban interface using mechanical, manual, biological, and prescribed fire treatments, where applicable.
- **WFM-03:** Appropriate management response for resource benefits will range from full suppression to the appropriate strategy to safely contain and control wildland fires in the planning area.
- **WFM-04:** Maintain natural biological processes through the use of fire as a natural disturbance.

2.3.2 CAL FIRE San Diego Unit Pre-Fire Management Plan

The San Diego Unit of CAL FIRE has developed a Pre-Fire Management Plan for San Diego County, encompassing 1,237,201 acres of SRA within San Diego County and portions of

western Imperial County. In the Pre-Fire Management Plan, the San Diego unit of CAL FIRE states that all communities within San Diego County are potentially at risk of wildland fires (CAL FIRE 2009). Similar to the 2010 Strategic Fire Plan, the Pre-Fire Management Plan does not contain any specific requirements. Rather, it assesses current fire-management policies, analyzes assets within San Diego County at risk of damage due to wildfire, and makes recommendations on how best to protect San Diego County's natural and man-made resources from wildfire damage. The identified assets at risk in San Diego County include water (soil erosion after wildfires damage water flumes and storage facilities), structures, wildlife, air quality, and power and communication infrastructure.

CAL FIRE provides a description of various programs and projects intended to reduce the occurrence of large damaging fire. These programs/projects include Battalion Pre-Fire plans, fuel breaks, defensible parameters around communities, clearances around structures, and a diverse mosaic of fuels and continuity that would help existing policies and strategies achieve success when combating fires (CAL FIRE 2009).

2.3.3 County of San Diego General Plan Update Public Safety Element

The following policies included in the General Plan's Public Safety Element are applicable to the Proposed Project:

- **Goal S-3: Minimized Fire Hazards:** This goal seeks to ensure developments are constructed in a defensible manner through siting, design features, new infrastructure, available emergency services, and construction materials and methods.
- **Goal S-4: Managed Fuel Loads:** This goal focuses on ensuring defensible space is provided and that it is managed in an environmentally sensitive manner and that the County's forests are managed for low fire hazard through silvicultural practices.
- **Goal S-5: Regional Fire Protection:** This goal focuses on ensuring coordination amongst regional fire agencies and provisions for balanced and cost-effective available fire resources based on updated fire assessments.
- **Goal S-6: Adequate Fire and Medical Services.** The General Plan seeks to ensure that water supplies, funding, response times, and resources are adequate for new development.

2.3.4 County of San Diego Code of Regulatory Ordinances

The following sections of the County Code of Regulatory Ordinances would be applicable to the Proposed Project:

2.3.4.1 Title 6, Division 8, Chapter 4: Removal of Combustible Vegetation and Other Flammable Materials Ordinance (Sections 68.401–68.406)

The Removal of Combustible Vegetation and Other Flammable Materials Ordinance establishes that combustible vegetation, dead, dying or diseased trees, green waste, rubbish, and other materials on private property can create fire hazards resulting in conditions that are potentially injurious to the health, safety, and welfare of the public. The ordinance goes on to state that combustible vegetation and other materials are public nuisances that must be abated and the requirements for abatement must be enforced in all County Service Areas and in the unincorporated areas of the County outside of a fire protection district or municipal water district. Fire protection districts and municipal water districts have either adopted their own combustible vegetation abatement programs or have adopted the county ordinance.

Clearance requirements and combustible vegetation removal protocols are established in Section 68.404 and 68.406 of the ordinance. Section 68.404 states that "no responsible party shall permit on a parcel any accumulation of combustible vegetation, dead, dying or diseased trees, green waste, rubbish, or other flammable materials within thirty (30) feet of the property line when such accumulation endangers property or the health, safety, or welfare of residents of the vicinity" and that "no responsible party shall permit on a parcel any accumulation of combustible vegetation, dead, dying or diseased trees, green waste, rubbish, or other flammable materials within ten (10) feet of each side of the improved width of highways, private roads and driveways" (County of San Diego 1985). Section 68.406 requires that combustible vegetation removal be conducted so as to leave the plant root structure intact to stabilize the soil and prevent erosion and that areas where combustible vegetation removal has occurred may be replanted with fire-resistant shrubbery and planting materials (County of San Diego 1985). The ordinance also requires that vegetation removal be conducted in conformance with all federal, state, and local environmental laws and regulations.

2.3.4.2 Title 9, Division 6, Chapter 1: County Fire Code (Section 96.1.4703)

Section 96.1.4703 states that the County Department of Planning and Land Use or the applicable fire protection district may require an applicant for a parcel map, specific plan, or major use permit located in a wildland–urban interface fire area to prepare and submit a Fire

Protection Plan (FPP) as part of the approval process. According to the County Fire Code, wildland–urban interface fire area is a geographic area identified by the state as a "Fire Hazard Severity Zone" (the ECO Substation, Tule Wind, and ESJ Gen-Tie projects would be located primarily within a Very High Fire Hazard Severity Zone). The FPP, which requires that the topography, combustible vegetation, and fire history (among other factors) be considered during development of the plan, addresses water supply, vehicular and emergency apparatus access, travel time to the nearest fire station, structure setback from property lines, ignition-resistant building features, fire protection systems and equipment, impacts to existing emergency services, defensible space, and vegetation management.

2.3.5 County of San Diego Consolidated Fire Code

The first consolidated fire code was created in 2001 through a collaboration between the County of San Diego and local fire protection districts and essentially assured consistency between County and local district fire ordinances for the purpose of public health and safety. The consolidated code includes minimum requirements for access, water supply, distribution, construction type, fire protection systems, and vegetation management within the County. The code also regulates hazardous materials and hazardous substance releases. The County's 2011 update to the Consolidated Fire Code has been certified by the State Board of Forestry, indicating that it is now the applicable fire code in San Diego County and supersedes Title 14.

2.3.6 San Diego County Rural Fire Protection District

Hazard Reduction Ordinance #2002-02 contains defensible space standards required for properties located within the jurisdiction of the San Diego Rural Fire Protection District. The applicable policies of the Hazard Reduction Ordinance include the following:

- Trash, rubbish, debris, and other combustible materials, which create a fire hazards, must be removed from property when within 100 feet of a structure and properly disposed of.
- Improved properties shall maintain 100 feet of clearance from all structures clear of native vegetation weeds and brush. Distances shall be measured in a horizontal plane.
- Vacant properties shall maintain 100 feet of clearance from adjacent structures clear of native vegetation, weeds, and brush. Distances shall be measured in a horizontal plane.

For all clearance activities, clearance shall be accomplished by methods that will not disturb native soil or rootstock and native chaparral may be thinned as approved by the Fire Protection District.

2.3.7 Border Agency Fire Council

Formally created during the 1996 fire season, the Border Agency Fire Council (BAFC) consists of 38 member organizations representing fire protection, law enforcement, legislators, health care workers, natural resource managers, and elected officials in the United States and Mexico. The member organizations meet quarterly during the winter and every 6 to 8 weeks during the fire season at the CAL FIRE San Diego unit headquarters in El Cajon. The BAFC promotes fire prevention and suppression strategies within the border area in order to prevent wildfires and minimize potential damage. Due to collaborative efforts of the member organizations, the BAFC has been successful at altering the natural environment to allow for better access for emergency services while at the same time respecting the natural values of the border area (BAFC 2007). In addition, the BAFC has been at the forefront in establishing and maintaining the International Fuel Break at Otay Mountain, which seeks to protect life and property in nearby communities, improve endangered species habitat, and reduce the risk of a large-scale fire in the protected Tecate Cypress groves on Otay Mountain (BAFC 2007). The member organizations of the BAFC include the BLM, CAL FIRE, San Diego Fire and Rescue, San Diego Rural Fire Protection District, and SDG&E. The Proposed Project's are located within the Border Agency Fire Council's Area of Concern (BAFC 2007).

2.3.8 San Diego County Multi-Jurisdictional Hazard Mitigation Program

Required by the federal Disaster Mitigation Act of 2000, the Multi-Jurisdictional Hazard Mitigation Plan is a comprehensive countywide plan that identifies potential risks associated with natural and man-made disasters and discusses ways to minimize resulting damage. Many purposes are served by the document including enhancing public awareness, creating a decision tool for management, promoting compliance with state and federal program requirements, enhancing local policies for hazard mitigation capability, providing inter-jurisdictional coordination, and achieving regulatory compliance (County of San Diego 2004). The plan also identifies goals, objections, and actions for each participating jurisdiction in the County.

Numerous natural and man-made hazards including coastal storms, dam failure, earthquake, flood, and structure/wildland fires are profiled in the plan. Each profiled disaster is discussed in terms of the nature of the disaster, the history of the disaster in San Diego County, and the location and extent/probability of occurrence and magnitude. The plan identifies 11 general goals and numerous objectives for the County of San Diego including the following:

- **Goal 1:** Promote disaster-resistant future development
- **Goal 2:** Increase public understanding and support for effective hazard mitigation

- **Goal 4:** Enhance hazard mitigation coordination and communication with federal, state, local, and tribal governments
- **Goal 10:** Reduce the possibility of damage and losses to existing assets, including people, critical facilities/infrastructure, and public facilities due to structural fires/wildfire.

A draft update of the 2004 plan has been completed by the County Office of Emergency Services and is currently under review. It expects to adopt the 2010 update in summer 2010.

2.3.9 San Diego Fire Chiefs Association Defensible Space Memorandum of Understanding

In response to the Harmony Grove Fire in 1997, the San Diego County Fire Chief's Association and the Fire District's Association of San Diego County entered into an MOU with the California Department of Fish and Game, U.S. Fish and Wildlife Service, and CAL FIRE (San Diego Fire Chiefs Association 2007). The removal of flammable vegetation within 100 feet of any structure and 30 feet from any roadway without a biological survey is permitted by the MOU. The intent of the MOU was to establish guidelines by which CAL FIRE, cities, and fire districts can continue to protect lives and property from the threat of fires by requiring the flammable vegetation abatement pursuant to applicable state and local regulations. The MOU is also intended to establish a cooperative mechanism through which the U.S. Fish and Wildlife Service and California Department of Fish and Game may "assess, minimize, and help account for potential adverse impacts to sensitive species and habitats resulting from vegetation abatement activities" (San Diego County Fire Chiefs Association 2007).

3.0 FORESEEABLE STUDY AREA PROJECTS

3.1 Soitec Solar Portfolio Project

The Soitec Solar Portfolio Project includes four projects, each with the same type of solar generation technology, but in varying sizes and configurations.

- Rugged Solar
- Tierra Del Sol
- LanWest
- LanEast

Table 2, Overview of the Proposed Project, lists the individual projects included in Soitec's Solar Portfolio and analyzed in this document. For each project listed, the acreage and approximate number of associated CPV trackers, if available, is provided. For purposes of this analysis, four projects are evaluated (Tierra Del Sol Solar Farm, Rugged Solar, LanWest and LanEast.

Table 2
Overview of the Proposed Project

Project	Acres	Approximate Number of CPV trackers
Tierra Del Sol Solar	420	2,657
Rugged Solar	765	3,588
LanWest Solar	55	264
LanEast Solar	233	900
Totals	**1,490**	**Estimated 7,409**

3.1.1 Proposed Project Components and Activities

Common components of the Proposed Project are provided as a basis for determining the potential sources of ignitions, common call types that may be generated, and risks by project phase. As previously indicated, projects included in the Proposed Project would utilize similar solar generation technologies and would include common project components (i.e., control systems, backup power and storm positioning systems, maintenance and security lighting) at all sites. Therefore, for ease of reference and to minimize repetitive information in this document, the discussion below is provided and does not appear within the project description for each of the individual projects. In addition to common project components,

construction, operation and decommissioning of the projects would entail similar activities at each project site and therefore, common construction, operation, and decommissioning activities are discussed below. The anticipated water construction and operational water usage of the projects is also discussed below.

3.1.1.1 Common Project Components

Module

Soitec's Concentrix modules, which are manufactured in San Diego County (Rancho Bernardo), are made up of a lens plate (Fresnel lens) and a base plate on which high-performance solar cells are mounted. The Fresnel lens focuses sunlight concentrated by a factor of 500 on the solar cells beneath (Figure 7).

Figure 7: Fresnel lens.

The solar cells are optimized mutli-junction solar cells (GAInP/GaInAs/Ge) in which three different types of solar cells are stacked on top of one another. Each cell is designed to convert a certain range of the solar spectrum: Short wave radiation, medium wave radiation and infrared. For almost 20 years, multi-junction solar cells have been used in space applications.

The solar modules are lightweight and surrounded by airflow both inside and outside the module. As a result, heat dissipates quickly from a solar panel. The normal operating condition temperature for solar panels is 20 degrees Celsius (°C) above ambient temperature, therefore, on a typical summer day at 40°C (104°F), the panel temperature would be approximately 60°C (172°F). When accounting for irradiance (a measure of solar radiation energy received on a given surface area in a given time), wind, and module type, it is expected that the peak module temperatures in the summer would be between 65°C and 70°C (149 and 158°F) and the peak module temperatures in the winter would be between 35°C and 40°C (95 and 104°F). Although the CPV panels would be hot to the touch as a result of solar energy absorption, CPV panels are designed to absorb energy inwards towards the panel to produce electricity. As opposed to mirrors which redirect the sun, CPV modules use Fresnel lenses to concentrate sunlight inside the module to produce electricity, and therefore, they would not noticeably affect the temperature of the surrounding area; temperatures below the modules would be nearly the same as ambient temperatures in ordinary shade.

CPV System

The Proposed Project includes a type of solar panel that includes no heating oil or fluids. The CPV System uses a dual-axis tracking system (Figure 8). Two types of sensors are used to ensure that the focal point of the concentrated sunlight is exactly on the cells at every moment of the day: astronomical positioning and a solar sensor that seeks to position the CPV System precisely perpendicular to the sun to ensure optimum system performance.

The entire CPV System module assembly dimensions are approximately 48 feet across by 25 feet tall. Each CPV System unit would be mounted on a 28-inch steel mast (steel pole) which would be supported by either (i) inserting the mast into a hole up to 20 feet deep and encasing it in concrete, (ii) vibrating the mast into the ground up to 20 feet deep, or (iii) attaching the mast to a concrete foundation sized to adequately support the CPV System based on wind loading and soil conditions at the site.

Figure 8: CPV dual-axis tracking system.

In its most vertical position and depending on foundation design, the top of each tracker would not exceed 30 feet above grade, and the lower edge would not be less than 1 foot above ground level. In its horizontal "stow" mode (for high winds), each tracker would have a minimum ground clearance of at least 13 feet 6 inches.

The CPV Systems tracker uses on-site sensors, or a comparable system to maintain tracker orientation toward the sun. At night, the trackers would be positioned vertically to minimize dust collection. When winds are high, the trackers would be positioned horizontally in "stow" mode.

Inverter Stations

The purpose of each Inverter Station is to convert the Direct Current (DC) power from the solar modules to an Alternating Current (AC) power, which is compatible with the SDG&E system and is the type of power that is sold to residential and commercial customers. The electrical device that changes DC to AC is the solid-state inverter.

Power from the trackers would be delivered through a 1,000-volt (V) direct current (DC) underground collection system. The power plant has not been electrically designed, but the

proposed inverters could be in any combination of output to equal the maximum power delivered to meet contract capacity. In addition to the inverters, each Inverter Station would be equipped with a step-up transformer to convert the power output from the inverters from 350-400 volts AC on the "low side" to 34.5 kV on the "high side." The total number of Inverter Stations and the overall dimensions of each Inverter Station depend on the number and capacity of inverters included in each Inverter Station in the final design. The inverter stations would be constructed in an open configuration with a shade structure or placed within an enclosure. All inverter pads would accommodate up to three inverters and one transformer.

Other common features include some variable configuration of:

- Load-bearing on-site fire access roads.
- Graded, non-load bearing dirt service roads
- Permanent water wells for the O&M building and to facilitate washing of the CPV Trackers and filling of the site's water tanks for fire protection purposes.
- Multiple 10,000 gallon or larger water tanks
- Septic tank system and leach field, as necessary for O&M buildings
- 6' Perimeter fencing with 1' of security barb wire
- Several back-up generators or two independent sources of utility supplied power for emergency positioning of Trackers in "safe" mode
- Illuminated signage at entrance with inverter and electrical grid disconnect and isolation information and identification.
- On-site staff - during the operations phase of the Soitec Solar projects, approximately 5 personnel on average would be on each site at any given time, including a plant manager, engineers, technicians, and security staff. The sites would be secured 24 hours per day by on-site private security personnel or remote security services with motion-detection cameras.

3.2 Proposed Projects

3.2.1 Tierra Del Sol Solar Farm Project

The Tierra Del Sol Solar Farm Project would produce up to 60 megawatts (MW) of solar energy and would consist of approximately 2,657 Concentrator Photovoltaic (CPV) electric generation systems (CPV Systems) utilizing dual axis tracking located on 420 acres near the unincorporated community of Boulevard, California. In addition to the CPV Systems and

DC to AC conversion equipment (i.e., inverter and transformer units), the Project would include the following primary components:

- A 1,000 volt direct current (DC) underground collection system and a 34.5 kV overhead and underground collection system linking the CPV Systems to the on-site project substation.
- A 4-acre operations and maintenance (O&M) site including a 60-foot x125-foot (7,500 square foot) O&M building. The O&M building would be used for storage, employee operations, and maintenance of equipment.
- A 3-acre on-site private collector substation site would encompass an area of approximately 7,500 square feet and a maximum height of 35 feet to house approximately 3,750 square feet of equipment, including 450 square feet of metal clad switchgear.
- A dual circuit 138 kV overhead transmission line (gen-tie) would connect the Project substation to SDG&E's proposed Rebuilt Boulevard Substation.

The Tierra Del Sol Solar Farm Project would located primarily on private lands within unincorporated San Diego County (A GEN-TIE ROUTE will also be part of this project and would extend northward to the Boulevard Substation). Construction of the Tierra Del Sol Solar Farm Project would take approximately 14 months to complete Phase I, Phase II, and the gen-tie line.. During peak periods of construction approximately 120 workers per day would be working on the project site. Upon completion, the Tierra Del Sol Solar Farm would be monitored both on-site at the 4-acre operations and maintenance annex and off-site through a supervisory control and data acquisition (SCADA) system.

3.2.2 Rugged Solar Project

As proposed, the Rugged Solar Energy Project would produce up to 80 MW of AC generating capacity and would consist of approximately 3,588 concentrating photovoltaic electric generation systems utilizing dual axis tracking CPV trackers on 765 acres in the unincorporated community of Boulevard, California. In addition to the CPV trackers and inverter transformer units, the Project includes the following primary components:

- A collection system linking the CPV trackers to the on-site Project substation comprised of (i) 1,000 volt (V) direct current (DC) underground conductors leading to (ii) 34.5-kV underground and overhead alternating current (AC) conductors.

- A 7,500-square-foot (sf) (60-foot by 125-foot) operations and maintenance (O&M) building. The O&M building would be used for storage, employee operations, and maintenance of equipment.
- A 2-acre on-site private collector substation site with a pad area of 6000 square foot (60-foot by 100-foot) with maximum height of 35 feet and includes a 450 square foot (15 feet by 30 feet) control house, and
- Power from the Rugged facility's private on-site substation would be delivered to the 69 kV bus at SDG&E's proposed Rebuilt Boulevard Substation via the Tule gen-tie, as adopted by the Board of Supervisors on August 8, 2012. The 138 kV gen-tie for the Tule Wind Energy project includes a 69 kV undersling line, which will be used to service the Rugged solar farm.

The Project would be developed in one phase with a construction period of up to 12 months spanning mobilization to the site through final project commissioning. Construction of the Project would require approximately 24 million gallons of water and during peak periods of construction, approximately 146 workers would be working on the project site. Upon completion, the Rugged Solar Farm would be monitored on-site at the 4-acre operations and maintenance annex and off-site through a supervisory control and data acquisition (SCADA) system.

3.2.3 LanWest Solar Farm

The LanWest Solar Farm includes up to 5.44 MW's on approximately 55 acres in Boulevard, California. The Proposed Project development area comprises about 40 acres with the balance to be undeveloped. The Project site is located about 0.5 miles west of at the northwest quadrant of the intersection of McCain Valley Road and Old Highway 80.

The Project includes the construction and operation of approximately up to 264 CPV trackers configured into 4 (1.26 MW AC to 1.36 MW AC) blocks that consist of up to 66 trackers each with a pair of inverters and associated step-up transformer. Each Building Block is comprised of up to sixty-six (66) Soitec ConcentrixR CX-S530 dual-axis trackers. Power within each building block is delivered through a 1,000-volt DC underground collection system from the trackers to a pair of 630-kilovolt (kV) to 680-kilovolt (kV) inverter pairs. Each inverter pair would be equipped with a 1,000-V to 12,500-V step-up transformer. Within each Building Block, trackers are arranged generally in an array comprised of 6 to 8 east / west rows with 8 to 10 trackers in each row. Spacing between trackers will be 21 meters (m) east to west and 25 m north to south (all subject to reasonable adjustment to accommodate site topography, etc.)

Power generated at the LanWest project site will be delivered to the nearby existing Boulevard substation or the new Boulevard East substation proposed by SDG&E, when operational, by means of a dedicated 12.5kV distribution line linking the four Building Blocks and extending an additional distance of approximately 0.75 mile from the southwest corner of the site, across Old Highway 80, and west to the Boulevard Substation. The Boulevard East substation is currently expected to be operational by or around year-end 2013.

3.2.4 LanEast Solar Farm

The LanEast Solar Farm is a 20.16 megawatt (MW) Solar Farm located on 231 acres in Boulevard, California. The Proposed Project site is located to the northwest (68.7 acres) and northeast (162.4 acres) of the intersection of McCain Valley Road and Old Highway 80. The project will include the construction and operation of approximately 768 CPV trackers configured into 16 (1.26 MW) blocks that consist of 48 trackers with associated transformer and inverter equipment room. The trackers will be constructed over 156.1 acres, while 75 acres will be retained as open space.

Power generated at the LanEAST project site will be delivered to the nearby Boulevard substation by means of a dedicated 12.5kV distribution line linking the four Building Blocks and extending an additional distance of approximately 0.75 mile from the southwest corner of the site, across Old Highway 80, and west to the Boulevard Substation. It is noted that SDG&E plans to re-build the substation and move it to the east by about 100 yards.

3.3 Other Foreseeable Boulevard Area Projects

Appendix A provides brief overviews of foreseeable projects in the Study Area. Figure 1 provides the locations of each of the foreseeable projects. The following brief descriptions of existing, approved, or reasonably foreseeable Renewable Energy projects, along with the Study Area projects discussed in Appendix A, were analyzed for determination of the potential cumulative effects on the fire delivery system. These projects were evaluated based on spatial distribution, size and mass, potential ignition sources, vulnerability to wildfire, effect on population levels, accessibility, and estimated call volume, amongst others. Detailed project information for many of the projects was not available at the time of this study, so the combined effects of these projects is estimated.

- Approved Tule Wind Energy Project – approved 86 turbine (200 MW) wind farm north of Interstate 8 west of McCain Valley Road.

- Approved ECO Substation - 500/138/69 kV substation located south of Interstate 8 and east of the community of Jacumba.
- Approved Boulevard Substation rebuild - 138/69/12 kV substation rebuild/expansion located on the eastern boundary of the existing developed community of Boulevard.
- Various interconnect, gen-tie, and electrical transmission lines – Approved electrical transmission lines that are anticipated to be constructed in the near future include ESJ Gen-Tie, ECO 138 kV transmission line (14 miles), proposed include various gen-tie and interconnect lines.
- Proposed Manzanita Wind Energy Project – 25 turbine (60 MW) wind farm north of Interstate 8 on Manzanita Reservation As depicted in Appendix A and on Figure 1, there are numerous potential projects ranging from large residential developments to small, cell phone mono-poles. The listed projects vary in their overall impact on fire service response capabilities with the larger projects demanding a higher level of service and the smaller projects representing minimal impact. As depicted, most of the projects occur in the east-central portion of the Study Area. This will focus potential cumulative impacts on fewer fire stations which results in higher potential for service impacts and the need for effective mitigation. The concentration of projects makes it less difficult to assess the potential impacts and identify mitigating measures that will successfully provide for service enhancements and match capabilities with demands.

4.0 SOUTHEASTERN SAN DIEGO COUNTY FIRE AGENCIES – EXISTING CONDITIONS AND RESOURCES

Dudek and Hunt Research conducted an informal field evaluation of the Project region on August 9, 2012. The reconnaissance included documentation of the site's topography, vegetation/fuel, existing infrastructure (primarily roadways, conditions, grades), land uses, fire station distributions, and solar farm site reviews. In addition, Dudek performed research and review of relevant planning documents and response statistics as well as acquired digital GIS information necessary for conducting response modeling and contacted Study Area firefighting agencies.

4.1 Firefighting in Southeastern San Diego County

The following sections identify and discuss the firefighting resources available in the Study Area. Because the Study Area includes a relatively large portion of San Diego County, there are several agencies that may respond to fires at any of the Study Area project sites. During a large wildfire in any part of the Study Area, it is likely that all of the fire agencies listed as well as more distant fire agencies from California and surrounding states will provide response.

4.1.1 CAL FIRE (California Department of Forestry and Fire Protection) – San Diego Unit

CAL FIRE's San Diego Unit is responsible for fire protection services on all SRA lands, including lands located in southeastern San Diego County and Imperial County. Approximately 1,237,201 acres of state responsibility lands and 301,130 acres of cooperative direct protection responsibility lands are under the jurisdiction of the San Diego Unit (CAL FIRE 2009). The San Diego Unit is well equipped for firefighting activities in the region. Equipment and personnel at the disposal of the San Diego Unit include the following:

- 18 California Department of Forestry (CAL FIRE) fire stations, 26 CAL FIRE fire engines
- 7 local government stations with 11 fire engines
- 4 CAL FIRE/CDC Conservation Camps with 19 handcrews
- 1 CAL FIRE/USFS Air Attack Base equipped with 1 CAL FIRE OV-10 Air Attack Aircraft, 2 CAL FIRE S-2T Air Tankers and 1 USFS Type 2 Helicopter
- 2 CAL FIRE/San Diego Sheriff Type 2 Helicopters
- 4 CAL FIRE bulldozers
- 1 CAL FIRE/USFS Interagency Command Center, Monte Vista Headquarters.

4.1.2 County of San Diego

The San Diego County Fire Authority was created by the County Board of Supervisors in July 2008 to improve fire protection and emergency medical services in the region. The authority's goal is to unify the administrative support, communications, and training of 15 rural fire agencies and extend "around the clock" protection to 1.5 million acres of the unincorporated county that previously had either limited or part-time "on-call" protection by 2012. To date (since 2010), the County has purchased 35 pieces of fire apparatus, including 15 water tenders and 15 Type II engines for volunteer fire companies and districts within the San Diego County Fire Authority area.

Fire protection services within the County of San Diego are provided by various city and rural district fire departments. Fire protection resources are primarily dependent on locality and need. Incorporated cities typically have their own fire departments to provide fire services within their jurisdictional boundaries. Unincorporated county occurs within the Study Area and San Diego Rural Fire Protection District provides fire services in both LRA and SRA. In SRA, CAL FIRE has the primary responsibility for suppressing wildfires. In addition to LRAs, County Service Areas have also been identified and services to these areas are typically provided by volunteer fire departments. Federal Responsibility Areas are typically the responsibility of the USFS, but military and civilian departments on bases within these areas provide services.

The unincorporated area of the County of San Diego has a Cooperative Fire Protection Agreement with CAL FIRE for fire and emergency services in the San Diego Rural Fire Protection District. CAL FIRE responds to wildland fires, structure fires, floods, hazardous material spills, swift water rescues, civil disturbances, earthquakes, and medical emergencies. CAL FIRE maintains two facilities in the project area: the CAL FIRE McCain Valley Camp Station (located at 2550 McCain Valley Road) and the CAL FIRE White Star station (located at 1684 Tierra Del Sol Road). The White Star station will be moved to co-locate at a new Boulevard Fire Station near the existing Station. The Jacumba area is serviced by Station 43 of the San Diego Rural Fire Protection District (staff consists of volunteer firefighters). The Boulevard area is also serviced by the Boulevard Volunteer Fire and Rescue Department (Station 87).

Additionally, the area has a mutual-aid agreement with the Campo and Manzanita Indian tribes for fire protection services. The Campo Reservation Fire Station is located at 36190 Highway 94, and the Manzanita Indian Tribe's fire services are located adjacent to the Proposed Project area.

4.1.3 Bureau of Land Management

The BLM maintains several programs in the disciplines of fire suppression, preparedness, fuels management, prevention and education, community assistance, and protection and safety, all of which are intended to safely protect the public, natural landscape, and wildlife habitat from fire-related damage (BLM 2009).

The Fire and Aviation Directorate Program is tasked with providing aerial firefighting support for fires occurring on BLM lands. Aircraft used by the BLM are BLM-owned and contracted.

In San Diego County, BLM lands are under a Direct Protection Agreement with CAL FIRE, which specifies that CAL FIRE provides fire response resources and is responsible for conducting investigations regarding the recovery of fire suppression costs (CPUC and BLM 2008a). BLM includes Bureau firefighters, engines, dozers, and similar resources that are available to fight fires, but may respond from greater distances.

CAL FIRE and BLM operate under a Cooperative Fire Protection Plan that implores CAL FIRE to consider BLM's resource protection standards in order to develop the least-cost/least-damaging suppression strategy possible. During wildfire incidents on BLM lands, BLM is required to send a resource advisor to work directly with the CAL FIRE incident commander to ensure resource values are fully protected or at least mitigated. This requirement is applicable to all vegetation fires occurring in the planning area (CPUC and BLM 2008a).

4.1.4 United States Forest Service

Wildland fire suppression responsibility on federal and private lands within the congressional boundary of the Cleveland National Forest is provided by the USFS. In southeastern San Diego County, USFS firefighting facilities can be co-located with firefighting operations of other jurisdictions such as CAL FIRE and San Diego County to share resources (CPUC and BLM 2008a). The joint CAL FIRE and USFS Firefighting Air Attack Base in Ramona (operated May through November) is an example of shared resources. During extended wildland fire attack, federal resources can be mobilized throughout the country to support these incidents. Cleveland National Forest resources include the following:

- 28 fire engine companies
- Three "Hotshot" handcrews
- One medium-sized helicopter
- One type-1 helicopter (heli-tanker)

- Access to air tankers jointly used by Angeles National Forest and San Bernardino National Forest.

4.1.5 AMR Medical Response

American Medical Response (AMR) is under contract for the Study Area and includes one ambulance stationed at Campo Fire Station. The AMR unit responds to a very large area in and can be out of the area for extended periods. When this happens, a second unit is made available, but often includes extended delays. Additional, and in many cases, primary medical response is provided by responding fire stations as all volunteers, stipend and reserves, as well as all CAL FIRE firefighters are at least EMT-1 level trained.

4.2 Current Study Area Emergency Response Status

Understanding the Study Area's and renewable energy project risks necessitates an equal understanding of the ability of the local firefighting and emergency medical resources to respond to calls resulting from those risks. Therefore, it is necessary to determine the capability of the existing emergency response resources to respond to emergencies at a level that is acceptable for the area and given the types of calls that may be expected. Because the Study Area occurs in a rural, sparsely populated landscape, local response standards are likely more applicable and appropriate than nationally accepted standards of cover. Therefore, the San Diego County General Plan, Chapter 7 Safety Element response standards are considered the baseline for emergency response throughout the Study Area. National standards, including the National Fire Protection Association 1710 - *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*, and the Insurance Services Office (ISO) standards are considered where appropriate, but are typically not realistic in a rural setting. The purpose for identifying the current delivery system is for analyzing how efficiently the current system covers the Study Area's emergency calls compared to the standards and then any resulting response gaps are identified. This process includes an examination of the most common community risks – emergency medical response, the potential fire problem, target hazards, critical infrastructure, and an analysis of historic call data review.

4.2.1 Current Emergency Services Delivery System

There are several stations that are owned and staffed by SDCFA, CAL FIRE, SDRFPD and USFS within a close proximity to the Proposed Project. These and additional Fire Stations in the Study Area are presented on Figure 9 and Table 3.

Theoretically, resources from throughout the state are available for major fires in the Study Area. Within the unincorporated region's emergency services system, fire and emergency medical services are provided by Fire Protection Districts (FPD), County Service Areas (CSA) and CAL FIRE. Collectively, there are over 2,800 firefighters responsible for protecting the San Diego region from fire. Generally, each agency is responsible for structural fire protection and wildland fire protection within their area of responsibility. However, mutual and automatic aid agreements enable non-lead fire agencies to respond to fire emergencies outside their district boundaries. Interdependencies that exist among the region's fire protection agencies are primarily voluntary as no local governmental agency can exert authority over another. This was demonstrated by the major response to the 2003 and 2007 San Diego County Fires, and more recently, in the 2012 Shockey Fire within the Study Area and very near the Proposed Project's Tierra Del Sol Solar site. Statistics provided by CAL FIRE indicated that there were some 115 fire engines on scene (35 CALFIRE), 47 hand crews (36 CALFIRE), 2 dozers, 3 water tenders and including resources from SDRFPD, BLM, Campo Reservation, and mutual aid strike teams. In addition, six aerial tankers were providing fire retardant drops. Therefore, unless there are multiple large fires occurring simultaneously, there should be sufficient resources to combat a major wildfire or other emergency.

It is the scenario where multiple fires do occur simultaneously, such as during the fire storms of 2003 and 2007 which include multiple southern California counties. In some instances, local resources were committed out of San Diego County and were not available to respond to local fires. This study considers the worst-case situation where local response is thin due to responses on out of area fires or even due to responses within San Diego County outside the immediate vicinity of the Study Area. This study recommends several measures that provide a redundant layering of passive and active fire prevention and protection features. These features are meant to minimize the likelihood of fire starts, maximize the ability of on-site resources to mitigate fires, minimize asset damage from fire, and minimize the demand placed on the local fire agencies while providing for a more robust response capability throughout the Study Area.

The Proposed Project's Fire Emergencies would be primarily responded to by SDCFA's Boulevard Fire Station. CALFIRE's Whitestar Station, which will be moved from its current location on Tierra Del Sol Road to a co-located station with Boulevard Fire Department within two years (estimated) will be able to provide secondary response. Additional response from San Diego Rural Fire Protection District's Lake Morena Fire Station, Jacumba volunteer Fire Station and from Campo (CALFIRE, Volunteer, and Reservation) and virtually unlimited mutual aid resources from throughout the State for emergencies in any of

the foreseeable projects within the Study Area. The USFS may also respond if requested or if fire is a threat to the Cleveland National Forest. Table 3 provides a summary of the current fire and emergency medical delivery system in the study area.

Table 3
Primary Study Area Fire Resources.

Station	Location	Agency	Staffing	Apparatus
Boulevard; Station 87	39923 Old Highway 94 (Old Hgwy 80 and Ribbonwood).	SDCFA	2 Stipend Firefighters	One Type 1, two Type 11 Engines, one Type 111, one 2500 gallon water tender
Campo/Whitestar	1684 Tierra Del Sol Road, Boulevard	CALFIRE	Captain plus 2 firefighters (3 FF in fire season), 1 BC, 1 hand crew	One Type 111 engine, one dozer
Jacumba	255 Jacumba Street, Jacumba	SDRFPD	2 Stipend Firefighters	One Type 111 Engine, one Type 1, one 1500 gallon tender
Lake Morena Fire	29690 Oak Drive, Campo	SDRFPD	Captain, 2 FF, 1 Reserve	Paramedic Assessment Engine (Type I)
Campo Indian Reservation	36210 Church Road, Campo	Campo Reservation	Varies	One Type 1, one Type 111 engine, one aerial ladder truck.
CALFIRE Hand Crew; Boulevard.	Mc Cain Valley road	CALFIRE	30 Firefighters	Emergency Crew Transport Vehicle - 2
USFS	Cameron, Cottonwood or Glencliff	USFS	4 firefighters per co. in season	Two Type III Engines
BLM	No local fire resources	N/A	N/A	N/A

4.2.2 Response to the Proposed Project

The average response travel time to the Proposed Project facilities varies from roughly three to 20 minutes from the Boulevard Fire Station to the most remote portions of the various project sites (Appendix D-1). This response is compliant with the General Plan response time and distance requirements for rural land use zoning which would allow in excess of 20 minutes. Although the General Plan provides a standard for response in the rural zoned areas, there is no designation for response specifically to solar farm facilities. Rather, response times are indicated for response to inhabited structures. None of the solar facilities associated with the Proposed Project will include nighttime occupancy. The sites' daily population will also be limited to fewer than 10 staff at any given time during daytime hours. Therefore, one would expect that longer response times may be appropriate, especially given the numerous fire prevention and protection features provided as component of these projects.

SOURCE: SANGIS 2012; Bing Maps

FIGURE 9

Study Area Fire Station Location Map

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SOITEC SOLAR PORTFOLIO EMERGENCY SERVICE CAPABILITIES ASSESSMENT

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The primary response to incidents involving the Proposed Project facilities will be provided by:

1. **Boulevard Volunteer Fire and Rescue Department**. Located at 39223 Highway 94 in Boulevard, the Boulevard Volunteer Fire and Rescue Department is an all-volunteer (stipend provided by SDCFA) fire department that protects an approximately 99-square-mile area in eastern San Diego County. The Department has approximately 27 volunteers consisting of fire fighters, officers, and probationary employees. The Department provides services including firefighting, hazardous material response, advanced life support medical service, vehicle extrication, and search and rescue (Boulevard Volunteer Fire and Rescue Department 2012). The Department's operations are financed by CSA 111 – Boulevard. When CSA 111 was formed in 1987, the San Diego County Board of Supervisors (BOS) transferred a share of property tax revenue to the district, which became its base property tax revenue. Fire mitigation fees, combined with the property tax, are the major sources of the CSA's funding.
2. **San Diego Rural Fire Protection District**. With 14 stations and a service area of 720 miles, the San Diego Rural Fire Protection District (SDRFPD) also maintains a presence in eastern San Diego. Two SDRFPD stations are located in the vicinity of the Proposed Project: the Jacumba Station (1255 Jacumba Street), located approximately 8 miles east of the Proposed Project, and the Lake Morena Station (29690 Oak Drive), located approximately 12 miles northwest of the Proposed Project. The Jacumba station is an all-volunteer fire station, while the Lake Morena station is staffed 24 hours a day, 7 days a week, with paid and reserve firefighters (SDRFPD 2009).
3. **California Department of Forestry and Fire Protection (CAL FIRE).** The unincorporated area of San Diego County has a Cooperative Fire Protection Agreement with CAL FIRE for the provision of fire and emergency services in the San Diego Rural Fire Protection District. CAL FIRE responds to wildland fires, structure fires, floods, hazardous material spills, swift water rescues, civil disturbances, earthquakes, and medical emergencies. CAL FIRE operates the CAL FIRE Whitestar Facility at 1684 Tierra Del Sol Road (CAL FIRE 2012a) but planned for relocation to a new co-located station across the street from the existing Boulevard Fire Station. CAL FIRE, in association with the California Department of Corrections and Rehabilitation, also jointly manages McCain Valley Camp (a prison camp) and provides inmates with a limited level of training in fire safety and suppression techniques. Crew levels at the camp fluctuate and the response is typically for wildland fire, flood control, and community projects. McCain Valley Camp is located at 2550 McCain Valley Road (CAL FIRE 2012b).

4.2.3 Response throughout the Study Area

Response within the Study Area includes nearly 30 fire stations distributed along major roadways and/or within or very near population centers. As more remote areas away from population centers are developed, the response distances and associated travel times will increase. Therefore, it is possible that as projects located to the east, north, or west of Boulevard, north of Interstate 8, or west of Lake Morena are developed, the response times or capabilities of the nearest fire station may not be acceptable or may not be suitable for the type of renewable energy emergency that may occur. However, as indicated previously in Figure 1, most of the foreseeable projects (as of April 2012) are located east of Lake Morena. Therefore, this study, although focusing on the Soitec Proposed Project, provides concepts, measures, and opportunities for fair-share funding by the combined group of projects over the long-term that would provide suitable resources where they can respond in an efficient and effective way and not only mitigate measured impacts, but improve the Study Area fire response capabilities.

4.3 Emergency Service Level

4.3.1 Project Generated Call Volume

Population increases associated with the Proposed Project and foreseeable projects in the Study Area are estimated at fewer than 100 persons during daylight hours. Construction phases of each project would include higher numbers of persons, but for a relatively short duration (12 to 14 months). The Proposed Project (five project sites) on-site population is estimated at roughly 60 persons during daylight hours (per more detailed discussion provided in Section 6.1.1.2).

The closest Fire Stations in the area provide a representative sample of the call volumes currently experienced in the area of the Proposed Project. Table 4 presents call volumes for the Boulevard, Jacumba, and CAL FIRE Whitestar stations.

Table 4
Current Call Volumes for Boulevard Area Fire Stations

Station	Annual Calls	Calls Per Day
Boulevard Fire Station	379	1.03
Jacumba Volunteer Fire Station	169	0.46
CAL FIRE Whitestar	311	0.85
Total	**859**	**2.35**

Using San Diego County fire agencies' estimate of 82 annual calls per 1,000 population, the Study Area's estimated project population increase of roughly 80 (refer to Section 6.1.1.2) plus a

50% increase for Indian Reservation projects, results at an estimated 120 potential person increase that would generate about 9.8 calls per year (0.8 per month). The Proposed Project's estimated 33 on-site operation and maintenance personnel would generate up to 3 calls per year (0.25 calls per month), most of which would be expected to be medical-related calls. These estimates are likely overly conservative due to the fact that there will not be staff on-site during nighttime hours and County statistics include calls from urban areas where emergency calls are much higher than would be anticipated from the Project.

Service levels within the Study Area are expected to be able to absorb the additional call volume generated by the Study Area's foreseeable projects. The Boulevard station would currently be impacted at the greatest level on a call volume basis due to the Proposed Project which includes five sites located to the north and south of Boulevard. However, the addition of less than ½ of a call per month (1 call every 4 months) would not create a service impact from a call volume perspective. Boulevard Fire Station currently responds to about 380 calls per year (just over 1 call per day) in its primary service area. For reference, a station that responds to 5 calls per day is considered average and 10 calls per day is considered busy. Therefore, the project is not expected to cause a decline in the emergency response times.

4.3.2 Response Travel Time

Response to the project from nearby fire stations will be within the acceptable time frame as designated in the County General Plan. The foreseeable projects include primarily lands designated as various rural classifications, with a few exceptions (e.g., Jacumba Valley Ranch). The Proposed Project includes predominantly RL-40 or RL-80 designations and very small areas of rural industrial or rural commercial. The rural land use categories include travel times of 20 minutes (rural industrial or commercial) or greater than 20 minutes (RL-40 and RL-80).

This study focuses on the Proposed Project as it represents a considerable portion of the foreseeable projects, particularly in the Boulevard area and is being processed within one EIS and provides a template for the Study Area foreseeable projects. Each of the facilities that together comprise the Proposed Project can be reached by Boulevard Fire Station within the General Plan standards, with times varying from roughly 3 minutes to just under 20 minutes travel time. Boulevard Fire Station response coverage area is discussed further in Chapter 7.0 of this document.

Most of the other foreseeable renewable energy projects in the Study Area appear to be serviceable within the General Plan standards from a travel time perspective. Projects in the

Study Area that may not be reachable within 20 minutes include the non-renewable energy projects that include residential development. These projects create a more typical demand for medical and fire protection than a renewable energy project. For example, the intent of the General Plan response travel time standards are based on the development density, population served, development funds generated, and public service expectations.

4.3.3 Fire Agency Incident Response

Emergency response data, other than overall call volume was not available at the time of this report's preparation. Among the categories typically tracked by fire agencies are: medical aid, traffic collisions, vehicle fire, vegetation fire, structure fires, hazardous material response, false alarm, cancel, illegal burn, smoke check, and public service announcement. Additionally, no response time data was available. Response time data is an important component for determining historical and current response times to calls for first arriving engine and effective fighting force.

A 2010 report by Citygate includes data from the general Study Area. Citygate identifies an area in southeastern San Diego County in their study that generally encompasses the Study Area. The 2010 report includes response information for the 2007/2008 and 2008/2009 years. According to that report, the Study Area included considerably lower call volumes than the remainder of the County quadrants. For example, the Study area included 5,682 and 6,249 calls for 07/08 and 08/09, respectively. During these same periods, the northeast quadrant included 13,387 and 13,545 calls, respectively. The northwest and southwest quadrants were considerably higher with an average of 80,000 and 149,000 calls, respectively. Clearly, higher populations drive higher call volumes. This same report indicates response times to various types of calls within the Study Area and they are re-stated in Table 5.

Table 5
Study Area Response Time Statistics*

Call Type	Incidents	4 minutes travel	5 minutes travel
EMS	4,738	40.0%	50.9%
Other	1,071	34.9%	43.2%
Other Fire	312	28.3%	45.0%
Wildfire	66	10.6%	15.2%
Building Fire	25	50.0%	62.5%

*Adapted from Regional Fire Services Deployment Study for the County of San Diego (Citygate 2010)

Table 5 indicates that a standard 5 minute travel time for EMS and Building Fires, which is typical for urbanized areas, is reached 51% and 62.5% of the time in the rural Study Area.

These statistics suggest that the stations respond to the EMS patients and structures within the population centers at a high rate and that is offset by the slower responses to the outlying, longer-distance responses. In terms of wildfire responses, longer travel times are common in the Study Area, with only 15% responded to within 5 minutes travel. The large response areas and lack of a wide-spread road network results in average initial response of roughly 15 minutes (Citygate 2010). Additionally, the response is considered light, lacking the "weight" of resources needed to control aggressive wildfires.

Wildfire response travel time performance supports the coverage findings that the fire stations are currently positioned well in or near population centers and along the rural road network. Given the lack of roads in some areas and the generally rugged terrain throughout portions of the Study Area, additional fire stations would not be cost-effective. Rather, the existing stations need proper staffing and initial attack aerial support to keep wildfires small (Citygate 2010).

4.3.4 Ambulance Response

The AMR Ambulance (Medic 86) at Campo Fire Station responds about 3.2 times per day (extrapolated 2012 total is 1168 calls). It is common that about two-thirds of those calls (roughly 15 calls per week, 2 calls per day) would be advanced live support (ALS) calls requiring a paramedic. This is important to note because it indicates that the current call volume may result in extended periods where the ambulance is not available or would result in an out of area ambulance being automatically dispatched for a response in the Study Area. The average turnaround time for a call which requires transport to a hospital is 90 minutes. Based on the current call volume, that equates to roughly 6 hours per 24 hour shift (25% of the time) where the ambulance is committed on calls and unavailable. If an emergency occurs in the Study Area while the primary ambulance is committed, a second ambulance from out of the area would be dispatched, but due to the large coverage area, out of area ambulance response can be delayed. Multiple queuing occurs several times per week and dispatching another AMR ambulance results in an approximately 30 minute response time to the Boulevard area.

Provisions for a second ambulance in the Study Area would be determined by the County Emergency Medical Services department. A request from the County EMS for a second ambulance would require a contract amendment with the ambulance provider. Attempts were made to discuss the current and anticipated ambulance situation in the Study Area with County EMS but were unsuccessful due to non-response by County EMS.

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5.0 STUDY AREA PROJECT IGNITION RISKS

5.1 Renewable Energy Ignition Sources

Studies (Grant 2010 and others) indicate that solar facility fire data is lacking, but it is clear that electrical fires (not necessarily associated with solar panels) occur relatively regularly and solar component fires can and do occur, although at much lower levels and typically related to roof-top solar arrays, at least to date. Equipment that may result in a fire hazard varies by project phase. The period of highest potential for a fire incident is during construction and decommissioning. Potential ignition sources include:

5.1.1 Construction and Decommissioning Phases

- Earth-moving equipment – create sparks, heat sources, fuel or hydraulic leaks, etc.
- Chainsaws – may result in vegetation ignition from overheating, spark, fuel leak, etc.
- Vehicles – heated exhausts/catalytic converters in contact with vegetation may result in ignition
- Welders – open heat source may result in metallic spark coming into contact with vegetation
- Wood chippers – include flammable fuels and hydraulic fluid that may overheat and spray onto vegetation with a hose failure
- Compost piles – large piles that are allowed to dry and are left on-site for extended periods may result in combustion and potential for embers landing in adjacent vegetation
- Grinders – sparks from grinding metal components may land on a receptive fuel bed
- Torches – heat source, open flame, and resulting heated metal shards may come in contact with vegetation
- Dynamite/blasting – if necessary, blasting may cause vegetation ignition from open flame, excessive heat or contact of heated material on dry vegetation
- Other human-caused accidental ignitions – ignitions related to discarded cigarettes, matches, temporary electrical connections, inappropriately placed generators, poor maintenance of equipment, and others.

5.1.2 Operation and Maintenance Phase

Ignition risks are anticipated to drop considerably following each project's construction phase. Operation and maintenance activities occur within a defined project footprint where the adjacent

fuels have been removed or converted to fuel modification-consistent vegetation. Operation activities include generation and conversion of electricity to a useable form and transmission of electricity to the grid. Maintenance activities will include repair, washing, maintaining, and replacing equipment. Equipment failures may occur over time in different components of renewable energy projects. Among the type of equipment that may present ignition sources:

- Transformers – are subject to occasional failure, sending sparks, hot materials out in any direction; fire in a transformer may result in ignition of the oil therein
- Capacitors – may overheat, fail, and cause a spark, which may result in combustion of flammable materials, such as vegetation, if nearby
- Electrical transmission lines – energized lines may arch from adjacent vegetation (trees) or if tower/pole fails, may arch on the ground, causing ignition of vegetation
- Substations – include various electrical components that may explode, fail, or ignite and include oil-cooled transformers
- Vehicles – heated exhausts in contact with vegetation may result in ignition
- Hot Works Equipment – all small hand tools either gas or electric powered that may result in sparks, flames, or excessive heat may result in vegetation ignition.

5.1.3 Fires Caused by Power Lines

Electrical transmission and collection lines such as those proposed for this project and associated structures can start fires in a number of ways, including the following:

- Uncleared vegetation, especially trees, coming into contact with conductors
- Sparks (from exploding hardware such as transformers and capacitors) coming into contact with vegetation
- Wind-blown debris coming into contact with hardware such as transformers and conductors
- Conductor-to-conductor contact
- Dust or dirt buildup on power line hardware
- Aircraft or helicopter, or attached features such as fire-fighting water buckets, coming into contact with power line hardware and support structures
- Wildlife coming into contact with power line hardware or transmission line
- Vandals shooting or throwing rocks at panels

Due to system components, low-voltage and high-voltage lines are susceptible to different wildfire-causing events. For example, some low-voltage lines are mounted with devices (transformers and capacitors) that can explode and ignite nearby vegetation. Also, fallen or wind-blown tree limbs and debris is more likely to come into contact with low-voltage transmission lines because these lines are spaced much closer together than higher voltage lines. Arcing (which occurs when electrons are able to jump a gap in a circuit) from a single conductor to ground through vegetation contact can occur on power lines of all voltages, but generally the distance to the ground of conductors on all facilities limits the potential for this event to occur (arcing between conductor phases is more likely to occur) (CPUC and BLM 2008a). Of the various voltage lines, 69 kV transmission lines can be subject to conductor-to-conductor contact when high winds force two conductors on a single pole to oscillate so excessively that they come in contact with one another (also known as "mid-line" slap) (CPUC and BLM 2008a). Nearby vegetation can catch fire from sparks resulting from conductor-to-conductor contact. Maintenance activities can also inadvertently result in fires on transmission lines of any voltage, depending on the specific components of the system in question.

Although power line structures (including wood and steel poles and steel lattice structures) are designed to retain their structural integrity in high-wind environments, high winds can (in rare cases) blow over these structures. When such an event occurs, the protection and control systems of transmission lines systems are designed to safeguard against the threat of wildland fire by shutting off power immediately, thereby disrupting electrical flow along the line (CPUC and BLM 2008a). This approach, however, does not always work as designed and sparks generated prior to power shut down can ignite nearby vegetation, although the occurrence of this type of wildfire is very rare.

In addition to high winds and vegetation maintenance violations, contact between large birds and power lines and gunshots fired at power line hardware can also result in wildfires. Fire can result from birds coming into contact with two closely spaced conductors, resulting in an unintended electrical arc or "flashover" (CPUC and BLM 2008a). Bird-related flashovers, which are more common on lines where conductors are positioned close together and can hence be contacted by outstretched wings, can result in fires if the feathers of an electrocuted bird catch fire and come into contact with ground vegetation. Wider spacing of conductors minimizes the possibility of this type of flashover; therefore, the risk of flashover decreases with increasing voltage as higher-voltage lines are required to be spaced at greater intervals. Regarding gun shots, it is common in remote areas for vandals to shoot at power line components, including ceramic insulators. Lower-voltage lines are more susceptible to damage from gun shots and possess a greater wildfire potential when compared to higher-

voltage lines. The support structures associated with higher-voltage lines are taller than those associated with lower-voltage lines, making insulators and conductors placed on lower-voltage lines easier targets for vandals. Similarly, the structural integrity of steel conductors associated with higher-voltage lines is greater than the integrity afforded to similar hardware located on lower-voltage lines, resulting in a less dramatic response to being hit by bullets and resulting in lower occurrences of vandalism.

As previously discussed, inadequate maintenance practices around power lines and associated structures can also result in wildfires, such as when the structural integrity of the power lines or structures is degraded and trees or vegetation are allowed to grow to the point of contacting hardware, such as conductors. California Public Resources Code 4293 establishes the minimum clearance requirements for overhead power lines.

5.2 Solar Facility Ignitions

Large-scale solar facilities represent the dominant project type foreseeable in the Study Area. In fact, the Proposed Project represents a significant portion of those projects, particularly in the Boulevard area.

Solar Farm projects, especially those utilizing CPV trackers, are relatively new on the California landscape, particularly in areas where native vegetation represents a significant potential wildfire threat. Most existing solar farms are located in desert environments where vegetative fuels are less prone to ignition, are less dense, and less likely to spread fire. An understanding of the types of risks associated with solar farms and solar panels is necessary in order to understand how to mitigate the risks. A challenge to determining known ignition risks associated with solar facilities is that there is scarce information available at any level regarding solar farms and fire hazard. There is even less information available regarding CPV trackers and fire hazard. Therefore, analysis in this study focuses on solar panels that are most commonly used at existing facilities and general electric shock hazards associated with solar arrays. However, it is understood that the fire risk associated with CPV trackers, based on their design and components, is inherently lower than that of the commonly used panels and solar energy systems that rely on heating oil and/or on-site turbines.

Among the listed potential causes of fire incidents involving Solar Panels and Solar Farms that are relevant for this study are:

1. Explosion/Arcs, arc flashing, electrical shorts, sparking, motor or other machinery fire, wiring and harnessing fire, overheated junction boxes, rodents chewing on wires and causing arcing, etc.

2. Collapse of supporting structure causing electrical shorts and fire
3. Overgrown vegetative fuel under and around the array
4. Equipment and supplies stored under arrays for shading
5. Tables, trash cans, smoking areas and other combustible storage under arrays
6. Fire in an inverter
7. Short circuit and fire of components in or on a panel
8. Potential for sun reflection from panels igniting vegetation
9. Illegal target practice or other vandalism or arson in a rural area
10. Lubricating and control oil fire
11. Switchgear and cable fire

5.2.1 Solar Panel Incident Causes:

As mentioned, available solar farm fire data is sparse, resulting in data gaps as neither the National Fire Protection Association, the State Fire Marshal nor the United States Fire Administration track data for solar panel or solar farm related fires. Additionally, the National Fire Incident Reporting System (NFIRS) data does not specifically define or track fires caused by Solar panels or other solar related sources at Solar farms. The importance of the lack of data is that it indicates two things: 1) that solar farms are a relatively new type of construction with few existing facilities and 2) that there is not a significant fire problem or these organizations would be tracking solar farm fires and they would have reports regarding incidents.

Solar panel fire data obtained from the State Fire Marshal's Office database does not indicate any fires reported solely on a wildland fire report. Instead, solar panel fires are reported as having an electrical fire source. Another resource provided by the State Fire Marshal's office reported that six fires involving solar panels were reported in 2010. This data was as close as CALFIRE could provide, at this point, to "Solar farms". The growing number of solar farm projects throughout California, but especially in San Diego County, will demand that improved data collection procedures are adopted in the near future in order to clarify what fires were caused by solar equipment and whether it was rooftop solar, stand-alone panels, or some other configuration. It is recommended that San Diego County Fire Chiefs begin this type of detailed data collection within their respective jurisdictions so that it can be shared with the national tracking organizations as green energy continues to occur throughout the nation.

Additional solar panel fire data was received from the Riverside County Fire Department (RCFD) and is from 2010. Although RCFD does track solar farm fires, their data does not differentiate between Solar farms which heat combustible oil to make steam to turn turbines and Solar farms which produce electricity and provide it directly into the grid. Additional research revealed no additional data sources. The sources typically used for incident data are the State Fire Marshal and the NFPA.

Based on the available data, and on logical reasoning, the types of farms which heat combustible oil present a higher fire risk than the farms that feed electricity directly into the grid. Therefore, the following data is considered conservative and not directly applicable to the Proposed Project, but provides a good frame of reference for the currently low number of fires, even though most of the existing facilities are older technology, heating oil based systems.

5.3 CAL FIRE Solar Ignition Data

The 18 incidents identified in Table 6 provide information on the various causes of fires in solar panels. These examples are excerpted from the CALFIRE/State Fire Marshal publication; "Fire Operations for Photovoltaic Emergencies" (CAL FIRE 2010). The information dates to 1996 through 2010.

Table 6
Solar Facility Fire Incidents – CAL FIRE DATA

Date	Location	Summary
June 1996	Grassy area	Small grass fire originating from PV modules
2003	San Bernardino (Devore) Cal	Residential wildfire in region. Building and PV system survived. All other buildings destroyed.
2004	Strip Mall	Overheated junction box with smoke and no fire
Feb 2008	Long Beach Cal	Fire in two modules on Convention Center. Damage limited to modules.
June 2008	Sedona Arizona	Residential content fire. PV system destroyed.
May 2008	San Francisco	Fire started in array at University. Maintenance personnel extinguished it.
Jan 2009	Torrance Cal	Residential fire in 2 modules. Questionable quality of installation
June 2009	Concord Cal	Residential garage fire. PV system not involved in fire and did not burn but inverter destroyed.
March 2009	Simi Cal	Residential fire started in shingle module of an integrated roof PV system
April 2009	Bakersfield Cal	Big Box retail store fire. May have started in the PV conduit or array. Plastic backed panel ignited and spread fire to other panels.
Summer 2009	San Francisco Cal	Incident at Convention Center. PV's observed to be arcing.
Summer 2009	Davis Cal	Grass fire at PV USA a former PV research center.

Table 6
Solar Facility Fire Incidents – CAL FIRE DATA

Date	Location	Summary
June 2009	Bursdadt Germany	Large warehouse. Fire occurred at the PV modules (200 sq ft of a 5 MW system) within the array.
Mar 2010	Victorville Cal	Concentrating modules burned while stored on site prior to installation. Fire caused by ignition of boxes by cigarette or other burning material
April 2010	Maryland	Residential fire involving older modules. Debris under modules may have caused fire.
April 2010	San Diego Cal	Residential fire in an 8-year-old self installed PV system. Modules not involved. Lack of external DC disconnect prevented responders from shutting off power from modules.
May 2010	Fresno	Fire at college in container box of a PV system mounted on parking structure.

This information confirms that the majority of incidents recorded appear to occur on roofs of buildings rather than at free standing Solar Farms of any type. Reasons for this may be that to date, there are far more roof-top mounted solar panels than there are solar farms and therefore, the likelihood of fires is higher.

It may be expected that as solar farms are built and operated, the number of reported fires resulting from their operation may increase. However, there are important distinctions that suggest that may not be the case. For example, solar farms include removal of adjacent fuels, are comprised of largely non-combustible materials, and are located away from flammable structures or structure components. For example the Proposed Project's CPV Tracker Panels do not include plastic and are constructed of glass and aluminum. Properly manufactured, installed and maintained solar equipment with little or no combustible materials, would likely have the potential for fewer fires than residential or commercial type solar installations or other substandard installations which are not provided the same high-level maintenance as a solar facility.

From 2007 through 2011 there were a total of 30 solar panel related fires in California. This is an average of six fires per year over the five-year period, primarily by roof-top solar panels. Data obtained from the California Energy Commission indicates there are 78 Photovoltaic plants (and a large number of other solar panels in private use) in operation in California. Solar statistics indicate that between 2007 and 2010, 47,335 solar panels (17,213 per year) were installed in California (http://www.californiasolarstatistics.ca.gov/reports/9-08-2010/AdminStats.html). Assuming that rate continued during 2011 and 2012, there would be a total of over 86,000

panels since 2007. There are likely many more panels that were installed prior to 2007. Therefore, if there are six fires per year in 78 plants and some conservatively estimated 65,000 solar panels, that equals 0.077 fires per farm per year if all fires were associated with solar farms, or 0.00009 fires per year, when known solar panels installed during 2007 to 2011 are considered (this does not include older panels that may be more prone to fires). Based on these statistics, solar farms would be expected to experience, at most, some type of fire about every 13 years and the 65,000 solar panels installed between 2007 and 2011 would be expected to experience, at most, some type of fire about every 11,000 years.

5.4 Riverside County Solar Ignition Data

Riverside County Fire Department reported that the incident rate for three older technology solar farms has been 30 calls over a 12 year period. These calls are primarily medical or hazardous materials responses, with only two fire calls during that period. These solar farms utilize heat transfer oil, which in turn makes steam and turns turbines. The 30 calls generated by 3 stations over a 12 year period equates to 0.83 emergencies per solar facility per year. A total of 0.83 calls per year per solar facility is a very low call volume. For example, five older technology, more flammable Solar facilities, would generate a total of about 4.15 calls per year, or .0011 per day, most of which would not be fire calls. This is considered an insignificant cumulative effect on response capability. Currently, the Boulevard Fire Station, the closest responding station to the Proposed Project, responds to about 1.2 calls per day; 50 percent of which are associated with Interstate 8.

5.4.1 Proposed Project Potential Risk Rating

Based on this analysis, the overall risk of any of the PROPOSED PROEJCT facilities is considered a Low Probability/High Consequence risk if not properly mitigated to a lower consequence level. The high consequence is due to potential for igniting a vegetation fire, firefighter injuries including electrical shock, toxic smoke from a fire in CPV panels, potential ignition of combustible components in a panel, electrical motor, electrical power lines, wiring, or exposure and ignition from vegetation fire, loss of power to customers, dollar loss to equipment, and delayed or complicated firefighting response and operations. The risk of fires on the site exists, but based on solar facility and solar panel research, the actual incident generation levels result in a very low probability for significant incident occurrence. Technology advancements and San Diego County fire and building code requirements, as will be implemented in the Proposed Project, include elimination or significant reduction in the on-site flammable liquids (oils) and numerous ignition prevention measures that are mandatory. In addition, specific performance measures and impact mitigating measures will be built into the individual project

Fire Protection Plans to further mitigate the likelihood of these types of incidents. With these measures in place, the consequence level is reduced to a very low level.

In an effort to understand what causes fires in solar equipment and how those ignitions can be prevented, this report incorporates data from project engineers, author observations of CPV trackers, MSDS sheets for tracker materials, and scenario analysis to determine the likelihood of ignitions and how those fires may behave. The information analyzed indicates that the trackers include minimal combustible materials. For example, the panels are made of sealed glass cells within an aluminum frame and a silicone seal on the edges of the panels. The panels are attached to a steel mono-pole which is inserted into the ground or may include a concrete footer/base. The pole includes a transformer and control box near its base, two motors where the panel attaches at the top of the pole, and wiring between. The transformer includes oil for coolant and the wires include potentially flammable insulating plastic skin. The total amount of exposed wiring is minimal. It is anticipated that the newer technology panels that include minimal exposed combustibles and absence of heating transfer oils would result in fewer fires than old technology systems. Also, because there is significantly less oil involved (transformer cooling oil only) in the conversion of sun energy to electricity with new technology, the number of hazardous materials calls would be expected to be lower than the already low incident occurrence. Finally, site staffing levels are anticipated to be lower on the newer technology sites due to very high tech, remote monitoring of the entire system 24/7. Therefore, fewer on-site personnel should result in lower call volumes for medical assistance. Our previously calculated estimate for each facility based on anticipated populations is 8 calls per year for all foreseeable Study Area projects and 3 calls per year for the Proposed Project, which is a conservative estimate using county-wide per capita call volume. The County-wide call volume would be expected to much higher than that of a solar site that is populated during daylight hours. County-wide call volume includes many more high-call volume land uses, so the calculated call volumes for the Proposed Project are expected to be lower, possibly one-half, than the estimated 3 per year.

5.5 Solar Facility Fire Defensibility

The Proposed Project and any other renewable energy project built in the Study Area will be built to highly ignition resistant standards. For example, Chapter 7A (CBC), ignition resistant building standards for structures in the wildland urban interface will be enforced for any habitable structures. Substations and other structures housing electrical equipment will include non-combustible construction. The electricity generating equipment will meet regulations and will be subject to FPP detailed minimum performance measures. It is noteworthy that the vast majority of the on-site structures are solar panels. As mentioned,

the solar panels are constructed largely of non-combustible components including metal and glass and typically surround the operations and maintenance buildings, providing a wide buffer from off-site wildland fuels. The required measures summarized within this report are anticipated to result in "fire protected" facilities that will be less vulnerable to wildland fires and less likely to result in fire than the existing native fuel covered site condition.

5.5.1 Solar Facility Firefighting Risks

The Proposed Project solar facilities are designed to minimize the demand placed on responding firefighters. However, firefighting near energized facilities and equipment includes inherent risks that require modified operations and firefighter training. Although fire on the sites is expected to be a rare event, there is a possibility that fire can occur. Among the general firefighting hazards related to Solar Panel and Solar facility fires are:

1. Electric shock to firefighters or workers
2. Inability to shut off electricity generation during a firefight
3. Danger to firefighters related to poor visibility (not seeing arrays) in smoky conditions
4. Hazardous atmosphere/toxic smoke due to burning panels and insulation therein
5. Back-up generator fuel (propane) potential for fire/explosion
6. Site access restrictions by malfunctioning axis motor

Despite the potential firefighting risks associated with energy producing project sites, solar facility fire research indicates that firefighter operations are likely less dangerous at a commercial solar farm (like the Proposed Project and foreseeable projects) with panels on the ground, than for a fire in panels that are located on a building roof, which introduces more risks to, and difficulties for the firefighter and which, can burn through a roof and ignite a structure. Additionally, with proper training, which is already required for fire agencies in the area and would be augmented through performance measures in FPPs and potentially through cumulative impact mitigation measures, firefighting capabilities will be enhanced, further reducing the potential risk to firefighters.

5.5.2 Solar Facility Fire Protection Concerns

In addition to addressing the wildfire and on-site fire threat and associated impacts on the fire service that the renewable projects represent during construction, operation, and maintenance, this plan discusses the potential impacts on firefighting (both ground and air) based on how the

projects' affect the fire agencies' operations. For example, responding fire agencies may have concerns regarding potential damage that can be caused to expensive solar or wind equipment based on normal firefighting techniques. Wildfire response in San Diego County typically includes aerial attack with fixed wing and/or rotary wing aircraft that drop fire retardant in front of an encroaching fire. The presence of transmission lines, wind turbines, microwave and cell towers and other vertical structures on the landscape has been previously evaluated for impacts on aerial firefighting in recently certified environmental documents in the Study Area. The presence of tall, vertical structures on the landscape was shown to have little overall effect on aerial firefighting. Many of the features are co-located with existing features, resulting in no or little change. New features are subject to FAA requirements and their locations are included in mapping used by the aerial fire attack aircraft. Typical fire operations include drops from 50 to 150 feet above ground surface from helicopters and from 150 to 500 feet above ground surface from fixed-wing aircraft, so most of the features would not interfere or pose a threat of collision. Nonetheless, tall vertical features on the landscape, especially the tallest wind turbines and transmission towers, may have some effect on the overall efficiency of aerial fire attack and require mitigations.

Fire agencies may elect to avoid dropping retardants near renewable energy facilities, especially solar energy facilities, to avoid the potential for damaging panels or other equipment. CAL FIRE indicates that aerial attack pilots are very accurate with the placement of retardant drops. There would not be a circumstance where aerial drops would be advised on a solar facility. However, there is potential for drops near a solar facility and for retardant "drift" during windy conditions, resulting in Phos-Chek or a similar chemical retardant film on solar panels. Similarly, firefighting ground operations may include the use of foam or dry chemicals and the potential for drift of these chemicals over a relatively wide area can settle and dry on the electrical equipment and solar panels. The primary concern for this is the short- and long-term damage that may be caused to panel function, physical damage to the panels or other equipment, and interruption of the energy production.

Potential damage by routine firefighting agents is a valid concern. However, Proposed Project engineers indicate that the CPV Tracker panels are glass on the exterior and the chemicals in the various fire retardants: Phos-Chek retardant includes concentrated nitrate fertilizer; ammonium polyphosphate, monoammonium phospate and diammonium sulfate and phosphate; liquid; (82%); Class A Fire fighting foam is typically a proprietary synthetic foam such as alpha olefin sulfonate (80%); dry Chemical fire extinguishers commonly use Potassium bicarbonate or monomonium Phosphate powder, would not cause long-term issues as it would simply be washed from the panels. Short-term affects could be noticed and

would be primarily associated with reduced energy production. However, the short-term impacts experienced from aerial retardant drift or ground based chemical applications should not affect firefighter tactical operations during a wildfire.

Water is the most common firefighting agent used. Water is not an issue for fighting fires at renewable energy facilities in terms of causing damage to equipment. The panels are washed regularly for purposes of maximizing efficiency and the panels are exposed to rainwater, especially in the winter months with no anticipated effect on these facilities. Though water use will have very little potential for damaging equipment, there is a potential shock issue as electricity can travel through a water stream. However, firefighters are trained to stay back a safe distance and use a "fog stream". The Firefighters could decide to use Class A foam or a Dry Chemical extinguisher, which many fire engines carry. Most likely, water would be used as it is most plentiful and can cool burning material below ignition temperatures.

Another form of fire extinguisher, carbon dioxide (CO_2) extinguishers, could be used in lieu of dry chemical as they leave no residue. However, most fire engines do not carry CO_2 extinguishers, so in order for this resource to be used, they would need to be available to responding firefighters. One example is to include CO_2 extinguishers on site (such as at each inverter structure) in "break glass" cases, provide this resource to local fire agencies for inclusion on-board engines, and to provide larger, wheeled CO2 extinguishers on each site.

As indicated, concerns by firefighting agencies regarding damaging the solar or other equipment during firefighting operations are valid, but avoidable. Research indicates that short of dropping large volumes of water/Phos-Chek directly on the equipment, which could have the effect of damaging the overall array, little damage can be done through normal firefighting tactics. Concern over firefighter safety is justified, but can be mitigated through firefighting training and provisions for engine-based and on-site measures that provide the correct tools for the potential hazards.

The next section analyzes the potential cumulative effect of foreseeable renewable energy projects on fire agencies ability to respond compared with build out to San Diego County General Plan land use category assignments.

6.0 GENERAL PLAN CUMULATIVE IMPACT ANALYSIS

The Study Area population is considered sparse with greater numbers of people associated within roughly 10 minutes of the population centers, including Boulevard, Campo, Jacumba, Lake Morena, LaPosta, and others. There are large areas that are devoid of human population or include very sparse per acre population densities. For example, Boulevard has a population of 315 people (2010 census data). Campo, in the extreme southwestern portion of the Study Area has a population of roughly 5,000 people. Jacumba, in the extreme southeastern portion of the Study Area is populated by 560 people. Area demographic details were not available to the authors at the time of this report. Population information is important because it provides a frame of reference for the population served by the local fire agencies. Populations in the Study Area are low compared to urban areas so the resulting call volume is proportionally low. However, the land area is large so response times may be slow for outlying areas and that can have effects on availability and multiple queuing as call volumes increase. The following section discusses the anticipated population changes with the Proposed Project and other foreseeable projects in the Study Area compared to potential populations based on the San Diego County General Plan.

6.1 General Plan Projected Population vs. Renewable Energy Projected Population

6.1.1 General Plan Analysis

The Land Use element has been analyzed so that a comparison of the potential area population with no renewable energy development and assuming build out to General Plan density levels vs. development of the same areas with the foreseeable projects. In addition, the General Plan Safety element has been analyzed to ensure consistency of the projects with regard to long-term changes on the landscape and their potential effect on emergency response services. Lastly, emergency service response gaps compared to the General Plan are analyzed to determine where additional resources may be needed. As each of these analyses identifies potential issues, those issues are further discussed in the Recommendation section of this report.

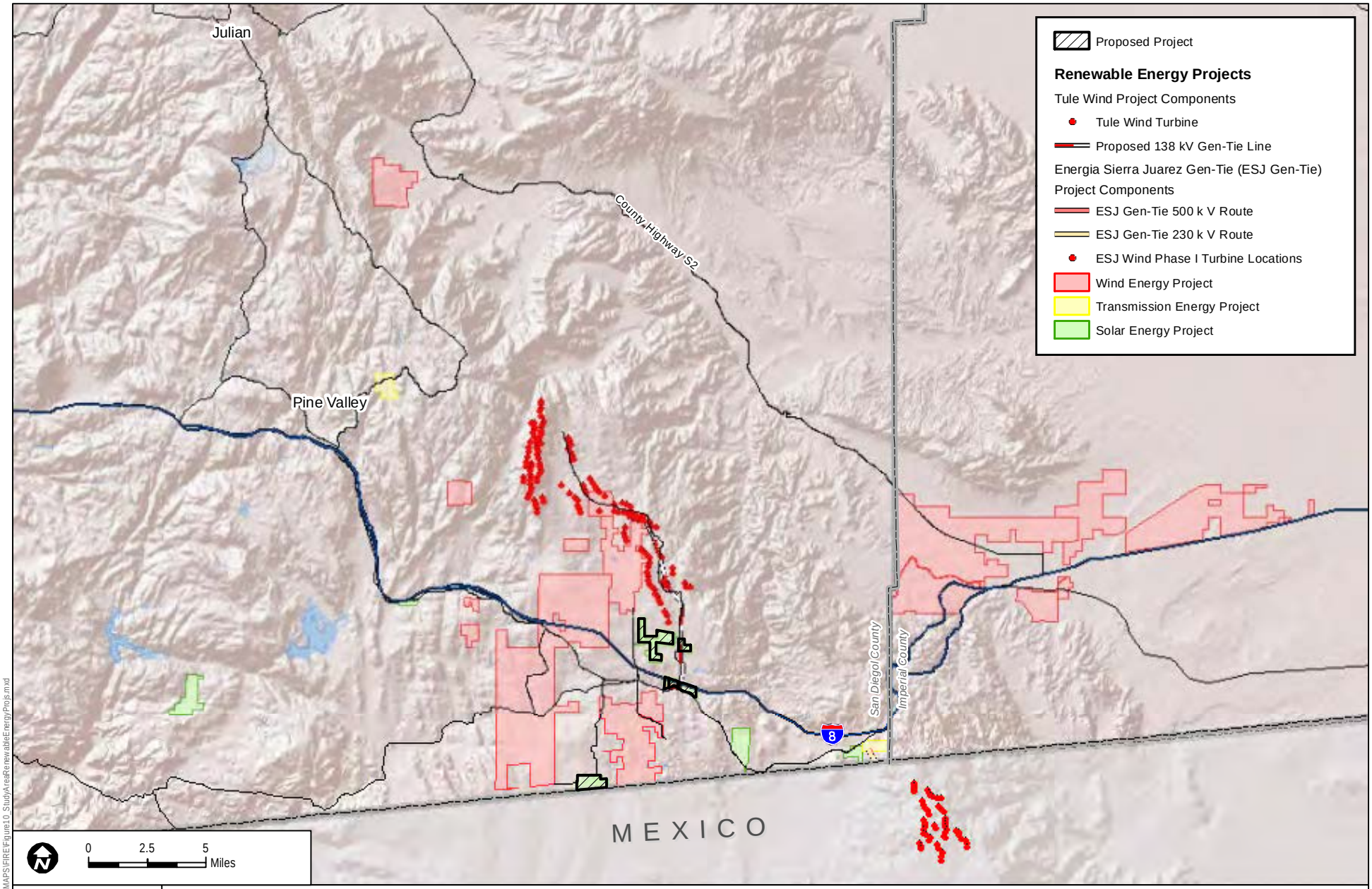
6.1.1.1 Land Use Element

The San Diego County General Plan Land Use Chapter (San Diego County General Plan Update, August 2011) indicates the various land use zoning applied to land throughout San Diego County. GIS analysis was conducted so that the foreseeable project sites could each

be compared on an acreage basis and so known or estimated population data could be extrapolated and applied to each site. The operational phase of each project is considered for comparison as the construction phase (and eventually the decommissioning phase) would be intensive, short duration periods. When averaged over the life of these projects, which may be 30 to 50 years or more, the daily population levels represented by construction and decommissioning have little overall affect. The analysis includes calculating the General Plan population for each project site based on the land use category and comparing that against projected on-site staffing for the life of each project.

Many of the foreseeable projects are cell phone towers or other projects that do not include daily on-site staffing. Therefore, this analysis considers the most significant foreseeable projects, which are primarily renewable energy projects. Figure 10 illustrates the location of the project sites compared in this study. Table 7 presents comparison project details. As noted, comparison projects include primarily solar facilities along with residential development. Large projects including a Specific Plan Area are indicated as "unknown" population due to the SPA details not being available. Additionally, there are large land areas on Tribal property where General Plan policies do not apply. Therefore, these areas are listed, but are not included in the overall population calculations for the General Plan analysis.

Estimated populations for the sites were assumed for determination of the per capita call volume increases (Section 4.4.1). Should these areas be included in the calculations, the General Plan land use population would be even higher compared to the renewable energy land use populations. Given these assumptions, the renewable energy population is estimated at just fewer than 80 people while the General Plan land use population would be just fewer than 228 people (Table 7). Further, the site employees would not be on-site overnight, whereas the residential development related population would be on-site overnight. The residential developments would be built to ignition resistant standards, but still include a higher potential for emergency medical calls. The energy use of these sites is anticipated to result in medical calls, but at a lower level. Therefore, one can conclude that compared to General Plan build out, the construction and operation of renewable energy facilities, particularly solar farms, would have less of an impact on the fire agencies ability to respond. However, there are specific hazards, as previously discussed, that make working in and around energized facilities potentially more challenging for firefighters and that require specific mitigations.



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NOVEMBER 2012

SOURCE: SANGIS 2012; Bing Maps

FIGURE 10

Study Area Renewable Energy Projects

SOITEC SOLAR PORTFOLIO EMERGENCY SERVICE CAPABILITIES ASSESSMENT

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6.1.1.2 Safety Element

The General Plan Fire Safety Element focuses on the most important components of providing new and existing development fire and medical protection and adequate response. It directs development to include important safety features including:

- Defensible Space
- Multiple Access/Egress Routes (as necessary)
- Funding For Fire Services
- Multiple Fire Protection Districts Coordination
- Multi-Story Structural Fire Considerations
- Building and Site Design Considerations

Table 7
Foreseeable Project Population Comparison - General Plan vs. Energy Facility Population

Foreseeable Project Name	Land Use Designation	Acres	General Plan Allowable	GP Population	Total Energy Population
Amonix	Rural Lands (RI-40)	5.7	1 per 40	0	
Amonix	Rural Lands (RI-80)	648.8	1 per 80	25.9	
Amonix	Semi-Rural Residential (SR-10)	0.5	1 per 10 or 20	-	
			Total Amonix	**26**	**8**
BP Energy	Public Agency Lands	1.9	-	-	
BP Energy	Public/Semi-Public Facilities	0.0	-	-	
BP Energy	Rural Lands (RI-80)	224.9	1 per 80	9	
			Total BP Energy	**9**	**3**
Jacumba Valley Ranch	Public/Semi-Public Facilities	0.1	0	-	
Jacumba Valley Ranch	Rural Commercial	0.7	2 per acre	15	
Jacumba Valley Ranch	Rural Lands (RI-40)	0.7	1 per 40	-	
Jacumba Valley Ranch	Semi-Rural Residential (SR-1)	3.6	1 per 1, 2, or 4	3.2 to 11.6	
Jacumba Valley Ranch	Specific Plan Area	817.0	SPA	Unk	
Jacumba Valley Ranch	Village Residential (VR-15)	0.0	0	-	
Jacumba Valley Ranch	Village Residential (VR-2)	0.0	0	-	
			Total Jacumba Valley Ranch	**18**	**10**

Table 7
Foreseeable Project Population Comparison - General Plan vs. Energy Facility Population

Foreseeable Project Name	Land Use Designation	Acres	General Plan Allowable	GP Population	Total Energy Population
Jewel Valley - North	Public Agency Lands	46.4	0	-	
Jewel Valley - North	Rural Lands (RI-80)	2880.7	1 per 80	115.2	
Jewel Valley - North	Tribal Lands	4.6	N/A	Unk	
			Total Jewel Valley - North	**115**	**N/A**
LanEAST	Public/Semi-Public Facilities	4.0	0	-	
LanEAST	Rural Lands (RI-80)	229.1	1 per 80	9.2	
LanWEST	Rural Lands (RI-40)	0.0	1 per 40	-	
LanWEST	Rural Lands (RI-80)	54.5	1 per 80	3.2	
			Total Lan East/West	**12**	**3**
Manzanita Wind Energy Project	Public Agency Lands	1.6	0	-	
Manzanita Wind Energy Project	Rural Lands (RI-80)	1.0	1 per 80	-	
Manzanita Wind Energy Project	Tribal Lands	4548.3	N/A	Unk	
			Total Manzanita Wind Energy	**-**	**N/A**
Rugged Solar	Public Agency Lands	38.5	0	0	
Rugged Solar	Public/Semi-Public Facilities	3.0	0	0	
Rugged Solar	Rural Commercial	0.1	2 per acre	-	
Rugged Solar	Rural Lands (RI-40)	24.3	1 per 40	1.5	
Rugged Solar	Rural Lands (RI-80)	727.6	1 per 80	29.1	
Rugged Solar	Tribal Lands	0.1	?	-	
			Total Rugged Solar	**31**	**20**
Tierra del Sol Solar Farm	Public/Semi-Public Facilities	0.0	0	-	
Tierra del Sol Solar Farm	Rural Lands (RI-80)	419.5	1 per 80	16.8	
			Total Tierra del Sol Solar Farm	**17**	**7**
			Grand Total Foreseeable	**228**	**78**

Renewable energy projects will need to meet at least minimum standards regarding each of these General Plan components. This study defines additional performance measures that are recommended for application on all renewable energy projects in the Study Area. Of the General Plan Safety Element objectives listed under "Fire", Goal S-6 – Adequate Fire and Medical Services, is the most applicable to the energy projects. The policies entailed within that General Plan section are focused on unincorporated areas, including the Study Area and the Proposed Project sites. The following discussion presents the various GP policies and

indicates how the Proposed Project accounts for, and proactively responds to each. It is presumed that other renewable energy and development projects will be expected to apply similar measures to meet the General Plan policies.

GP POLICY: Water Supply – Ensure that water supply systems for development are adequate to combat structural and wildland fires.

Proposed Project Measures – Each solar facility includes provisions for stored water on-site in an amount based on anticipated water needs for each facility. Among the considerations are Operation and Maintenance building fire sprinklers, dispersed water sources for hose lay, and ongoing solar panel maintenance.

GP POLICY: Funding Fire Protection Services – Require development to contribute its fair share towards funding the provision of appropriate fire and emergency medical services as determined necessary to adequately serve the project.

Proposed Project Measures – Each solar facility will participate in a multi-layered structure to funding fire protection and emergency medical services. First, each project provides specific performance measures that are the result of focused analysis at the Fire Protection Plan (FPP) level. The measures provided in each FPP focus on fire prevention and passive protection (i.e., built-in measures that require little or no outside intervention) as well as other measures that mitigate potential issues unique to each site and facility. Second, each project will participate in the County CFD or a similar Fire Services Agreement, providing fair-share funding toward fire and emergency medical service. The amount of fair-share funding provided by each project should be calculated based on fire environment, project size, overall risk based on equipment, number of employees on site, total energy produced, and overall demand the project will place on fire service. Lastly, projects may provide funding for specifically identified resources to mitigate an identified cumulative issue or offset an identified need by the emergency response system.

GP POLICY: Fire Protection Services for Development – Requires that new development demonstrate that fire services can be provided that meets the minimum travel times identified in Table S-1 (Travel Time Standards from Closest Fire Station).

Proposed Project Measures - The response (travel) time criteria for the Boulevard area is consistent with and complies with Table S-1 in Chapter 7 of the General Plan, for the closest staffed fire station. Table S-1 indicates an allowed travel time of over 20 minutes, with no

stated maximum travel time, for very low rural land densities (RL 40 and RL-80) which it appears the majority of Boulevard has been classified in the General Plan.

An officer in charge at the Boulevard Station indicated in a personal interview (Jim Hunt personal communication July 22, 2012) that the furthest driving point in their "first in" area can be reached in about 15 minutes at 35 MPH. That would equate to about 8.7 miles. For comparison, a 20-minute travel time at 35 MPH would result in a travel distance of 11.6 miles. National Fire Protection Association Standard #1142, referenced in the General Plan Chapter 7, uses a 35 MPH driving speed. The Insurance Services Office (ISO) states that the average national driving speed for fire apparatus is 35 MPH, and that is the standard assumed speed that is utilized in rating communities.

Regarding Table S-1 in Chapter 7, the General Plan states that the Table refers to travel time from fire station to the farthest "dwelling unit". Therefore, the travel times are intended to apply to occupied dwellings. The intent of this table is based upon the need to arrive at a fire or EMS emergency in a given amount of time based upon the land use designation. In community Fire Protection Planning it is accepted practice that emergency response to very rural areas cannot be expected to be the same level of response as in an urban area. This is due to expected incident demand (volume of calls) in a rural area versus a congested urban area, potential for structural fire spread in a congested urban area, potential need for fast fire attack on large or multi story structures, potential need to rescue or provide initial EMS care to multiple individuals, number of persons exposed to the fire hazard, and the cost of providing equal services in all areas.

When a fire or other emergency does not involve a structure, then travel times can be longer as the issue of flashover occurring in a structure in 5 minutes or so after ignition is not a factor. The vast majority of the "structures" on solar facility sites are solar panels/arrays. These structures are not inhabited and are highly ignition resistant. The Proposed Project includes inhabitable structures, but they are built to the latest ignition resistant construction requirements and include interior sprinklers, which also enables a slower response time. Each of the Proposed Project facilities includes an Operation and Maintenance building. Each of these structures will be built to the latest ignition resistant construction methods and materials required by the applicable fire and building codes and will be fitted with interior sprinklers. These required measures are meant to protect human life but also minimize fire spread, preventing flashover or providing a longer time until flash over occurs. The use of sprinklers has shown to have a very high success rate in limiting fires to the room of origin and extinguishing fires with reported success rates ranging from 96 to 99 percent (Southern California Fire Sprinkler Advisory Board 2012). This success rate helps to "buy time" enabling longer response times and working in a passive manner.

Emergency Medical Service Response

EMS response in the Boulevard area is provided by the closest fire stations and supported by American Medical Response (AMR), a private ambulance company in Campo. Travel time estimates, per AMR, is roughly 15 minutes, driving the posted speed limits to the Boulevard area (personal communication with Jim Hunt, August 2012). The travel time for an emergency medical response event would be that of the closest fire engine. That crew will provide at least a first responder level of care and stabilize the victim until arrival of the Paramedic level service. The ALS level of response can be a longer travel time than that of a properly equipped and trained initial arriving responder. It must be noted that not all EMS calls require a Paramedic, with estimates that 70% of all EMS calls can be successfully mitigated without a Paramedic. The ambulance would transport patients to either Grossmont or Sharp Memorial hospital. Driving times are at least 30 minutes. Life flight times may be less dependent on response time of the helicopter.

Based on the slower response times for medical emergencies, and the statistics that suggest most of the anticipated emergencies can be successfully resolved with basic life support techniques, on-site employee first aid training will be an important component of the applicant-provided measures. Co-worker first aid efforts must be able to adequately respond to the most common type of medical emergencies until professionals arrive. All employees should be trained to a minimum level of basic first aid T and trained to use an Automatic External Defibrillator (AED). Adequate first aid equipment to approval of the local Fire Agency and ambulance Paramedics, and an AED will be at each facility. Training will also include briefings and training by a local Fire Station crew and AMR Paramedics.

GP POLICY: Concurrency of Fire Protection Services – Ensure that fire protection staffing, facilities and equipment required to serve a development are operating prior to, or in conjunction with, the development. Allow incremental growth to occur until a new facility can be supported by development.

Proposed Project measures – Project facilities will comply with the General Plan by incorporating negotiated trigger points in a fire services agreement. The fire services agreement would indicate, among other things, when funding would be provided to the fire agencies. Additionally, where other measures that are not based on applicant funding to the fire agencies are project required mitigations for assisting the fire agencies, the measure(s) will be implemented based on 1) a negotiated trigger point, 2) as needed to perform function during construction or operation, or 3) as possible based on infrastructure and project component completion.

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7.0 STATION COVERAGE

A critical element in the assessment of any emergency service delivery system is the ability to provide adequate resources for anticipated fire combat situations, medical emergencies, and other anticipated events. Each emergency requires a variable amount of staffing and resources to be effective. Properly trained and equipped fire companies must arrive, deploy, and mitigate the event within specific timeframes if successful emergency event strategies and tactical objectives are to be met. Each event, fire, rescue operation, major medical emergency, disaster response, and other situations will require varying and unique levels of resources. For example, controlling a fire before it has reached its maximum intensity typically requires a rapid deployment of personnel and equipment in a given timeframe. Various issues may impact the ability of the nearest fire station to respond quickly and with enough resources to mitigate the emergency.

The objective is to have a distribution of resources that is able to reach a majority of events in the timeframe as stated in the service level goals (County General Plan or other standard). There are many factors that make up the risk level, which would indicate the need for higher concentration of resources:

- Inability of occupants to take self-preserving actions
- Type of development site
- Construction features
- Lack of built-in fire protection (older structures)
- Hazardous structures
- Lack of needed fire flow
- Nature of the occupancy or its contents

From a population and call volume perspective, especially considering call volumes may be even lower than the conservatively based analysis in this report, along with the following analysis of fire station coverage and response characteristics and results from the 2010 Citygate Fire Services Deployment Study for San Diego County, it is difficult to justify the need for additional fire stations, as the current configuration appears to be well-suited for the rural area.

7.1 Response Reliability

Response reliability is defined as the probability that the required amount of staffing and apparatus will be available when a fire or emergency call is received. The response reliability of

the Study Area fire agencies would be 100 percent if every piece of apparatus and staffing were available every time an emergency call was received. In reality, there may be times, however rare, when a call is received for a particular company but the company is already on another call. Or, it is possible that engines with no career paid staff that rely on volunteer or stipend staff may not be able to respond quickly. This requires a substitute (second-due) company to be assigned from another station. As the number of emergency calls per day increases, so does the probability that a needed piece of apparatus will already be busy when a call is received. This may be especially true in the Study Area for ambulance service due to the current contract that includes one ambulance stationed in the Study Area.

Consequently, response reliability of the fire stations decreases, which would have an impact on travel times to emergencies. The size of the area that a station covers, the number of calls, the types of calls, and the population density all affect response reliability (CITYGATE 2010). The more densely populated, the more likely a second-due call will occur. An analysis of current response data can reveal variations in the response reliability among stations.

The critical responding fire resource is initial emergency response of the closest unit. Most structure fires and vegetation fires are controlled or extinguished by the first arriving engine company. The modern Fire Service relies on the closest unit theory, rather than only responding units from a fire jurisdiction when there may be units from other jurisdictions adjoining a jurisdiction, which could arrive in less time. The Boundary Drop concept began in the City of Huntington Beach in 1971. One of the authors of this study, Jim Hunt, was instrumental in the design, implementation and management of that four City Boundary Drop. Such boundary drops have proven very efficient and cost effective throughout the Country.

The current rural setting in the Study Area allows over 20 minutes travel time in the County's General Plan. This travel time response is not considered satisfactory for significant fire or medical aid calls, but is allowed due to the infeasibility of providing fire station distribution in rural areas that would meet the national standards. The funding available through property tax assessments designated for fire service in rural areas is generally not sufficient to fund more fire stations that would result in faster response times, and those living in rural areas accept a reduced service level. Thus, Study Area fire station travel times result in few gaps, except where lack of roads occurs, and enables Boulevard Fire Station to cover all of the Proposed Project sites within General Plan standards. Determining whether this is an acceptable response to renewable energy projects is a focus of this report and analysis suggests that reliable medical response will be most important and fire/other emergencies will be secondary. Because the first arriving engine is critical for fire and medical emergencies, the remainder of this section focuses on selection of a response standard and analyzing station distribution and concentration.

7.1.1 San Diego County General Plan

As previously discussed, the County's General Plan sets policy for fire protection services for development. It requires that new development demonstrate that fire services can be provided that meets the minimum travel times identified in Table 8 -*Travel Time Standards from Closest Fire Station*.

Table 8
General Plan Travel Time Standards from the Closest Fire Station*

Travel Time	Regional Category (and/or Land Use Designation)	Rationale for Travel Time Standard**
5 minutes	Village (VR-2 to VR-30) and limited Semi-Rural Residential Areas (SR-1) Commercial and Industrial Designations in the Village Regional Category Development located within a Village Boundary	In general, this travel time standard applies to theCounty's more intensely developed areas, where resident and business expectations for service are the highest.
10 minutes	Semi-Rural Residential Areas (> SR-1and SR-2 and SR-4) Commercial and Industrial Designations in the Semi-Rural Regional Category Development located within a Rural Village Boundary	In general, this travel time provides a moderate level of service in areas where lower-density development, longer access routes and longer distances make it difficult to achieve shorter travel times.
20 minutes	Limited Semi-Rural Residential areas (>SR-4, SR-10) and Rural lands (RL-20) All Commercial and Industrial Designations in the Rural Lands Regional Category	In general, this travel time is appropriate for very low density residential areas, where full-time fire service is limited and where long access routes make it impossible to achieve shorter travel times.
>20 minutes	Very-low rural land densities (RL-40 and RL-80)	Application of very-low rural densities mitigates the risk associated with wildfires by drastically reducing the number of people potentially exposed to this hazard. Future subdivisions at these densities are not required to meet a travel time standard. However, independent fire districts should impose additional mitigation requirements on development in these areas.

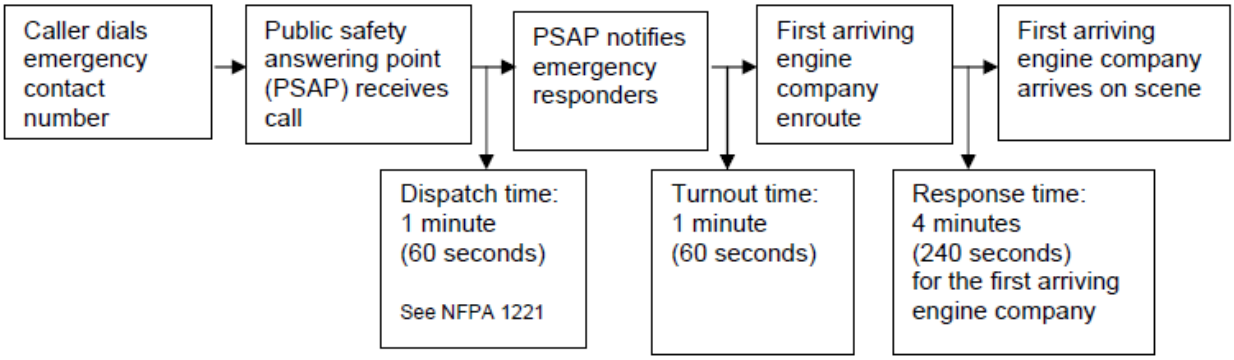
* The most restrictive standard will apply when the density, regional category and/or village/rural village boundary do not yield a consistent response time standard.

** Travel time standards do not guarantee a specific level of service or response time from fire and emergency services. Level of service is determined by the funding and resources available to the responding entity.

7.1.2 National Fire Protection Association Standard 1710

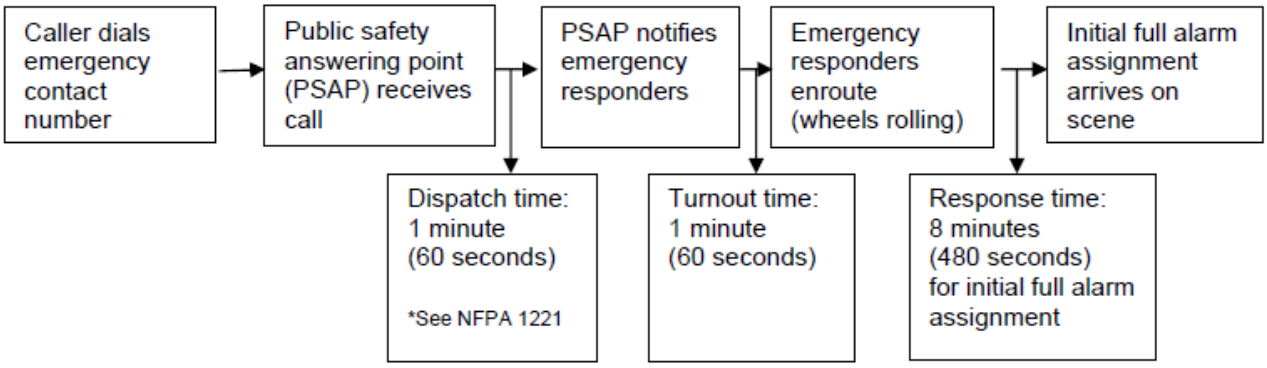
The development of this standard, adopted in 2000, was the first organized approach to developing a standard, defining levels of service, deployment capabilities, and staffing levels for "substantially" career fire departments. NFPA 1710 provides the user with a template for developing an implementation plan in respect to the standard. The NFPA 1710 standard set forth in concise terms the recommended resource requirements for fires, emergencies, and other incidents. (Note: NFPA 1710 travel time is 1 minute less than SD County's General Plan.). Figures 11 and 12 provide a graphic of the 1710 standard response time for initial arriving and full alarm response, respectively.

Figure 11. NFPA 1710 Initial Arriving Engine Company Response Travel Time Detail.



* Flowcharts adapted from City of Fresno Fire Department Standards of Cover Report - 2007

Figure 12. NFPA 1710 Full Alarm Assignment Response Travel Time Detail.



NFPA 1710 Emergency Medical Service

There are three levels of EMS provision recognized in the NFPA 1710 standard:

1. First responder with automatic external defibrillator (AED)
2. Basic life support (BLS)
3. Advanced life support (ALS)

Figures 13 and 14 provide illustrations of the NFPA 1710 standard response time for first responder and advanced life support, respectively.

Figure 13. NFPA 1710 Emergency Medical First Responder Travel Time Detail

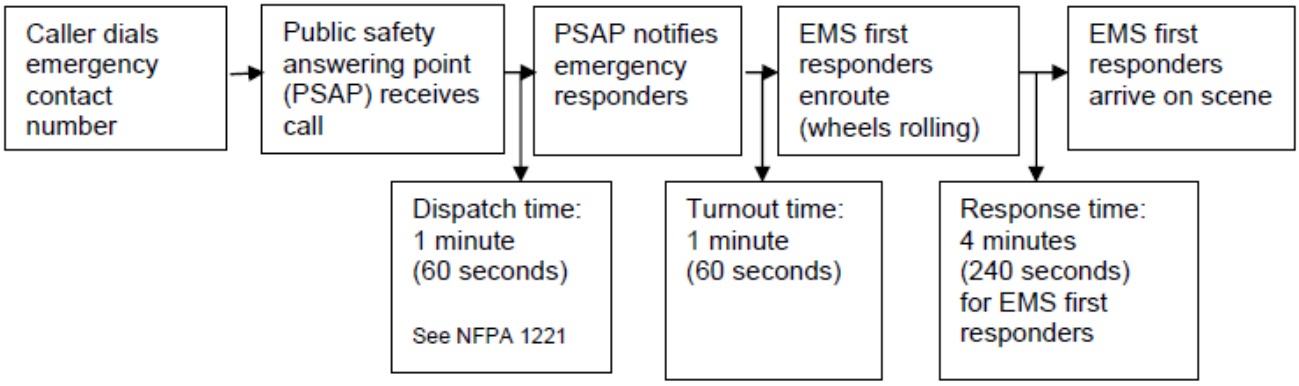
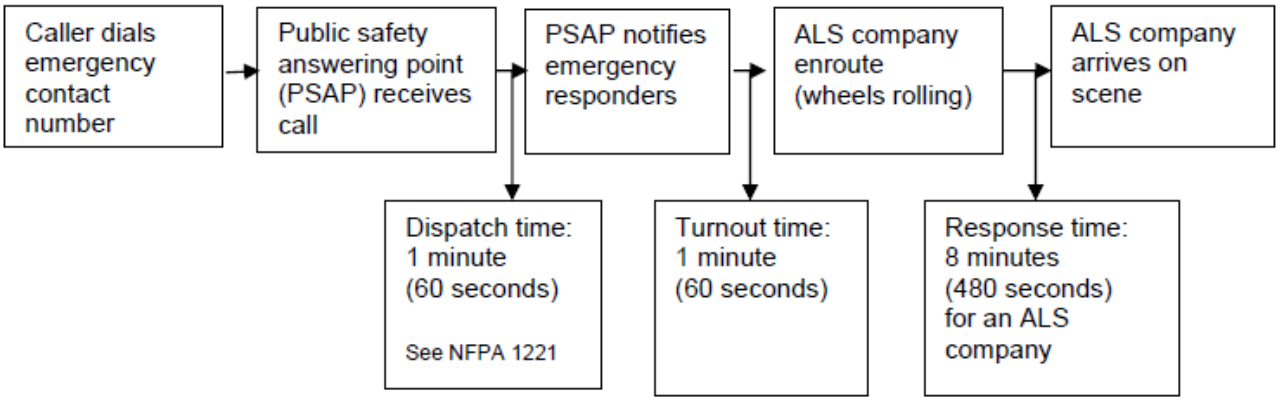


Figure 14. NFPA 1710 Advanced Life Support Response Travel Time Detail.



7.1.3 Insurance Service Office Standards

In urban areas, the Insurance Service Office (ISO) Fire Department Grading Schedule aims for first due fire engine stations spaced 1.5 miles apart and ladder trucks spaced 2.5 miles apart, which, based on travel speeds would result in less than 4 minute travel time for first due engines and less than 8 minute travel time for first due ladder trucks. This standard is difficult to apply to rural settings like the Study Area, as previously discussed, but provides a guideline for consideration and perspective.

The ISO grades community fire defenses on a 10-point scale, with Class I being the best. Typically, urban areas are rated Class 3. There are no Class I Fire Departments in San Diego County, and there are not many throughout the nation. As population densities and risks decrease, so does fire protection. In rural areas, like most of the Study Area, there are not typically infrastructure like water mains and fire hydrants, so water is not readily available and must be trucked to the emergency. In emerging suburban and rural areas, fire departments are typically rated at Classes 5 to 9. Class 10 is a situation where no protection exists or the fire department is inadequately equipped or staffed. Currently, the Study Area fire agencies ratings vary but are mostly rated as 9, which is typical for a rural area.

7.2 Proposed Project Standards of Cover

A common view is that even though a particular rural fire station may have less than 90 percent performance (i.e., it may not meet the travel time standards 90-percent of the time) it may be justified based on its service area of rural, lower risk, undeveloped open space lands where the economic justification for better performance is not present. With the development of large solar facilities in these rural, undeveloped areas, there is an increase in the economic justification) and a slight increase in the emergency response justification (medical related calls increase and fast response to most medical calls is essential for saving lives). When compared to dense residential development, however, solar facilities are expected to generate a much smaller demand based on call volumes (Riverside County, State Fire Marshal's Office data) and would typically not require any faster response than open space. In addition, fire detection would be faster than in open space areas due to on-site personnel and 24/7 automated fire monitoring systems.

Based on the unique rural locations of projects in the Study Area, the analyzed potential ignition sources, the fire-hardened nature of these facilities, and the accepted service level, the standards of cover utilized in this analysis follow the General Plan standards and include:

1. Proposed Project Facility Fire - Citygate (2010) indicates that there are two response standards that are appropriate for the Study Area. First, a structure fire in a remote area would have a goal of 20 minute travel (90%) for first due and an Effective Firefighting Force (EFF) of 6 firefighters within 24 minutes travel time. This response timing assumes that the structure includes maintained defensible space which reduces fire spread and intensity around the structure. Second, for rural areas that are not as sparsely populated (500 to 5,000 people per square mile) a goal of 12 minutes travel time for first due and an EFF of 6 firefighters within 16 minutes travel time is considered appropriate. These standards comply with the General Plan standards.
2. Emergency Medical Response - The applicable NFPA 1710 Standard recommends that the first responders with basic First Responder first aid training and an AED arrive in 4 minutes travel time, 90% of all calls, and that the Paramedics arrive in 8 minutes travel time; 90% of all calls. This will be difficult to meet on some of the Study Area foreseeable projects, including the Proposed Project.
3. Wildland Fires - NFPA 1710 suggests deploying a total of 2 hand lines from 2 fire engines (1 each) using five firefighters within 10 minutes of arrival; 90% of calls. Citygate (2010) suggest wildland fires can be broken into two categories, remote and wildland interface. Wildfires in remote areas would have a goal of 20 minutes first due with an effective fighting force (EFF) of 6 firefighters within 24 minutes travel time and following CAL FIRE's goal of 10 acres or less fire containment. Wildland fire near populated areas have a goal of 10 minutes travel for first due and an EFF of 10 firefighters within 15 minutes travel time and 5 acres or less fire containment. These suggested standards are not in conflict, but combine to provide a travel time standard that appropriate for the Study Area and its large area and few roads and a standard for hose lay once at the scene. Initial attack supported by water tenders and aircraft will be a part of the tactics and strategy, and will be supported by the standard robust response by CALFIRE and other responding agencies, as successfully demonstrated in the recent Shockey fire. Aircraft initial response criteria have been established to deliver retardants to the fire scene on SRA lands within 20 minutes of dispatch and to provide follow-up aircraft as needed.

   Wildland fire responses are not based on time but on response measures that are consistent with the risk and desired outcomes. For example, NFPA 1710, in Section 5.7.1

states: "Wildland fire suppression operations shall be organized to ensure that the fire department's wildland fire suppression capability includes personnel, equipment, and resources to deploy wildland direct operations that can address marginal situations before they get out of control and wildland indirect firefighting operations that can be assembled and placed into operation against major wildland fires". CAL FIRE, responsible for wildland firefighting in SRA areas, of which much of the Study Area is within, has a statewide goal to contain all wildfires within the first two hours to 10 acres or less, 95 percent of responded fires. CAL FIRE has met this goal at least over the last decade.

Note: units responding can be via automatic aid assignment and in the Study Area, would likely be from multiple fire agencies due to the limited distribution of single agency stations within a concentrated area.

7.3 Response Assignments

The CAL FIRE Monte Vista Dispatch center provides dispatch for the Study Area fire agencies and provided the following response assignment information. The typical emergency follows a response path similar to the following example:

- **Notification**—The point at which an alarm is received. This transmittal may take the form of electronic or mechanical notification received and answered by central answering point.
- **911 Dispatch Processing Time**—The time between the first ring of the 9-1-1 telephone at the dispatch center and the time the computer-aided dispatch (CAD) operator activates the station and/or company alerting devices.
- **Turnout Time**—The interval between the activation of station and/or company alerting devices and the time when the responding crew is aboard the apparatus and the apparatus is beginning to roll toward the call as noted by the mobile computer terminal or notifies dispatch by voice that the company is responding.
- **Travel Time**—The point at which the responding apparatus signals the dispatch center that they are responding to the alarm and ends when the responding unit notifies the dispatcher of its arrival on scene (via voice or mobile computer terminal notification).
- **On-Scene Time**—The point at which the responding unit arrives on the scene of the emergency.
- **Initiation of Action**—The point at which operations to mitigate the event begin. This may include size-up, resource deployment, and patient intervention.
- **Termination of Incident**—The point at which units have completed the assignment and are available to respond to another request for service.
- **Total Response Time**—Alarm processing time plus turnout time plus travel time.

When automatic aid units are needed, the Monte Vista Center CAD system dispatches for the local and automatic aid companies using automatic vehicle locators (AVL) to dispatch the closest unit(s), as possible. CAL FIRE is in the process of installing AVLs in all apparatus with full deployment in the near future (completion date not available at time of report). Emergency Dispatch assignments are provided by Monte Vista (per BC Darrin Howell, personal communication with Jim Hunt 8-22-12).

The following section provides an overview of the most likely emergency call scenarios from the Proposed Project and foreseeable renewable energy projects. These scenarios are described and critical tasks are estimated.

7.4 Study Area Highest Likelihood Emergency Call Scenarios

7.4.1 Scenario 1: Emergency Medical Aid

A site staff person or maintenance crew member has suffered a heart attack. Another site worker has observed the health issue and called 9-1-1. On-site personnel are required to carry red cards, and to have first responder level first aid training, certification of CPR and automatic external defibrillator (AED) training. Trained on-site personnel provide immediate assistance until the two person Boulevard Fire Station crew responds with a Type II engine. In addition, the three-person engine from Whitestar station in Campo (also in Boulevard once the new fire station is constructed) and AMR Medic 86 are responding from Campo; a 15-minute average response time. Table 9 provides the critical tasking and number of emergency responders needed.

Table 9
Critical Tasking for Emergency Medical Aid

Task	Number of Firefighters needed	Number of Engines needed	Number of Water tenders needed	Number of Ambulances needed
1. Take command. Get observers out of way	1	1	0	0
2. Size up situation	1	0	0	0
3. Continue or Begin CPR	One from above	0	0	0
4. Begin ALS intervention	3 including 2 from above	0	0	1
5. Defibrillate if appropriate	One from above	0	0	0
6. Stabilize and transport	Two from above	1	0	One from above
Total*	**5**	**2**	**0**	**1**

* Five personnel are needed for a full cardiac arrest. Currently five respond plus the paramedic ambulance with two medics.

The applicable NFPA 1710 Standard recommends that the first responders with basic First Responder first aid training and an AED arrive in 4 minutes travel 90% of all calls, and that the

Paramedics arrive in 8 minutes travel; 90% of all calls. The response weight should include: 1 Paramedic engine and one medic ambulance. This would result in 5 personnel on scene which are needed for a full cardiac arrest event. The current programmed response may or may not meet the standard depending on location of the site.

The patient would be transported to the nearest medical facility in San Diego County, which would be either Grossmont hospital or Sharps hospital depending on type of emergency, etc., a minimum 30 minute drive, for additional attention. A second "dedicated", local, AMR paramedic ambulance, stationed in Boulevard, perhaps at the new proposed CALFIRE fire station, with 2 medics may be needed, as discussed further below. Additionally, depending on the availability and reliability of the Life Flight Medic Helicopter, fair share funding may be necessary to ensure its continued operation (approximately 25 minute response time).

7.4.1.1 Ambulance Thresholds and Trigger Points

The following summarizes information regarding workloads of Paramedic units which was obtained by contacts with four Fire Agencies that have Paramedic units: Los Angeles County Fire Department, San Gabriel City Fire Department, Huntington Beach Fire Department, and the North County Fire Protection District.

Los Angeles County Fire Department

This fire department has many 2 person paramedic squads. These units do not transport. Their busiest station is in Lancaster. The fire department EMS Battalion Chief states that at about 5,000 calls per year (13.6 calls/day) they consider putting another unit in service.

San Gabriel Fire Department

The Paramedic Coordinator estimates that on average, when there are 16 Advanced Life Support (ALS) calls per 24 hour shift, where response times are 15-20 minutes (such as in Campo/Boulevard) an additional ALS ambulance should be added.

Huntington Beach Fire Department

Operations Chief states that their ambulances run about 9 to 11 calls per shift. He says that when they exceed that on a regular basis, then they look at putting another ambulance in service.
The average of the above 3 fire departments is 13.5 calls per 24-hour shift.

Information has been requested from the San Diego County EMSA on two occasions. No response has been received to date. Incident data regarding AMR was obtained from AMR dispatch center.

Information was received from the North County Fire Protection District Paramedic Coordinator; Chief Steve Abbott. He provided information regarding the "Utilization Ratio" and the County Ambulance standard.

AMR Campo station personnel state that the ambulance has about 1 to 6 calls per day. Average driving time to Boulevard is about 15 minutes. Some of the calls involve responses out of the area, which results in coverage to Boulevard coming from the ambulance in Alpine, which is about 30 minutes away. The response time to the hospital is about 30 minutes. So if they have to transport to the hospital, this can be a two-hour turnaround during which they are out of the area.

In general, about 70% of all EMS calls do not require a Paramedic. But many times this is not known until after the medic arrives and does an assessment.

The factors to be considered in determining when another ambulance should be placed in service include:

- Call volume
- Driving time to calls
- Average time at calls
- Average "turnaround" time to transport to and return from the Hospital - this can add up to 2 hours on an ALS call in the Study Area
- If the ambulance has a "utilization ratio" of greater than 20% (dedicated to calls more than 20% of their total in service time), which it appears that the Campo ambulance may be reaching such a tipping point, (subject to review of more data when received) where an additional ambulance is needed, due to the long response time of the second ambulance from Alpine
- If the ambulance is out of the area often, then the local area can be uncovered
- If multiple queuing is occurring; Campo AMR ambulance personnel state that it does occur
- The time it takes for the second ambulance to get to a call in Boulevard if the Campo ambulance is not available
- "Burnout" of paramedics due to call volume and time on calls in a 24 hour shift

- Ability to quickly arrive at the scene of a cardiac arrest or severe trauma; in cardiac arrest, the point of awareness is the recognition of the patient's condition by a by-stander or medical personnel; the greatest chance for survival resides within the first 10 minutes (preferably 4-6 minutes) during which external defibrillation measures are utilized.
- The amount of time that the closest engine company is not available to respond; for example, at the time this is written, there was a major vegetation fire in Tierra Del Sol area. Therefore, the local engine companies were probably all committed on the fire for several days. Thus, the AMR ambulance in Campo would be the first responder and the travel time criteria in NFPA 1710 (4 minutes, 90% of all calls for basic emergency responder with an AED, and 8 minutes, 90% of all calls for a paramedic unit) would probably not be met.
- If the Paramedic ambulance is in a high fire hazard area (such as the Study Area) the odds are that the unit would be committed during times of vegetation fires, caring for residents and firefighters who have debris in their eyes, have inhaled too much smoke, are overcome with exhaustion, or residents with anxiety, and similar issues.
- The capability of the local engine company for EMS/ALS calls, and their standard staffing is also a factor; 5 trained persons are needed at a full cardiac arrest.

In rural San Diego County, the ambulance standard is 30 minutes response time; 90% of the time. Emergency response critical timeline standards indicate that this response time is excessive for a successful outcome of an ALS call.

Therefore, it is recommended that an additional AMR ambulance, or a Fire Department Paramedic engine, should be placed in service in the Boulevard area. In addition, on duty Fire Station staffing should be increased at Boulevard and Jacumba Fire Stations to three persons each including a Captain. The Campo CALFIRE station has this level of staffing currently. In this manner, 5 trained persons, including two paramedics, would arrive at an EMS call, and there would be a Fire Officer to manage the incident.

7.4.2 Scenario 2: Construction Phase Fire

Welders are working above some equipment awaiting installation. The equipment is covered by plastic sheeting. Hot slag drops onto the sheeting and it ignites and is burning. Workers call 911 while others operate required on-site fire extinguishers. The fire would only occur during non-Red Flag Weather conditions as construction restrictions would prevent any type of hot-work from occurring when these conditions persist, as stated in the required construction fire prevention plan. The fire is extinguished or controlled prior to firefighters arriving on site. In no

case would the fire not be reported to the fire authority, even if it is controlled before 9-1-1 is called. Table 10 provides the critical tasking and number of emergency responders needed.

Table 10
Critical Tasking for Construction Phase Fire

Task	Number of Firefighters needed	Number of engines needed	Number of water Tenders needed	Number of Ambulances needed
1. Take command. Size up. Keep onlookers back	1	1	0	0
2. Deploy one hose line to extinguish fire	3 (including one above)	From above	1	0
3. Overhaul fire	2 (included in above)	0	0	0
Totals	**3**	**1**	**1**	**0**

The applicable Standard (Citygate 2010) is for the first unit to arrive within 20 minutes driving time; 90% of all calls and an EFF of 6 firefighters within 24 minutes travel for a structure fire. The current programmed response may be able to meet the standard, depending on the remoteness of the project site. The need for up to three engines to meet the minimum 6 firefighters for EFF is not applicable in this scenario because the fire does not involve a structure. The fire station coverage analysis in Chapter 8 provides more details on overall response capabilities in the Study Area. Assisting the firefighter response is execution of a Construction Fire Prevention/Fire Safety plan and trained and equipped workers who can respond to an incipient phase fire, the standard would be met.

7.4.3 Scenario 3: Santa Ana Influenced Wildland Fire

A wildland fire is approaching a southeast San Diego County Solar Facility in the Boulevard area. The fire coincides with the region's fall dry period and is being influenced by "Santa Ana" wind, humidity and temperature conditions. The fire is roughly one-quarter mile from, and spreading toward the solar facility. Burning embers are being produced, set aloft, and carried in front of the primary fire front. These embers, varying from very small to 2 to 3 inches in diameter, are landing on the site's CPV panels and onto the ground under the panels as well as on the other facility structures/substation/components. It is assumed that the on-site structures are maintained to the ignition resistant level detailed in the project's Fire Protection Plan (FPP) and that vegetation under and around the panels has been maintained to the level required in the project's FPP. Prior to leaving the site, staff placed the panels into vertical stow positions,

minimizing the exposure to embers and have taken the facility off-line (de-energized) to avoid any potential conflicts with the firefighting operation.

The Boulevard Fire crew and CALFIRE have responded to the fire. The total response, which is the minimum standard initial vegetation fire response, is the Boulevard Station with two firefighters and a Type I or Type II engine, plus four additional engines and one water tender from area fire agencies such as CALFIRE White Star Station (second due engine), Rural Fire Protection District's Jacumba Station, CALFIRE Campo station, Campo Reservation Fire Department, and RFPD Lake Morena. In addition, a Battalion Chief (BC), aircraft, dozer and hand crews are dispatched. Total firefighters including BC is estimated at 15 plus two hand crews, aircraft, dozer, etc. Beyond that, the Incident Commander can order virtually unlimited resources through the state Mutual Aid system. Table 11 provides the critical tasking and number of emergency responders needed.

Table 11
Critical Tasking for Wildland Fire

Task	Number of Firefighters needed	Number of engines needed	Number of Water tenders needed	Number of ambulances needed
Take command. Determine electrical risks, available shut-off, stow mode operation, etc.	1	0	0	0
Order evacuation of Solar Facility Staff	Staff evacuate prior to firefighter response	0	0	0
Patrol the farm to observe any ignitions	2	1	0	0
Extinguish any spot fires	Same 2 as above	Same as above	0	0
Total*	**3***	**1***	**0**	**0***

* In reality, the Fire Incident Commander would probably order a strike team of five engines to patrol five solar farms (1 engine at each farm) for downwind embers and spot fires. This would be in addition to the initial CALFIRE vegetation fire response.

The wildfire would be expected to burn and spot through available fuels to the Solar Facility edge where it would be reduced in intensity and spread rates as it was starved of fuels. The Solar Facility fuel modification areas are virtually site wide and include very low growing, maintained fuels that would result in very low likelihood of fire ignition, and if ignition did occur, would result in fire that could be controlled by hand crews. The solar facilities would be expected to act as a fuel break and defensible position for responding firefighters.

Wildfires in remote areas would have a goal of 20 minutes first due with an effective fighting force (EFF) of 6 firefighters within 24 minutes travel time and following CAL FIRE's goal of

10 acres or less fire containment (Citygate 2010). The applicable NFPA 1710 Standard recommends that two hand held hose lines be deployed within 10 minutes of arrival of the first due engine, from two fire engines (one line from each), with a total of eight Firefighters including 2 per line, 2 apparatus operators, a company officer per line and an Incident Commander. It appears that the current standard fire response is adequate and meets the standard. Indication that this standard can be met was recently provided (September 2012) during the Shockey Fire, which resulted in a robust response from several fire agencies.

7.4.4 Scenario 4: Electrical Anomaly or Electrical Motor Fire

An electrical short has occurred in a CPV tracking motor or in a panel. The fire is exposing a panel to flames and heat and the wiring and other flammable materials in the panel have ignited. The fire is exposing adjoining panels to moderate heat. Sparks and burning material are dropping to the ground. On site workers have called 9-1-1 and are using the required on-site CO_2 fire extinguishers. The Boulevard engine company arrives within approximately fifteen minutes with two firefighters. Other area engine companies are responding.

If Boulevard is on another call then the first due engine company will be from Whitestar/Campo CALFIRE station (which will co-locate at a new Boulevard Station within two years). If an extended period occurs without a fire fighter or staff intervention, it is expected that the fire will burn itself out once the limited combustibles burn out or melt. Depending on design of panel, burning material or other components could fall to the ground or become airborne in wind driven scenarios. Fire in one panel could spread to another adjoining panel and so on the estimated ignition temperature of plastic is 910^{o} F. Glass melts at around 2700^{o} F. The temperature of a molten glass matrix can be about 1905^{o} F. Wiring, metal frames and solder can melt at lower temperatures. The estimated flame temperature of unmodified burning vegetation is about 1800^{o} F. If the panel has a fire rating, or is of a self-extinguishing materials, then there may be no fire spread from panel. Electrical motor or associated wiring, and any wiring on electrical poles, could arc and spark.

The Estimated needed Fire Flow would be it would take approximately 240 Gallons Per Minute (GPM) to extinguish the fire in one panel if fully involved in fire. So in reality the firefighters would probably operate one or two 180 GPM hose lines on the fire, and one to cool exposed panels, and fight vegetation fire in proximity to panels. The traditional large hand held hose line (2.5" diameter) flows 250 GPM with a 250 GPM nozzle on it but they are not very maneuverable and firefighters in rural areas don't typically use them on fires. So the total estimated fire flow would be three 180 GPM hose lines (540 GPM) for 60 minutes, or total of 32,400 gallons of stored water needed on each site. This assumes that a single array is less than

1500 square feet in size. The total stored water should be one hour's fire flow; 540 GPM for 60 minutes at each site (33,000 gallons).

Various publications indicate that a hose line spray nozzle, set at a 30 degree spray pattern, can safely be used from at least 30 feet away, and if not standing in water. Firefighter training and caution is needed as panels may be electrically charged at all times during daylight hours.

Table 12 provides the critical tasking and number of emergency responders needed.

Table 12
Critical Tasking for Electrical Fire

Task	Number of Firefighters needed	Number of Engines needed	Number of water tenders needed	Number of ambulances needed
1. Take command. Size up situation. Keep onlookers back.	1	0	0	0
2. Engine deploys 150' hose line and fights fire with spray nozzle.	3 (includes above)	1	1	0
3. Shut off generation of electricity by covering panels	4	0	0	0
2. Second engine company arrives and deploys a hose line to confine fire and for exposure protection	3	1	1	0
Totals	**11**	**2**	**2**	**0**

The fire can be successfully engaged with the use of water fog from engines and supplemented by on-site portable fire extinguishers for use by fire agencies. The described critical tasks and response would require 2 firefighters per hose line (total 6) plus one Company Officer plus one fire apparatus engineer and one Battalion Chief and two firefighters conducting support work. This is a total of 11 firefighters.

7.4.5 Scenario 5: Downed Power Line Fire

During an especially high wind event, an interconnect power line that is fed by a Solar Farm has fallen and ignited wildland vegetation in/adjacent to the Right Of Way. The fire is spreading towards an off-site residence and toward a group of periphery CPV arrays. The on-site workers have called 9-1-1 and the Boulevard Station crew with a Type II engine and two firefighters, as well as a full vegetation fire response, is on the way. One of the first priorities would be to take a defensive stand at the nearby residence. The residence is of older construction and includes

vulnerabilities for ember penetration as well as lack of maintained fuel modification. The first task would be to evacuate the residents to a safe area (open area with no vegetation or out of the area along a major roadway). The firefighters would then create defensible space, as time permits build a hand line to intercept the encroaching fire, and prepare to extinguish spot fires. Under high wind conditions, this scenario may have a different result with evacuation of residents and firefighters as the first priority.

Table 13 provides the critical tasking and number of emergency responders needed.

Table 13
Critical Tasking for Downed Power Line Fire

Task	Number of firefighters needed	Number of engines needed	Number of water tenders needed	Number of ambulances needed
Take command and size up situation. Keep onlookers back. Isolate area/ deny entry	1	1	0	0
Contact Power Company to shut down line and have Solar farm disconnect power feed to lines.	1	0	0	0
Deploy hose line to fight fire after power off	3	1	1	0
Deploy second hose line to protect exposed panels	3	1	0	0
Patrol for embers in Solar farm	3	1	0	0
Totals	**11**	**3**	**1**	**0**

Wildfires in remote areas would have a goal of 20 minutes first due with an effective fighting force (EFF) of 6 firefighters within 24 minutes travel time and following CAL FIRE's goal of 10 acres or less fire containment (Citygate 2010). The applicable NFPA 1710 Standard recommends that two hand held hose lines be deployed within 10 minutes of arrival of the first due engine, from two fire engines (one line from each), with a total of nine Firefighters including 2 per line, 2 apparatus operators, a company officer per line and an Incident Commander. It appears that the current standard fire response is adequate and meets the standard.

7.5 Response Deficit

The critical scenarios described indicate there is a potential response deficit for Scenario 1; Medical Emergency, if a Paramedic is needed on scene. There does not appear to be an initial fire response deficit, assuming nine firefighters and 2 engines can deploy 2 lines within 10 minutes of arrival of

the first due engine company. A temporary deficit could occur for Scenario 3 until the Incident Commander requests a strike team of five engines for downwind patrol. Arrival time could take perhaps 30 minutes for all additional strike team units to arrive. The total initial vegetation fire response is robust other than that. In high fire hazard weather such as Red Flag Warning, the CALFIRE dispatch would be 10 engines, 4 hand crews, 2 dozers, aircraft and 2 tenders.

It must be noted that all scenarios meet the County of San Diego General Plan Response Time requirement of 20 minutes (or longer) for rural areas. There is no identified conflict with the General Plan.

Cumulatively, foreseeable projects, at build out or at some future date when multiple renewable energy and development projects have been constructed, the current resources could experience response delays or stacked (multiple queued) calls. However, each project's participation in providing basic fire safety performance measures and participation in the CFD or similar fire service agreement, is expected to provide fair share funding for targeted resources aimed at mitigating the cumulative effects of the project.

The greatest potential response deficit that may be experienced at some future point, likely during construction phases of these Study Area projects and then when several of the projects are operational, is the need for a second Paramedic or ambulance, which would remain in the area. The second potential deficit that currently exists is staffing of Boulevard and Jacumba Fire Stations. A Study Area improvement would be to staff the Lake Morena station with a Paramedic, resulting in a Paramedic Assessment Engine (PAE). The current volunteer staffing should be augmented with a Captain with total on duty staff of 3. Captains are able to make critical decisions upon arriving at an emergency and can supervise and train volunteers, resulting in more cohesive and efficient response capability.

It is generally accepted that an Urban Fire engine company is not overloaded calls if call volume is less than 10 per day. That number is a little less in rural areas. The odds of multiple queuing (stacked calls) occurring with this estimated call volume is low. A paramedic ambulance is overloaded if they have more than about 13 calls in a 24 hour period (5000/year) as the typical turnaround time per call is about 1-2 hours depending on whether they have to transport to the hospital. An estimated 2/3 of the total calls (about 9) would probably be ALS level calls.

7.6 Proposed Project Fire Station/Agency Distribution

Dudek conducted an analysis of the response travel time/route and response coverage area of several existing Study Area fire stations as well as automatic aid stations from nearby fire

agencies to supplement an assessment of fire department response capabilities specifically associated with the Proposed Project. Citygate (2010) provide an assessment of the entire Study Area and indicate that fire stations are appropriately placed, but that as new development occurs beyond the current 12 minute travel time area from existing stations, depending on the type of development, additional resources may be necessary. One could conclude that if additional residential development occurs beyond the current 12 minute travel time area, such as a higher density, master planned community, that it would require additional resources, and possibly a new fire station, depending on the size and mass of the project. Lower demand sites in terms of human population, development type, and low emergency call volume, including renewable energy sites, would presumably not require additional fire stations, but may require additional, targeted resources to offset cumulative fire service impacts.

This study focuses on the Proposed Project since it encompasses at least 50 percent of the foreseeable projects in the Study Area and all five of the facilities it represents are within a reasonably close proximity to the Boulevard Fire Station. Both analyses were conducted using Network Analyst tools within Geographic Information Systems (GIS) software (ArcGIS 10) in combination with fire station location data and existing and Proposed Project road data. Output data from these analyses includes response routes (coded with response times) and response coverage areas, indicating the areas which can be reached by all modeled stations within allotted timeframes. For this assessment, Boulevard vicinity fire stations were modeled using 4, 5, 10 and 20 minute travel time windows. Minimum travel speeds were based on the ISO standard of 35 mph and the model allowed for faster travel on highways and major roads where road type speed limits exceeded 35 mph. For the network model analysis, minimum travel speeds were 35 mph and maximum travel speeds were 60 mph (highways, major roads).

Response modeling used an estimated call processing time in the dispatch center of 1 minute for 90% of calls (NFPA 1221) and an average of 1.33 minutes for turnout time in the fire station for 90% of fire calls and 1 minute for EMS calls (NFPA 1710; Section 4.1.2.1). The resulting 2.33 minutes is added to the travel time for total response time. These calculated response times are estimated standards. The Network Analyst modeling output files were utilized to generate the exhibits presented in Appendices B through D, which depict fire station response capabilities assuming travel time and speed limit constraints.

Following compilation of all necessary data layers received from project applicants and acquired via publicly available sources, Dudek verified that all data layers were in the California State Plane Zone 6 coordinate system with units in feet. A network data set was then created utilizing ESRI's Network Analyst extension in the Arc Catalog module. The data set was created by merging the existing centerline street layer, acquired from SANGIS (2012), with the Proposed

Project road data, provided by project applicants, where available, and assigning parameters to the created data set. Several parameters are available during the creation of a network data set and include elevation constraints, U-turn capabilities, curb approach direction and travel impedance. For the purposes of this analysis, no elevation constraint was applied to the data set. Elevation constraint parameters typically apply to an analysis of other network types and are not typically applied to transportation network analyses. Due to the emergency nature of the response scenarios modeled in this analysis, U-turns were permitted on every road. Curb approach determines on which side of the street the vehicle needs to approach and includes three options, left, right, or either. The 'either' option was selected for all roads in this analysis based on the emergency nature of the response situations. Finally, travel impedance was utilized to include the effect of speed limits on response time. A custom impedance value was created for each road segment and was a function of road segment distance (miles) divided by speed (mph). This value was utilized in Network Analyst calculations for both modeling types and reflected the time necessary for a vehicle to cover the distance of the road segment.

7.6.1 Response Travel Time Consistency

Once the network data set parameters were finalized, the route analysis was run using the Network Analyst extension in ArcGIS 10. This function determines the best route between a minimum of two points based on the parameters chosen. In this analysis, possible roots for responding stations were analyzed to a point within a Proposed Project facility (Tierra Del Sol), which is the most remote of the five projects, and assumed three separate response scenarios, including a structure fire, a wildland fire with structural threat, and a medical aid response. The response routes included one from each of 4 existing area fire stations (Boulevard, Campo Volunteer, CAL FIRE Campo, and Lake Morena, Jacumba Volunteer). For this analysis, travel speeds were based on road speed limits. A route analysis procedure was then run using Network Analyst for each station, with the fire station as the starting point, and a remote location at Tierra Del Sol or nearby as the destination. For the wildland fire analysis, a point in the Study Area that would be vulnerable to wildfire was selected for the destination point based on its proximity to more hazardous fuels. Table 14 summarizes the distances from each of the existing stations to the destination point, along with the total driving time required to reach the site. The maps depicting these analyses are presented in Appendix B provides response travel times to Tierra Del Sol for both a medical emergency and an on-site fire in the remote southeast corner of the project. Appendix C provides response travel times for a wildland fire near Tierra Del Sol and include unique outputs based on different response actions required for each type of emergency.

Table 14
Fire Station Drive Times to Tierra Del Sol Emergencies

Fire Station	Distance (miles)	Travel Time to Project (minutes to remote southeast corner of project)	Comments
Boulevard Fire Station	6.8	10:55	Located among the Proposed Project facilities and furthest response is to Tierra Del Sol
CAL FIRE Whitestar	3.8	6:35	Currently closest station to Tierra Del Sol, but will move to co-locate new fire station in Boulevard
CAL FIRE Campo	11.0	18:27	Can respond within County General Plan and would round out EFF
SDRFPD Lake Morena	15.8	26:37	Long travel time to Tierra Del Sol but would help round out effective firefighting force with Jacumba volunteer station. Includes paid, career staff and captain
AMR Ambulance (Campo)	11.1	18:37	Location of ambulance
Jacumba Volunteer	14.8	21:38	Currently two volunteers, no captain, third closest to Tierra Del Sol site

As depicted in the Appendix B, up to three (plus Jacumba volunteer which is not shown) engines can reach the emergency within 18 minutes 37 seconds travel time. This confirms consistency with the General Plan and this study's standards for on-site fire response. Medical emergencies would be provided initial response by on-site staff, but first arriving engine would occur within roughly 11 minutes travel from Boulevard. The CAL FIRE Whitestar engine can arrive sooner, but will be moved to co-locate a new station with Boulevard Fire Station by the time the projects are operational. Ambulance response travel time is under 19 minutes, which is a long response time for serious medical emergencies requiring advanced life support.

As depicted in Appendix C, a wildfire in the extreme southeastern portion of Tierra Del Sol would receive initial response from Boulevard/CAL FIRE Whitestar, Jacumba, Lake Morena, and likely Campo Volunteer. The initial engine (assuming Whitestar is co-located in Boulevard) would arrive in just under 11 minutes travel time. Effective firefighting force would arrive on scene roughly 18 minutes to 26 minutes thereafter. Based on current staffing, the initial arriving engine would meet the remote area wildland fire response of 20 minutes travel and the 6 firefighters would be on scene within the EFF 24 minutes travel time.

7.6.2 Station Coverage Capabilities

The next Network Analyst study involved running network models to determine the response coverage area of each of the selected fire stations within the Study Area. These models were generated to depict the geographical limits of the response area that can be reached by each fire station/engine within a designated travel time. These models account only for travel time from the fire station location. For this analysis, 4, 5, 10 and 20 minute response travel times were used for evaluation purposes. All response areas were created using the Network Analyst extension in Arc GIS 10 and the network data set previously created to analyze emergency response routes and response times. The model outputs depicting the response area for each of the aforementioned stations also utilized speed limit data for response speed. Additionally, model parameters applied to this analysis were the same as those applied to the response route analysis. The output from each of these analyses is an irregularly shaped polygon depicting the extents, which can be reached from each station in a given travel period while traveling at identified speed limits. Maps depicting the results of response area modeling are presented in Appendix D. Table 15 provides a summary of the coverage model exhibits in Appendix D-1 through D-5.

Table 15
Summary of the Fire Department Response Coverage in Appendices D-1 through D-5

Map Number	Title	Description
D-1	Boulevard Station Coverage Area – 4, 5, 10 and 20 Minute Travel Time	Response travel times encompass all five of the Proposed Project facilities between roughly 3 and 19 minutes.
D-2	CAL FIRE Whitestar Coverage Area -4, 5, 10 and 20 Minute Travel Time	Response travel times encompass the majority of the Proposed Project facilities between roughly 1 and 19 minutes
D-3	SDRFPD Jacumba Volunteer Coverage Area – 4, 5, 10 and 20 Minute Travel Time	Response travel times encompass one of the Proposed Project sites within roughly 9 minutes, 3 additional sites within 18 to 20 minutes, and cannot reach the Tierra Del Sol site within 20 minutes.
D-4	CAL FIRE Campo Station Coverage Area – 4, 5, 10 and 20 Minute Travel Time	Response travel times encompass four of the Proposed Project sites within 20 minutes and only portions of the northernmost sites within 20 minutes.
D-5	SDRFPD Lake Morena Coverage Area – 4, 5, 10 and 20 Minute Travel Time	Response travel times do not encompass any of the Proposed Project sites within 20 minutes; includes good coverage of areas to west of Proposed Project

7.6.2.1 Response Coverage Area Capabilities

The daily event is usually the routine that results in minimal losses, while significant events are less frequent. Toward the highest risk levels, the events are less frequent. In other words, if the

risk management system is working in the Study Area, a catastrophic loss should be an extraordinary event. The objective of a risk assessment is to reduce the truly serious loss to a very unusual event for the area served and involves trying to keep routine emergencies from becoming serious loss situations. The speed and weight, in terms of resources, of the response is a critical component of this incident strategy.

The response maps provided in Appendices D-1 through D-5 focus on the Proposed Project portion of the Study Area. Additional coverages are assumed to be similar to these throughout the Study Area based on the Citygate (2010) study that indicated fire station locations were appropriate for the rural land uses and current population configurations.

Appendix D-1 depicts four travel time responses (4, 5, 10 and 20) minute travel times from the Boulevard Station. As illustrated, the fire stations and resources appear to be located where they can respond to the highest population density areas (Boulevard) in an efficient manner. Response gaps are associated primarily with currently roadless areas or where there are no road interconnections through private property to a public roadway. These areas are allowed a longer response time in the General Plan. As indicated, each of the Proposed Project sites is reachable within 20 minutes travel time, with estimates ranging from roughly 3 minutes to 18 minutes. Additionally, the station can respond to a large area north, south and along I-8 and west of Boulevard, overlapping with SDRFPD's Lake Morena station coverage area. The I-8 provides opportunities for faster travel through the Study Area, enabling larger coverage areas. Boulevard Fire Station can respond to foreseeable Study Area projects to the north, east and West, but with response travel times 20 minutes or longer.

Appendix D-2 depicts travel time coverage areas from the CAL FIRE Whitestar Station. As mentioned, this station is planned to relocate to a new station in Boulevard where it will co-locate with the existing Boulevard Fire. This analysis is for current response from this station, but is irrelevant following the move, which will likely occur within the next 24 months. There may be overlap with the current station and construction at one or more Proposed Project facilities. From the Whitestar station, which is to the south of the Boulevard Station, there is considerable overlap with Boulevard. Likewise, there is considerable overlap to the west with SDRFPD Lake Morena Station coverage area and along the I-8. CAL FIRE's Whitestar Station can respond to foreseeable projects to the west, east, and north of the Boulevard Area (including the Proposed Project), but will include response times of 20 minute and longer.

Appendix D-3 illustrates, 4, 5, 10, and 20 minutes travel times from SDRFPD Jacumba Volunteer Station. As suggested, lack of roads to the west limits the station's response capability toward the Proposed Project. Even so, provided roads on the project sites would enable response

to four of the five Proposed Project sites as part of the EFF. The I-8 corridor assists this station's ability to meet 20 minute travel times for a relatively large area, which overlaps with Boulevard Fire and CAL FIRE's Whitestar Station coverage areas. Besides the Proposed Project, the Jacumba Station will have minimal ability to respond quickly to Study Area foreseeable projects due to its extreme southeasterly location. It will continue to provide assistance in its current first-due area and on large wildfire events.

Appendix D-4 presents the response coverage at 4, 5, 10, and 20 minute travel times from CAL FIRE's Campo Station. As indicated, the coverage area extends from the border to just north of the I-8, overlapping Boulevard, CAL FIRE Whitestar, and Lake Morena response areas. The small gaps in coverage are related to roadless areas. The engine from this station can be in the project area within 20 minutes for wildland fire support. CAL FIRE's Campo Station will be able to respond to foreseeable projects within the south-central Study Area. Its close proximity to Lake Morena provides considerable overlap with that Station's response coverage area. Responses to the north of I-8 and west of Lake Morena are limited within a 20 minute travel time.

Appendix D-5 illustrates the SDRFPD's Lake Morena Fire Station response coverage area. As noted, the station cannot reach the Proposed Project area within 20 minutes, but provides a central Study Area location that can provide initial response to other foreseeable projects as well as providing assistance within roughly 26 minutes. Lake Morena Fire Stations' coverage area to the west and southwest provides important response for foreseeable projects in the Study Area. Roadless areas are the primary gaps to the west, but with approved projects, roads will make these areas accessible and gaps will be reduced. Response times to the foreseeable projects will be 10 to 20 minutes or longer.

8.0 CUMULATIVE IMPACTS

Cumulative impacts from large projects, projects including new or atypical land uses, and/or multiple projects within a fuel bed like that found in southeastern San Diego County can cause fire response service decline and challenges that must be analyzed and where necessary, mitigated. The renewable energy development occurring in San Diego County represents all three of these cumulative impact producing factors. The projects result in large areas of conversion from undisturbed conditions to passive-industrial type facilities with an increase in the overall population of the area and that include potential ignition sources and challenges to responding firefighters. The projects also include potential benefits including the conversion of native fuels to low-flammability landscapes and a net reduction in the potential population of the area vs. if it were built out to the County General Plan land use zoning categories. Additionally, a significant source of fair-share funding for fire and medical response will be realized from the construction of renewable energy projects in the Study Area that would not be available without the projects. The cumulative impact on fire services has been analyzed in detail within this report as presented in the following analysis.

Cumulative impact analysis for renewable energy projects is difficult as there are no specific criteria for impacts related to wildfire and public services within the CEQA Guidelines. However, the following analysis utilizes common CEQA practices and established significance criteria in San Diego County as a bases for cumulative impact analysis. These thresholds are compared against the evaluations and analysis of current capabilities, anticipated renewable energy unique hazards and call volumes from foreseeable Study Area projects provided in preceding chapters of this document.

8.1 CEQA Guidelines

Recent approved renewable energy projects in the Study Area utilized significance criteria set forth in Appendix G of CEQA Guidelines (14 CCR 15000 et seq.) to formulate the standards and thresholds for impacts determination. These standards can be adapted to encompass all renewable energy projects (along with other foreseeable projects) in the Study Area. According to these standards, wildfire impacts would be considered significant if any of the following were to occur:

- Activities associated with project construction, maintenance, or decommissioning significantly increases the probability of a wildfire resulting in damaging impacts to communities, firefighter health and safety, and/or natural resources
- The presence of overhead transmission lines significantly increases the probability of a wildfire resulting in damaging impacts to communities, firefighter health and safety, and/or natural resources

- The presence of the projects creates obstructions to fire suppression efforts, resulting in damaging impacts to communities and/or natural resources
- Activities associated with project construction or maintenance result in a fuel vegetation matrix with an increased ignition potential and rate of fire spread.

Determining whether the combined grouping of Study Area foreseeable projects will cause the occurrence of any of these conditions, on a cumulative basis requires consideration of whether each of these projects can be mitigated on a project by project basis. Thus far, two very large energy projects in the Study Area were able to conclude that each of the above standards had potential to occur, but could be mitigated to below a level of significance. Whether that significance level can be maintained, Study Area-wide, when multiple projects are under construction and eventually in operation, is unknown. However, as this report recommends, if minimum performance measures (described in this report) are applied to each of the projects, then none of these criteria will be found to occur at significant levels. Then, focusing on potential cumulative impacts would enable fire agencies to utilize fire mitigation agreement fees for purchase and implementation of specific measures.

8.2 San Diego County Guidelines for Determining Significance for Wildland Fire and Fire Protection

In addition to the impacts outlined in the CEQA Guidelines, the County of San Diego Guidelines for Determining Significance for Wildland Fire and Fire Protection are also addressed as they differ somewhat from the CEQA definitions and are more detailed regarding the potential impacts. Failure of private, local, or state projects to comply with any one of the following guidelines are generally considered a significant impact under CEQA related to wildland fire and fire protection as a result of project implementation, in the absence of scientific evidence to the contrary:

1. The project cannot demonstrate compliance with the following fire regulations: California Fire Code, California Code of Regulations, County Fire Code, and the County Consolidated Fire Code.
2. A comprehensive FPP has been required, and the project is inconsistent with its recommendations including fuel modification.
3. The project cannot meet the emergency response objectives identified in the Public Facilities Element of the County General Plan or offer Same Practical Effect.

The three County guidelines for significance are not directly applicable on lands not under the jurisdiction of the County (e.g., BLM, USFS, Tribal). However, projects on County lands,

including the Proposed Project will be analyzed against these thresholds and each of these thresholds is linked to the CEQA guidelines discussed above. For example:

Item 1, compliance with applicable codes, is included in impact guideline two regarding the presence of projects increasing probabilities for a wildfire. The applicable local fire codes and regulations are designed to reduce the likelihood for ignition, escape, and damage from wildfire. Analysis of potential impacts will include the level of extent the project's components meet or exceed these codes.

Item 2: Project inconsistency with an FPP required for the project is included in guidelines two and four. Project FPPs prepared for projects include recommendations that must be applied as applicant proposed mitigation measures. Where the project is not consistent with the FPP in terms of fire protection features and/or fuel modification, overall project impact level is proportionate.

Item 3: Emergency response objective consistency is incorporated within criteria three, although unmanned electrical generation facilities and transmission lines are not usually evaluated for compliance with the General Plan. The project's effect on fire suppression efforts and efficiency and potential obstructions to fire response standards with presence of the project are analyzed and impacts resulting are based on General Plan standards.

8.3 San Diego County Fire Protection Plan Determination of Project Effects

FPPs provide an evaluation of the adverse environmental effects a Proposed Project may have from wildland fire and are required in San Diego County and San Diego Rural Fire Protection District within the Study Area. FPPs must provide mitigation for identified impacts to ensure that development projects do not unnecessarily expose people or structures to a significant loss, injury or death involving wildland fires. Significance is determined by answering the following guidelines:

Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

The wildland fire risk in the Study Area and near the Proposed Project has been analyzed and it has been determined that wildfires are likely occurrences, but would not be significantly increased in frequency, duration, or size with the construction of the foreseeable projects, including the Proposed Project. The Proposed Project would include non-combustible solar array construction, operation and maintenance structures, and related infrastructure. The sites

will be largely converted from readily ignited wildland chaparral and grasslands fuels to ignition resistant facilities and equipment. The Proposed Project would not include full-time inhabitants, but would include increased human activity during construction and for ongoing Project maintenance.

The types of potential ignition sources that currently exist in the area include vehicle and roadway, electrical transmission line, and machinery associated with rural residential, amongst others. The Proposed Project, like most foreseeable solar projects, would introduce potential ignition sources, but would also include conversion of ignitable fuels to lower flammability landscape and include 24 hour surveillance, resulting in faster observation and reporting of fires. With the conversion of the site's fuels, the projects are expected to function as unintended fuel breaks that results in reduced fire spread, flame lengths and fire intensity in the direct vicinity of the project sites based on the lower fuel volume that will be maintained throughout the sites. Fires from off-site would not have continuous fuels across these sites and would therefore be expected to burn around and/or over the sites via spotting. Burning vegetation embers may land on solar facility structures, but will not result in a favorable fuel bed. Ignition resistant materials of glass, steel, aluminum and decomposed granite will provide resistance to ignitions from embers. Understory fuels will be maintained at roughly 6 inches, so ignitions in the ground cover from embers would produce a fast moving but low intensity fire through the highly compartmentalized fuel modification areas beneath the solar panels.

The Proposed Project would comply with applicable fire codes and would include a layered fire protection system designed to current codes and inclusive of site-specific performance measures that will result in a project that is less susceptible to wildfire than surrounding landscapes. Further, the facilities will provide specific measures to reduce the likelihood of fire igniting on the site from necessary maintenance operations as well as measures to aid responding firefighters to the facility through direct site safety designs and training methods. On-site personnel would be able to temporarily remain on site during a wildfire and there will be no permanent, habitable structures where people would remain overnight. Therefore, projects designed to these levels will not expose people or structures to a significant risk of loss, injury or death involving wildland fires.

Would the project result in inadequate emergency access?

Foreseeable projects and the Proposed Project are presumed to include fire access consistent with fire agency requirements. Solar facilities include roads throughout the sites, but some of the roads may not be accessible by typical fire engines due to weight ratings. Fire access on the project sites would typically be improved from current conditions, which include limited access on

dirt/gravel roads. On-site roadways for the Proposed Project are designed as looped access throughout the project and general conformance with wildland area (Title 14/County Consolidated Fire Code) road surface, width, turning radius, and vertical clearance Code requirements for emergency access. The number of fire access roads vs. service roads and the ability of and the overall need for fire engines to traverse the sites is a critical component of fire planning. Fire roads are expensive and can create a financial imbalance, but can be important for responding to panel fires or for medical rescue. Smaller, more mobile and lighter engines would be able to traverse virtually anywhere on these sites. Therefore, emergency access is considered potentially a cumulative impact for renewable energy projects.

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance service ratios, response times or other performance objectives for fire protection?

This study includes analysis of whether foreseeable projects, (particularly the Proposed Project) are projected to add call volume, extended response times, and fire service overload to Study Area fire agencies. Findings indicate that new fire stations in the Boulevard area, and likely in the Study Area are not necessary based on a very low call volume associated with solar facilities. Although no new fire stations are considered necessary, additional resources are considered likely based on the type of development and its associated needs. One such need that has been identified is for improved medical response. At some point, it will be necessary to augment existing ambulance response as the cumulative impact of calls associated with the projects and the long turn-around times will leave large gaps of time where the nearest ambulance is 30 minutes or more away. The fire engines in the Boulevard area do not currently include Paramedics, so delayed ambulance response is especially critical in the area. Another identified resource need is Captain level firefighters at volunteer stations. Full-time captains would provide stability, reliability, and increased decision making capabilities that may be necessary for various responses to foreseeable projects.

Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

Projects will need to demonstrate that sufficient water is available to serve the projects' firefighting needs. Solar projects, like the Proposed Project, require significant water for maintaining clean panels. This same water source enables piggy-backing for fire service, resulting in a reliable water supply. Typically, on-site water tanks would be provided and served

by private well with secured entitlements and resources. The project would typically enhance existing wells and provide plumbing and on-site water storage tanks. The tanks are placed throughout the site as necessary for firefighting purposes.

8.4 Summary of Potential Cumulative Impacts

Potential cumulative impacts associated with foreseeable projects in the Study Area identified by this study are:

1. Potential for increased ambulance/medic service level demand beyond the capabilities of the existing AMR ambulance.
2. Potential for wildfire ignition coinciding with extreme weather and resulting in large-scale fire potentially threatening up to 16,000 structures within the Study Area.
3. Potential for firefighting challenges related to renewable energy projects including higher risk to firefighters and need for better trained and supervised firefighters
4. Potential for firefighters to alter normal firefighting tactics to avoid damage to facility, resulting in less effective overall response

The following sections focus on performance measures that are recommended by foreseeable projects in the Study Area and potential mitigation measures for identified potential cumulative impacts in the Study Area.

9.0 INDIVIDUAL PROJECT FIRE PROTECTION PLANS AND MINIMUM RECOMMENDED PERFORMANCE MEASURES

As discussed in the previous section, the Study Area projects within SDCFA and SDRFPD will be required to include individual facility fire protection plans. The fire protection plans provide an analysis of the facilities and specific measures needed to provide a facility that is reasonably hardened from wildfire and that can be accessed for equipment related fires. Each project site is unique and requires a focused assessment of the fire risk, ability to meet codes and standards, and the need for additional measures to adequately protect the project and minimize fire hazards. Facilities that are within the Study Area but that occur on property owned by entities that are not under the jurisdiction of SD County and SDRFPD and therefore are not required to prepare a FPP should provide at least the minimum performance measures discussed in this Section to ensure that the individual facilities are starting with similar baselines in terms of mitigating direct impacts to the Study Area fire agencies. This will result in more effective cumulative impacts mitigation by the measures recommended in the next section.

The following section identifies common FPP components and brief discussions of the performance measures that must be met by all projects in order to provide mitigation of the immediate project fire impacts. Cumulative impact mitigation measures outlined in this report and other mitigations provided in specific FPPs may enable justification for deviations from the applicable standards.

The primary goals for developing the baseline performance measures are to address the identified ignition sources and risks so that the facilities start and end, from the construction phase to the final decommissioning phase in a reduced risk, planned and managed state. Among the goals developed as a direct result of the risk identification phases of this project are:

1. Prevent/minimize fires during construction, operation and decommissioning
2. Provide a safe work-site for all employees, contractors, visitors and emergency personnel
3. Prevent shock to emergency responders, workers, and unauthorized trespassers
4. Prevent arcing or sparking, which could ignite vegetation on site
5. Employ materials which will not be readily ignited by airborne burning embers or exposure to off-site wildland fires or on-site equipment fires
6. Employ materials which will not emit toxic fumes during a fire and spread off site
7. Prevent or minimize dollar loss to the equipment

8. Prevent or minimize potential for a fire starting on site to spread off site
9. Provide water, appropriate fire extinguishers and access for firefighters
10. Provide adequate signage and shut off devices to stop power feed into power lines in the event of a line failure, or fire in right of way
11. Provide the ability to report a fire or other emergency to emergency dispatch center without delay and to make contact with internet websites and company personnel

Meeting these stated goals requires completion of focused FPPs or similar fire protection planning documents. These FPPs should incorporate the following baseline performance measures for renewable energy/solar sites in the Study Area.

Performance Measures

1. **Roads: Fire Apparatus Access Roads (Fire):** fire access roads should be provided according to local fire agency requirements which typically include an all-weather surface and ability to support the imposed loads of fire apparatus. At minimum, fire access roads should be provided around the perimeter of the property and to within 150 feet of any on-site, habitable structures (O&M buildings, etc.).

   Background: The solar facility arrays are not considered buildings per CFC Section 503. They would be considered a facility, structure, and equipment per CFC Section 202 and therefore subject to access road requirements in Section 503 (20' width by 13'6" vertical clearance, etc.) Per the State Fire Marshal Bulletin IB0810, the access requirements in Title 14, Fire Safe regulations, CCR Title 14, Section 1270-1273.11 which requires 18 foot wide roads will be the minimum standard unless there is a more restrictive local requirement, which has been approved by the Board of Forestry and Fire Protection. Width of 16 feet would be the minimum needed to operate a typical fire engine within 300 feet of panels. Fire authority may provide exceptions if appropriate mitigations are provided that result in equivalent fire protection.

   a. **Fire Driveways**: Fire driveways occur throughout the solar arrays and provide fire apparatus access (50,000 pound load, drivable surface) to within 300 feet of all site appliances (panels, inverters, and other features), as possible. Therefore, spacing between fire driveways can be 600 feet, allowing 300 foot hose pulls from each driveway.

   b. **Service Roads:** Graded hard-packed service roads for cleaning and maintaining panels. Service roads will be capable of supporting typical maintenance vehicles

and some types of fire apparatus. Service roads would be clearly marked to indicate that they will not support imposed loads of 50,000 pounds, as appropriate. Surfaces would be required to be maintained with a soil binder to prevent undrivable conditions over time.

c. **Secondary Access:** Because these projects will typically include few on-site personnel during daylight hours, the need for secondary access, which is designed to enable responding fire engine access and citizen egress during an emergency is not entirely applicable. At least one additional access should be provided to the site, even if it is not remote from the primary access.

d. **Deadends:** Road distance thresholds specified under Section 503.1.3 of the Consolidated Fire Code restrict maximum dead end road lengths for varying parcel size. Solar projects may include one inhabitable structure on site (O&M building), few staff, and no overnight staff. Dead end road lengths are intended to provide for evacuation of citizens/residents and safe access by fire agencies. Long dead end roads should be provided with appropriately spaced turn-arounds or provided equivalent mitigation.

e. **Vertical clearance:** Minimum vertical clearance of 13 feet 6 inches shall be provided throughout the project sites unless the fire agency determines it is not required due to provided mitigations. This vertical clearance can be provided via a solar panel safe mode that will move it to a vertical or horizontal position.

f. **Grade:** Road grades will not exceed 10%, complying with the Consolidated Fire Code.

g. **Surface:** All internal fire access road surfaces will be considered "all-weather" and capable of supporting the imposed load of responding firefighting and emergency apparatus (50,000 pound minimum).

h. **Gates/Fences:** Gates will be in compliance with Section 503.5 and 503.6 of the CCFC and to the satisfaction of the Director of Public Works. The facilities will be completely fenced with a chain link and barbed wire fence. Knox padlocks will be provided on all gates.

i. **Identification:** Identification of roads and structures will comply with CCFC, Section 505. Additionally, an illuminated sign at the Project entrance will be provided that clearly indicates inverter and electrical grid layout, panel "safe" mode switch location and entire site de-energizing disconnect switch identification and location. Illumination will be on a motion sensor to avoid lighting all night, every night and include reflective lettering and positioning such that vehicle headlights can adequately illuminate the sign.

2. **Water:** Typical water usage will include panel washing, dust suppression (soil binding agent road applications), and O&M building personnel usage. FPPs will provide an accounting of all site water needs and calculations for fire suppression needs according to Section 507.2.2 of the San Diego CCFC. On-site water tanks shall comply with NFPA 22, Private Fire Protection Water Tanks. The water capacity of each tank shall be a minimum of 10,000 gallons which is the maximum required by the CCFC standard. Final location of the tanks and the total number of gallons will be approved by the FAHJ based on a tank location drawing to be submitted by the Project applicant.

3. **Ignition-Resistant Construction and Fire Protection Systems:** Operations & Maintenance Buildings: On-site structures such as Operations and Maintenance Buildings or other buildings that will include regular human inhabitance along with inverter structures, water tanks, and substation control rooms will be of non-combustible construction or will comply with the ignition-resistive construction requirements: Wildland-Urban Interface areas of Chapter 7A of the County Building Code. The O&M facilities or office buildings, if proposed will include an automatic interior sprinkler system. Fire Sprinkler system may require supervision by an off-site 24/7 alarm monitoring company. Computer control rooms and electrical equipment rooms may require clean agent fire suppression systems rather than fire sprinklers due to potential water damage. .

   In addition, ignition resistance solar panel components are recommended, and include:

   a. Wiring, harnesses and junction boxes designed so as to not ignite and arc or spark thereby causing potential ignition source for vegetation.

   b. Electrical wiring to be listed for outdoors/exterior and be fire retardant.

   c. Insulation materials (sealants) on panels to be noncombustible.

   d. Electrical motors to be of a type that is sealed and does not emit sparks.

   e. Provide Arc-Flash protection.

   f. Exposed electrical wiring to be in proper weather resistant conduit to help resist fire exposure, arcing and sparking, etc.

   g. Waterproof electrical enclosures.

   h. No plastic components or cases on panels.

   Substations: Substation control rooms will be of non-combustible construction. Substation and panel transformers will utilize fire walls for exposure protection and will have secondary containment to control any oil that could be released. The size of the containment must be adequate to contain the total amount of oil plus firefighting

water for 15 minutes. Firefighting foam concentrate will be stored at the O&M building for use by firefighters.

As an additional fire protection measure, portable carbon dioxide (CO2) fire extinguishers will be mounted at the inverter enclosures and medium voltage transformer units throughout the site as well as near generators and including appropriate fire protection, shut-offs, spill control (if diesel).

4. **Defensible Space and Vegetation Management:** Project's will provide defensible space by setting back all equipment and buildings a minimum 50-feet from property boundaries and modifying the natural fuels by removing and replacing the landscape plantings with a mix of low growing ground cover plants or, in the case of perimeter areas, drivable surfaces. Where fire behavior modeling indicates lower flame lengths and fire intensity, perimeter setbacks reductions may be proposed. Project structures, including O&M Buildings, inverter structures control rooms and substation sites will include minimum 100 feet wide Fuel Management Zones in all directions. Roadway Fuel Modification of 30 feet on either side will be provided and maintained along the site's access road.

   Combustible vegetation within the Project area shall be reduced to a height of no more than 6 inches. Plant species must be from acceptable fuel modification plant lists and must not include plants known to be highly flammable.

   Defensible Space will be maintained on at least an annual basis or more often, as needed, by the applicant or current Project owner. Planting used in the defensible space will consist of low-growing ground cover selected from the SDCFA desirable plant list. The planting list and spacing will be reviewed and approved by the SDCFA Fire Marshal and included on submitted Landscape Plans.

   Disturbed areas will be revegetated with a native plant mix suitable to the area to avoid establishment of non-native species, particularly grasses that create a readily ignitable landscape and can ultimately result in increased fire potential.

Special fuel management areas will include clearance of all vegetation, placement of landscape fabric to inhibit the growth of vegetation, then topped with a rock material. The amount of special fuel management area provided varies with the application, as follows:

1. **Tracker Pole Base** – a 36-inch circular area around the base of tracker poles will be provided with special fuel management.

2. **Inverters** – where inverters are not positioned along an internal fire access road or driveway, they will be provided with a 10 feet wide special fuel management area on all sides

3. **Perimeter area outside fence** – an 18 feet wide area outside the perimeter fence will be cleared and provided with landscape fabric and topped with rock material.

   In some perimeter locations where perimeter fire access cannot be provided to within 300 feet from the outermost row of trackers (primarily based on road layout constraints on odd shaped sites and environmental constraints), the perimeter special fuel management area will be extended from the perimeter fence to the fire roadway. There are no specific areas on Tierra del Sol where this occurs based on the conceptual plan.

4. **Staff and Firefighter Training –** Studies (Grant 2010 and others) evaluated what measures provide the best results for improving response capabilities and firefighter safety. Among the types of measures that provide the most benefit are firefighter training, proper labeling, firefighter familiarizing, and extreme caution during fire response. On-site staff will be trained for basic first aid and AED operation. Basic firefighting training will also be provided to on-site staff. A training program for local fire agencies including preparation of a facility-specific technical training video that can be easily viewed by new firefighters will be provided for each facility and will include at least annual visits by the local firefighters for on-site familiarity.

5. **Remote Monitoring –** Remote monitoring of the facility and its system features should be incorporated into the facility design. For example, the supervisory control and data acquisition (SCADA) system utilized by the Proposed Project will provide notification to technical staff of system faults or potential issues.

6. **Technical Report –** Fire Safety Technical Reports, provided by the applicant, indicating the primary risks and methods for responding firefighters to most effectively respond to site fires and other emergencies.

7. **Technical Staff Contact –** System contact information with local fire agencies/stations to assist responding firefighters during an emergency.

8. **Construction Fire Prevention Plan –** A construction fire prevention plan will be provided that effectively identifies and mitigates potential ignition sources during construction and directs construction practices and restrictions, such as during Red Flag Warning weather.

9. **On-Site Water –** Fire Protection Water tanks placed around perimeter of facility. Individual tank capacity to be at least 10,000 gallons. Tank to be steel and fittings and

connections shall comply with the Consolidated Fire Code and NFPA 22. The total water capacity on site should be such as to allow firefighters to apply a total of 550 GPM for 60 Minutes (minimum 33,000 gallons) from hand held hose lines, or a firewater monitor supplied from fire trucks and to supply fire sprinkler systems.

10. **Extinguishers –** Portable carbon dioxide (CO_2) fire extinguishers mounted at the inverters and medium voltage transformer units; larger volume, wheeled CO^2 extinguishers at each facility
11. **Signage Kiosk –** Illuminated signage at entrance with inverter and electrical grid disconnect and isolation information and identification. Signs should be illuminated via a motion sensor and include reflective lettering/symbols that can be illuminated by a vehicle's headlights.
12. **Firefighter Control of Panel Position –** Ability of first responders to put tracking panels into the horizontal stow "safe" position by flipping a switch/switches (located at the main gate near the directory), which will provide the greatest clearance from ground level to the tracker assembly of a minimum of 13' 6" overhead clearance. Back-up power will be provided to ensure this feature works when needed. Ability to place the tracking panels in the vertical position to enable unimpeded site access on fire access roads.
13. **Firefighter Control of Panel Power –** Ability of first responders to de-energize the entire site from one location.
14. **Funded and Enforced Maintenance –** Committed on-going maintenance of all facility components to fire safe levels for the life of the project.
15. **Site Labeling for Firefighter Safety –** Consistent placarding and labeling of all components for fire safety/response
16. **Funding Fire Mitigation Measures –** Vehicle for funding including Fire Service Agreement(s) or CFD/CSA or similar funding entities for funding firefighting resources that can be pooled on a fair-share basis for implementing Study Area wide cumulative impact mitigation measures.

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10.0 RECOMMENDED CUMULATIVE IMPACT MITIGATION MEASURES

Based on the fire agency capabilities analysis outlined in this report, which has considered the southeastern San Diego County unique response area, land uses, call volume, station distribution and concentration, automatic aid, budgets and speed and weight of response, the authors of this report have developed recommended measures to address the potential cumulative impact from building the Proposed Project and foreseeable projects. The Proposed Project's contributions to fire resources through one-time and/or annual mitigation fees determined through a project-specific development agreement, combined with the proportional contributions from foreseeable project's in the service area are expected to result in fair share funding that can be used for enhancing Study Area emergency response capabilities and enhancing firefighting and emergency response for the area's residents and visitors. The Study Area wide enhanced capabilities, available apparatus, staffing, and firefighting resources will be available to all existing area residents, not just the foreseeable projects. Over the long term, with the implementation of fire agency priority measures from measures identified herein, it is anticipated that Study Area fire agencies will be able to perform their mission into the future at levels that exceed current standards.

The following mitigation measures are the result of Study Area and foreseeable project analysis and are provided as considerations by the fire agencies charged with responding to emergencies at existing and proposed Study Area projects. Potential measures that are included in the list below are considered to directly offset or mitigate one or more of the potential cumulative impacts. The selection, acquisition and implementation of appropriate and desired measures will ultimately be the Study Area's fire agencies' responsibility. Fire agencies typically have a solid understanding of the resources they have and need for responding to evolving service area needs. This study, and the measures that follow are presented as a method for focusing in on the most impactful use of available funds.

It should be noted that the following measures will complement and in some cases, augment the redundancy of the fire protection systems that has been painstakingly assembled in San Diego County and the Study Area. Determining which mitigating measures should be presented herein for consideration was not completed in a vacuum, absent of the county-wide, regional and Study Area fire protection situation. Likewise, deciding which of the measures should be selected for implementation cannot be made without considering the layered system of fire protection that has resulted in San Diego County's nation leading status. For example, the following list highlights some of the accomplishments since the

2003 and 2007 fires that have been direct mitigations of known weaknesses in the system and that result in a robust capability:

1. CAL FIRE agreement for year-round fire protection in San Diego backcountry, including the Study Area
2. Creation of the SDCFA for consolidation of fire and life safety services in unincorporated areas
3. Purchase additional fire apparatus and equipment (over 30 engines and water tenders)
4. Military disaster support including aerial firefighting capabilities
5. Purchase two firefighting/rescue helicopters and arrange for CAL FIRE crews to operate
6. Expanded and re-equipped a state of the art emergency operations center
7. Conduct damage assessments after each wildfire – has led to important fire and building code changes that have proven to save structures
8. Increased CAL FIRE presence, coordination between SDCFA, co-location of CAL FIRE/USFS air attack base
9. Created a consolidated county fire code that has been certified by the Board of Forestry
10. Created a combustible vegetation ordinance requiring 100 feet of defensible space around homes
11. Created the guidelines for determining significance to spell out exactly what measures are needed to make projects as fire-safe as possible
12. Require Fire Protection Plans for all discretionary projects to assess fire safety and provide recommendations to make projects as fire-safe as possible
13. Removed over 500,000 dead, dying and diseased trees along important evacuation routes
14. Completed a multi-hazard, county-wide evaluation and evacuation plan
15. Prepared a county vegetation management plan indicating ways to manage vegetation
16. CAL FIRE increased staffing to four firefighters per engine, including in the Study Area
17. Invested in major communications upgrades to improve interagency communications
18. Combined the County's code-enforcement abatement power with fire agencies' brush-clearance authority. The continuing program conducts 12,000 inspections a year. Roughly 90% of residents comply and clear brush after the first notification

19. Invested in Reverse 911 and a digital AlertSanDiego system to provide fast, reliable, mass-notification of residents of emergency situations and evacuations
20. Conducted numerous public outreach campaigns focused on fire safe landscaping and steps to protect homes
21. Forest Area Safety Taskforce identified 9 areas of the county with fuel loading issues and developed hazard reduction projects
22. Interactive Web site providing citizens with directions on what to do prior to, during and following a wildfire
23. Full-scale exercise programs to improve the region's state of readiness
24. To date, there are in excess of 40 Fire Safe Councils throughout the county that focus on identifying hazardous areas and designating hazard reduction projects with the assistance of federal funding

10.1 Study Area Recommended Mitigating Measures

The following measures are presented for consideration by the Study Area fire agencies. These measures are intended to provide guidance, reference, and justification for future expenditures on fire protection enhancements. This list is not exhaustive, does not include descriptions of all potential mitigations, and should be updated as new technologies are developed. This list does include the primary measures identified for directly responding to potential cumulative impacts from foreseeable projects. Implementation of these measures, over time as funding becomes available, will result in mitigation of cumulative impacts and enhancement of the already robust, redundant layering of fire protection provided to projects in San Diego County. Solar facilities like the Proposed Project will be, bar none, the most fire protected and planned solar facilities in the world.

HIGH PRIORITY MEASURES (Consider Implementing With Initial Study Area Projects)

Measure 1) Require all projects to meet or exceed minimum performance measures provided herein and included in a Fire Protection Plan or similar document which will provide for mitigation of project-level fire risk. This measure provides a template for basic fire protection features that are recommended for new projects, particularly renewable energy projects in the Study Area. Not all projects are required to prepare FPPs, but these plans are the baseline documents that document site fire risk and the first-line measures that are provided by the project to ensure a fire-hardened facility. Agencies that do not require FPPs should consider this type of document for any project within the Study Area's wildfire corridor.

Measure 2) Provide Type VI engines for use by Study Area Fire Agencies. Type VI engines utilize a ¾ or 1-ton, 4x4 pickup chassis and include a skid-mounted pump in the bed along with other equipment needed to respond to various emergencies. These engines, due to their size, can quickly respond to the Study Area projects, including Solar Facilities and navigate all on-site roads. A potential cumulative impact associated with some foreseeable projects, particularly solar energy facilities is that roadways can be provided on the project sites that enable fire engine access, but that building roads that meet current code requirements is cost prohibitive and based on the composition of new technology solar panels, may not be critical. Additionally, each panel requires routine cleaning and maintenance so drivable surfaces are provided throughout the solar projects, but building them to support a 50,000 or 75,000 pound fire engine is financially infeasible. Type VI engines would be able to drive virtually anywhere on these sites and could be equipped with renewable energy facility-specific firefighting and emergency medical equipment. This measure conceptually proposed that the Proposed Project provide fair share funding for up to two Type VI engines, one at the Boulevard Fire Station and a reserve at another nearby fire station, to be determined. Additional projects within the Study Area could provide fair share funding additional engines, as necessary for response to various portions of the Study Area. These units would also benefit existing residents as they bolster the existing fire response system with a fast attack resource.

Measure 3) Fund paramedic assessment engines at San Diego Rural Fire Protection District's Lake Morena and Pine Valleys Fire Stations. Upgrade the engineer position to a medic. SDRFPD's Lake Morena Fire Station currently includes full time captain and engineer positions and one volunteer firefighter. This measure would assist the Study Area's emergency medical response capabilities by providing two full-time paramedics, providing for advanced life support in a Study Area central and western location. This measure provides additional advanced life support capabilities that will benefit existing residents as well as foreseeable projects.

Measure 4) Fair share annual funding toward a Study Area (southeastern San Diego County) hazard reduction grant program, administered by San Diego County Fire Authority for the sole purpose of assisting residents in need with defensible space and/or structural hardening based on County inspector recommendations and in coordination with the WRAP. Recent fire mitigation for energy facilities in the Study Area included annual fair share funding for a SDCFA inspector to enforce defensible space requirements on private properties. Prior to this funding, inspections were not conducted on a regular basis due to staffing issues. The County indicates that some 90% of property owners provide defensible space after the first notice. The remaining 10% (which throughout the Study Area may include some 1,600

homeowners) cannot afford to hire brush clearing activities and/or cannot physically perform the work. Therefore, this measure would directly respond to the potential cumulative impact of increased ignition sources from foreseeable projects by providing a fair share funding source for homeowners determined to be unable to provide defensible space. Weed abatement would be provided and paid for, reducing the vulnerability of these structures to wildfire damage. Additionally, as funds are available each year, the most vulnerable residences could be fitted with important hardening devices including roofs, ember-resistant vents, siding, windows, or other exterior, ignition resistant features that would result in a reduction in likelihood of ignition.

Measure 5) Project funded basic medical training for all renewable energy facility employees. Training is to be provided by a company acceptable to the Fire Agencies and proof of completion to be provided to Fire Agencies each year. All site staff will be trained to the basic life support level with one on-site employee trained to EMT-1 level. All staff will be trained in CPR and operation of AED. Approved first aid equipment and AED are to be provided at each site in the Operations & Maintenance Buildings or similar, approved location. This measure directly responds to the Study Area's slower response times for ambulance service. Regardless of the other measures that are employed to help improve medical emergency response, it will be unlikely that response times will be able to meet nationally recognized standards, which are based on the critical time frames necessary for successful outcomes to major medical emergencies. Therefore, training site staff to provide initial basic life support is an important component of the emergency response system.

Measure 6) Provide solar facility incident response data collection procedures and include the data within the response types so that solar emergencies can be more accurately tracked over time. The growing number of solar farm projects throughout California, but especially in San Diego County, will demand that improved data collection procedures are adopted in the near future in order to clarify what fires were caused by solar equipment and whether it was rooftop solar, stand-alone panels, or some other configuration. It is recommended that San Diego County Fire Chiefs begin this type of detailed data collection within their respective jurisdictions so that it can be share with the national tracking organizations. No funding is anticipated to be needed for this effort, but Study Area energy projects will cooperate and provide incident data, as requested.

MODERATE PRIORITY MEASURES (Consider Implementing as Critical Mass of Projects Dictates)

Measure 1) Provide fair-share funding for full-time, career firefighter position (Captain) at Study Area volunteer stations currently staffed by two volunteer firefighters. As a direct

mitigation of potential cumulative impacts associated with the need for experienced firefighters with the ability to make field decisions and supervise volunteer firefighters, this measure should eventually occur in each of the southeast San Diego County fire agency stations (18 total) that are currently staffed by stipend volunteers. The Fire Station captain positions could be funded by nearest projects through fair-share funding. As such, the Proposed Project would fund the position for the Boulevard Fire Station and for the Jacumba Fire Station, over time based on development triggers. The position could start out as a "super-captain" initially (mobile captain called a Captain II) visiting each area Station on a 40-hour work week providing supervision and training to those crews and responding to emergencies with a Type VI unit, to provide initial Incident Command until arrival of a Battalion Chief), evolving to a full-time, career position with three captains to cover shifts. Regionally, developing projects fund super-captains until project mass generates funding for career positions.

Measure 2) Provide fair share funding toward implementation of the County's Wildfire Risk Assessment Program (WRAP) publicly available Web interface. This important fire risk tool enables fire planners the ability to prioritize, plan and address fire hazards throughout the County. Fair share funding of the implementation of a publicly accessible component of this tool would greatly assist the greater Boulevard and Study Area with pre-planning, fire prevention, preparation and ongoing maintenance and fire suppression efforts. As indicated by SDCFA, the advanced version of this WRAP program is complete and useable by SDCFA. The tool is not available to the public and funding to take it to that level is not secured. This measure would enable public roll out of this planning tool, which is anticipated to have a positive effect on public education and preparation throughout San Diego County, and within the Study Area. This measure directly responds to the potential cumulative impacts of increased ignition sources and potential wildfires.

LOW PRIORITY MEASURES (Consider Implementing When Available Funding Enables, As Applicable)

Measure 1) Provide fair share funding for a mobile training facility that can be moved from station to station, agency to agency or, provide location or fair share funding for a permanent facility including a training center and electrical infrastructure props for firefighter training. As indicated in the Citygate report (2010), the east county does not include a training facility. Constructing a training facility in the Study Area may be possible, but would require travel at great distances for outlying fire departments. A mobile training facility (trailer) would enable training to occur where it is most cost-effective and could include on-project training days to further heighten familiarity of firefighters with the various project types,

especially renewable energy, within their response area. Potential cumulative impacts associated with altered attack strategies based on the presence of energized facilities would be directly addressed through a more robust training capability within the Study Area and benefitting all east county fire agencies.

Measure 2) Fair share funding for Life Flight Helicopter to help ensure its continued operation and reliable availability to the Study Area. Funding would be on a fair-share basis, as budget needs are identified. The Life Flight helicopter is critical to providing emergency medical service to the Study Area. Distances to hospitals from the Study area are considerable. The slower emergency response realized throughout the Study Area coupled with a long ground transport period combine to create an undesirable situation. Life Flight transportation can reduce the transport time by half or more, a period of time that is expected to result in saved lives.

Measure 3) Fair share funding of an augmented AMR contract to include a second ambulance that remains in the Boulevard area. The cumulative impacts analysis indicates that there is currently a relatively slow medical emergency response in the remote portions of the Study Area and that many of the foreseeable projects, including the Proposed Project, would be subject to delayed ALS service. Additionally, with increased populations in the Study Area, the expected delays may be increased, resulting in service decline. This measure provides for a second contracted ambulance in the Boulevard Area to be provided at a trigger point where multiple queuing or stacked calls related to call volume approach unacceptable levels. The addition of a second ambulance would provide a public benefit throughout the Study Area.

Measure 4) Fair share funding toward a regional solution to the varying water capacities that can be achieved from the wells and water sources in the Study Area. This measure would fund a study and implementation of a strategic firefighting water tank distribution throughout the Study Area based on regional need and advantageous local. Project applicants in the Study Area would work with SDCFA, CALFIRE, and SDRFPD for strategic locations of water storage tanks (including open topped tanks for helicopter use) to help firefighting capabilities in the region. Tanks may be located on foreseeable project sites or if a critical need is identified, located off project sites where water is anticipated to provide the most benefit. This measure directly responds to the potential cumulative impact associated with increased ignition sources, but also would help the fire service with its initial wildfire attack, which currently, due to the Study Area's large size and lack of roads, can result in long response times.

Measure 5) Provide a helipad with a dip tank for firefighter use at a protected location on one or more of the foreseeable projects, including the Proposed Project sites or at the future

co-location site of the Boulevard Fire Department/CAL FIRE Whitestar site in Boulevard. The longer wildfire response times throughout the Study Area and light "weight" of the initial response to these wildfire ignitions is aided by aircraft as successfully demonstrated in the recent Shockey wildland fire in the area. A helipad within the Study Areas would provide for temporary staging of a helicopter within the Study Area during Red Flag Warning conditions, resulting in the potential for quick aerial assistance at extinguishing ignitions during these periods when most of the acreage historically burns.

Measure 6) Provide strategically located heat/ detecting devices at each facility for early detection of wildfires. Due to the long response times in the Study Area, early identification of fire starts is one method to help increase response efficiency. There are several detection technologies available and in research stages. As these detectors are available, locating them in the remote portions of the Study Area, on towers, poles, or other project equipment, the ability to detect and respond to small ignitions quickly will assist in containment of these fires before they can gain momentum and size to become major events. This measure responds directly to the potential for increased ignitions associated with foreseeable projects in the Study Area.

Measure 7) Cooperation with local cell phone and internet providers, as possible, to enhance the area's communications reliability, which will improve firefighter training and communications as well as residents' ability to report emergencies and receive notifications regarding emergencies. Project applicants can cooperate with and fair share funding may be used, in part, to fund any necessary improvement of local emergency communications, wireless service, interoperability, and internet access, and the ability to notify 911 and be notified via reverse 911, via cell phone, text, or other alert. This measure would be focused on improving wireless communications throughout the Study Area which is currently spotty. There are numerous advantages to wireless coverage including the ability of firefighters to send and receive data prior to and during a wildland fire for better situational awareness and safety.

Measure 8) Provide fair share funding toward reserve fire apparatus and equipment. Reserve equipment directly responds to the type of wildfires that result in 90% of the acres burned. Fires occurring during extreme weather (Red Flag Warning periods) are far more likely to become uncontrollable fire storms. Fast attack with the appropriate weight of attack is crucially important for keeping these fires from exponential spread in the fuel bed. Reserve engines and equipment would enable quick call-up of off-duty fire personnel (which represent 2/3 of the total 900+ career firefighters on-duty every day in San Diego County). Reserve apparatus needs in the Study Area would need to be provided by fire agencies.

11.0 ESTIMATED IMPLEMENTATION FUNDING

Funding for fire service augmentation will be provided through a multi-layered approach that will result in a considerable amount of funding that is specifically targeted at mitigating the anticipated impacts from the type of facilities proposed. The multi-layered approach includes: Fire Service Agreement or CSA funding, project-specific contributions related to Fire Protection Plan requirements, cumulative impact analysis measures, as described below

1. **Fire Protection Plans** – each fire protection plan indicates performance measures that must be implemented in order to mitigate direct impacts of the project on the fire response system. Fire protection plans can include a variety of measures including construction, access, water availability, fuel modification, and other site-specific measures needed to provide a low risk, fire hardened site.
2. **Fire Service Agreement or CSA** – these funding entities provide for fire service enhancements over time by accumulating funds on a one-time or annual, fair share basis. As more projects are developed and pay into the fund, the fire protection resources can be augmented to match the growing population and growing number of potential call generators. A fire service agreement would be entered into between the project applicant and the fire agencies. Final details of the funding from each project in the Study Area are determined through negotiations of the fire service agreement.
3. **Cumulative Impact Mitigation** – This report includes a number of mitigation measures that would work together as a system to address potential cumulative impacts from development of foreseeable projects in the Study Area. The intent of this study is for the applicant and fire agencies to base fire service agreement negotiations on identified resource enhancements and utilize provided contributions toward acquisition of the final priority measures.

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12.0 CONCLUSION

The recommendations provided in this Soitec Solar Portfolio Project Emergency Services Capabilities Assessment and Cumulative Impact Mitigation Study are the result of an analysis of the existing Study Area and regional emergency response system and how the foreseeable projects, but primarily the large renewable energy projects in the region may impact the fire service and its ability to provide service to existing residents and to the new land uses.

This document provides background information on the solar projects and how they differ from typical rural development with regards to fire risk and fire protection needs. This document analyzes the effects of the Proposed Project and foreseeable projects in the Study Area on local fire service operations and integrated risk management planning and how analysis of associated risk can be mitigated to result in enhanced fire service and response. This plan is not intended to be a stand-alone document, but to be used in conjunction with Study Area fire agency strategic planning documents to determine the best use of the available funding for servicing the cumulative activity increase in southeastern San Diego County while not impacting existing service levels and where possible, improving overall capabilities. While this study provides an overview of risk assessment, deployment of resources, analysis of current and projected performance, and potential mitigating measures that are targeted to compensating for anticipated impacts, the fire agency strategic planning documents detail the resources needed to address current deficiencies and future service demands. Thus, the recommendations provided in this study are intended for fire agency consideration and for assisting the project applicants and the fire agencies during negotiations of fire mitigation funding agreements.

This report is based on available data and information provided from publicly available resources, personal interviews, and reconnaissance of the Study Area. Assumptions have been made in order to complete this analysis and the accuracy of those assumptions is based on the available information. This report provides recommended options for cumulative impact mitigation, but is not intended to be considered the only potential options to accomplish the stated goal of servicing the Solar Projects while minimizing impacts to the existing fire service system.

Ultimately, it is the intent of this Study to guide, through a layered system of code and mitigation requirements, the construction of renewable energy projects that are defensible from wildfire, are accessible for emergency medical and equipment fire response, and, in turn, do not represent significant threat of ignition source for the adjacent native habitat. It must be noted that during extreme fire conditions, there are no guarantees that a given structure will not

burn. Precautions and mitigating actions identified in this report are designed to reduce the likelihood that fire would impinge upon the Proposed Projects. There are no guarantees that fire will not occur in the area or that fire will not damage property or cause harm to persons or their property. Implementation of the required enhanced fire protection features provided by the applicable codes and the mitigating requirements provided in this report will accomplish the goal of assisting firefighters and medical responders in their efforts to protect human life and defend public resources and private assets.

13.0 LIST OF PREPARERS

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APPENDIX A

Study Area Foreseeable Projects

APPENDIX A
Study Area Forseeable Projects

Study Area Foreseeable Projects

Project	Project No.	Project Type	Project Location	Status	Map ID
Wind Energy Projects					
ENERGIA SIERRA JUAREZ WIND PROJECT I: Development of 400 MW of wind generation. Phase I (just north of the town of La Rumorosa) is proposed to generate approximately 100 MW of energy with 45 to 52 turbines. Point of interconnection proposed with the ECO Substation.	N/A	Public Facilities and Utilities (Wind)	Northern Baja California, Mexico, in the Sierra Juárez mountains north of the town of La Rumorosa	Final Interconnection Study completed. Draft Interconnection Agreement (IA) provided for review. (Queue No. 159a). The project would be built in multiple phases. Construction anticipated to be completed in 2014.	1
ENERGIA SIERRA JUAREZ WIND PROJECT II: Development of 300 MW of wind generation. Point of interconnection proposed with the ECO Substation.	N/A	Public Facilities and Utilities (Wind)	Northern Baja California, Mexico, in the Sierra Juárez mountains	Project schedule unknown.	—
ENERGIA SIERRA JUAREZ WIND PROJECT III: Development of 420 MW of wind generation. Point of interconnection proposed with the ECO Substation.	N/A	Public Facilities and Utilities (Wind)	Northern Baja California, Mexico, in the Sierra Juárez mountains	Project schedule unknown.	—
TULE WIND FARM, GENERAL PLAN AMENDMENT, 11-001: 12,239 acres of public lands, 186 MW; 128 wind turbines. The project would deliver power through the project substation by a 138 kV transmission line to run south to an interconnection with the proposed SDG&E Rebuilt Boulevard Substation.	3300-09-019	Public Facilities and Utilities (Wind)	Mountain Empire; North of I-8, Hwy 94, and Old Hwy 80	BLM approved December 19, 2011; County Board of Supervisors approved August 8, 2012. BLM Geotechnical Investigation notice to proceed issued September 17, 2012.	2
EGP JEWEL VALLEY – Wind and Solar Energy Facilities: Meteorological (MET) facilities have been approved that include erection of two Tilt-Up towers (A-1 and C-1) that would include the placement of three SoDAR (Sonic Detection and Ranging) units (A-2, B-2, and C-2).	3000-10-051 3000-10-052 3000-10-053	Public Facilities and Utilities (Wind)	1874/1888 Jewel Valley Road, Boulevard; South of Hwy 94 and Old Hwy 80	MET Facilities approved in June 2011.	3
MANZANITA WIND ENERGY PROJECT: Project of up to 57.5 MW, which could include up to 25 wind turbines. These wind turbines are proposed to be located on the same ridgeline as the existing Kumeyaay Wind facility. Turbines are	N/A	Wind Farm	Manzanita Band of Mission Indians Reservation, southeastern San	Pending	4

Study Area Foreseeable Projects

Project	Project No.	Project Type	Project Location	Status	Map ID
proposed to be approximately 414 feet tall from ground to tip of the turbine blade fully extended. The Manzanita Wind project would connect with the Rebuilt Boulevard Substation component of the ECO Substation Project.			Diego County		
DEBENHAM ENERGY, CACA 0504855: Wind testing site. 2,169 acres.	N/A	Public Facilities and Utilities (Wind Measurement Testing)	West of the community of Boulevard, south of I-8 in southeastern San Diego County	Wind testing stage (Type II)	5
NATIONAL QUARRIES, CACA 050635: Wind testing site. 4,435 acres.	N/A	Public Facilities and Utilities (Wind)	North of I-8, east of Sunrise Highway in southeastern San Diego County	Memorandum of Understanding signed. Application complete April 22, 2009, Wind testing stage (Type II).	6
OCOTILLO EXPRESS LLC, CACA 051552: Development of 562 MW on 14,691 acres in two phases.	N/A	Public Facilities and Utilities (Wind)	North and south of I-8 in southwestern Imperial County	A Plan of Development (POD) prepared in September 2009. The project is currently in the wind testing stage (Type II) under CACA 047518 and CACA 050916 (MAP ID items 9 and 10). Notice to Proceed June 27, 2012. Phase I completed and constructed in 2012.	7
RENEWERGY LLC, CACA 048004: Wind testing site; 3,912 acres.	N/A	Public Facilities and Utilities (Wind)	North of I-8 in southwestern Imperial County	MET Tower Environmental Assessment nearing completion. Pending Native American consultation. Cultural literature started. Wind testing stage (Type II).	8
WIND MEASUREMENT TOWERS: The Descanso Ranger District proposes to authorize temporary wind measurement towers. The towers would be approximately 160 feet high and testing would be 3 years or less in duration.	N/A	Public Facilities and Utilities (Wind Measurement Testing)	Cleveland National Forest. Descanso Ranger District. San Diego County. North side of I-8, LEGAL - T 16 S, R 5 E, Sections 1, 2, and 13.	USFS issued a permit in February 2010 for three towers in the area of La Posta Valley and Fred Canyon Road.	9
A. BRUCCI LLC ADMINISTRATIVE PERMIT AG CLEARING, AD 10-035	3000-10-023	Agricultural clearing for MET Tower	3055 La Posta Circle, Pine Valley	Approved November 16, 2010.	10

Study Area Foreseeable Projects

Project	Project No.	Project Type	Project Location	Status	Map ID
Transmission and Other Energy Projects					
ENERGIA SIERRA JUAREZ U.S. TRANSMISSION, MUP: Power lines leading to SDG&E ECO Substation near the Mexican border.	3300-09-008	Transmission Line	Near SDG&E ECO Substation	Approved by County Board of Supervisors August 8, 2012.	11
ECO SUBSTATION: ECO Substation, Rebuilt Boulevard Substation, and 13.3-mile 138 kV line between Rebuilt Boulevard Substation and ECO Substation.	N/A	Substation and Transmission Lines		Notice to proceed for geotechnical activities and construction issued February 1, 2013.	12
SDG&E MASTER SPECIAL USE PERMIT: SDG&E is proposing to combine over 70 existing special use permits for SDG&E electric facilities into one Master Special Use Permit to be issued by the USFS.	N/A	Public Facilities and Utilities	Cleveland National Forest	In Progress.	13
Solar Energy Projects					
IMPERIAL VALLEY SOLAR - SOLAR TWO, CACA 047740: Development of up to 750 MW of energy on 6,140 acres of BLM-administered public lands and on 360 acres of private lands.	N/A	Public Facilities and Utilities (Solar)	North of I-8 in southwestern Imperial County	Application for Certification filed with California Energy Commission June 30, 2008. Application for Certification/POD determined adequate under minimal criteria. Notice of Intent published October 17, 2008. The Final EIS published July 2010.	14
SILVERADO POWER, Major Pre-application 11-009: The proposed project is a 58 MW photovoltaic /solar generation plant that would span approximately 350 acres of the 734-acre site. The proposed tie-line to the existing SDG&E Barrett-Vameron Transmission Line would be composed of three overhead conductor lines on 55-foot-high wood poles. The tie line would be approximately 0.25 mile long. The electricity generated would be delivered to the regional distribution network. The facility would be remotely monitored and controlled. Construction would consist of trenching for the underground electrical conduits, installation of foundations for the photovoltaic mounts, electrical inverters, transformers and gear, and internal access. The project may also require construction of a substation.	3992-11-009	Public Facilities and Utilities (Solar)	602-170-02 604-050-01 604-090-01	Pre-application meeting was held on July 19, 2011. County reviewed redesign of solar project on November 15, 2011. Pending.	15

Study Area Foreseeable Projects

Project	Project No.	Project Type	Project Location	Status	Map ID
JACUMBA SOLAR FARM, MAJOR PRE-APP 11-023	3992-11-023	Public Facilities and Utilities (Solar)	661-041-02,-03; 661-080-01,-04,-08	Pre-application meeting was held on January 12, 2012.	16
Development Projects (Federal)					
GOLDEN ACORN CASINO AND TRAVEL CENTER, SCH No. 2007071097: 33-acre expansion consisting of 150-room hotel, 900-space parking garage, surface parking, RV park, casino expansion, bowling alley, arcade, offices, retail, restaurants/food service, wind turbines, and water and wastewater improvements in three phases.	N/A	Commercial	South of I-8 at Crestwood	Draft off-reservation Environmental Evaluation complete. Public review ended August 2007. No commencement of work to date. Project schedule unknown.	17
CAMPO LANDFILL PROJECT: 493-acre landfill facility and a 657-acre buffer area surround landfill.	N/A	Public Facilities and Utilities	Southeast corner of Campo Reservation	On May 27, 2010, the Campo General Council voted to rescind applicable lease agreements in order to terminate the Campo Sanitary Landfill Project. The vote occurred at a special General Council meeting resulting from a petition signed by the required number of tribal members (Campo Kumeyaay Nation 2010).	18
BOULEVARD BORDER PATROL STATION: 32-acre site proposed for an administrative and training/educational facility, operated 24 hours a day, 7 days a week. At least 250 personnel, over three shifts, would occupy the site throughout the week.	N/A	Public Facilities and Utilities	North of I-8, on the east side of Ribbonwood Road	Final Environmental Assessment and Finding of No Significant Impact issued February 2010. Closed and Constructed.	19
LA POSTA MOUNTAIN WARFARE TRAINING FACILITY: Construction of a special warfare operation and training facility on approximately 2,250 acres.	N/A	Public Facilities and Utilities	La Posta Road, south of I-8, Campo	Final Environmental Assessment dated June 2007.	20
BORDER PATROL FENCE PROJECT: As of March 2009, the 18-foot-tall, 3-foot-deep fence has been completed in eastern San Diego County.	N/A	Public Facilities and Utilities	Along U.S.–Mexico border in eastern San Diego County	Constructed in eastern San Diego County between July 2008 to March 2009.	21

Study Area Foreseeable Projects

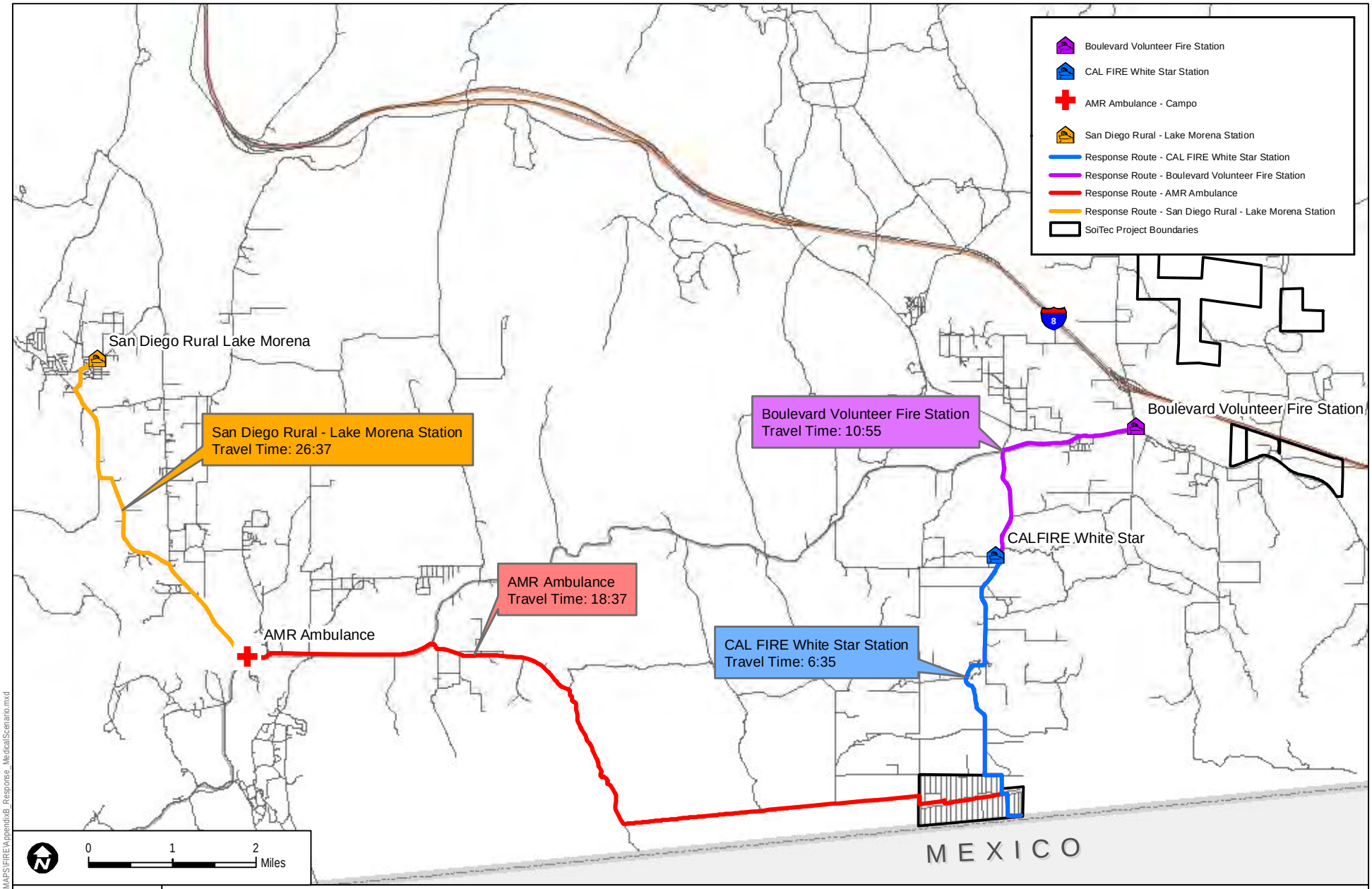
Project	Project No.	Project Type	Project Location	Status	Map ID
Residential Development Projects (County)					
STAR RANCH, Tentative Map (TM) 5459: Subdivide 2,160.1 acres into 460 single-family residential lots, commercial uses, equestrian facility, helipad, water treatment facility, and wastewater treatment facility.	3300-13-004	Residential	South of Big Potrero and west of Buckman Springs Road	Final Draft EIR submitted March 27, 2013.	22
VAUGHN, TM 5417: 14-lot TM with a 15th non-buildable lot for the roads and water system. The proposed lots range from 5.00 net acres to 6.85 net acres. The project site is 81.24 acres.	3100-5417	Residential	30069 Canvasback Drive, Campo, just west of Buckman Springs Road	Idle as of February 26, 2010.	23
McCLINTOCK, Tentative Parcel Map (TPM) 20755: Minor subdivision of 10.0 gross acres into two residential parcels of 4.15 acres and 4.56 acres net.	3200-20755	Residential	Basso Road in the Campo/Lake Morena Community	Project was approved on July 6, 2005.	24
BARTLETT, TPM 20754: Subdivide 164 acres into four single-family residential lots.	3200-20686	Residential	1850 Lake Moreno Drive	Project was approved on June 17, 2003.	25
TIBBOT TPM 20686: Subdivide 35 acres into four single-family residential lots.	3200-20686	Residential	20774 Bee Valley Road	Notice of Determination filed with County Clerk on October 17, 2006. Project was approved October 12, 2006.	26
DART TPM 20675: 33.46-acre subdivision into 3 lots. Two lots for single-family residential and one for general commercial uses.	3200-20675	Residential	Ribbonwood Road and Roadrunner Lane	Project was approved November 27, 2006.	27
GRIZZLE: TPM 20719: Subdivision of one lot into four parcels with a remainder parcel for single-family residential development.	3200-20719	Residential	McCain Valley Road and I-8	Notice of Determination filed with County Clerk on Jun 29 2006. Project was approved on July 13, 2006.	28
ARELLANO: TPM 20756: Subdivide a 17.27-acre parcel into three parcels.	3200-20756	Residential	Hauser Creek Road west of Lake Morena Drive	Project was approved on January 26, 2009.	29
PIJNENBURG: TPM 20778: 5-lot subdivision on a 76-acre site.	3200-20778	Residential	Barrett Smith Road, North of Hwy 94	Approved on August 6, 2009.	30
HEALD, TPM 21014: 4-lot subdivision (5 net acres each) with a remainder lot (15 net acres) on a 36-acre site.	3200-21014	Residential	Southern terminus of Sunfish Way	Project is on idle status as of February 2, 2010.	31

Study Area Foreseeable Projects

Project	Project No.	Project Type	Project Location	Status	Map ID
Other County Development Projects					
RIBBONWOOD ROAD SIGHTLINE IMPROVEMENT: Approximately 270-foot improvement to sightline on a horizontal curve.	N/A	Public Facilities and Utilities	North of I-8 along Ribbonwood Road, approximately 0.25 mile south of Opalocka Road, near Boulevard	Estimated completion date Spring 2013.	32
ROUGH ACRES FOUNDATION CAMPGROUND FACILITY	3300-12-021	Conference/ retreat and wellness center and campground facility	2750 McCain Valley Road, Boulevard; north of I-8 and Hwy 94	Second major pre-app meeting held December 12, 2011; under review.	33
ROUGH ACRES FOUNDATION	3300-12-020	Rock crushing facility	2750 McCain Valley Road, Boulevard; north of I-8 and Hwy 94	Under review	34
BOULEVARD FIRE STATION: Project would replace existing fire station along Highway 94. The fire station would likely consist of a single-story structure between 5,000 square feet and 6,000 square feet in size, would include an apparatus bay, and would have a total footprint of disturbance of approximately 30,000 square feet of the 17.5-acre parcel. The site would include water tank facilities that would be filled infrequently as well as roadway improvements along its northern boundary and roadway access improvements to Manzanita Dulce. The project would use an on-site well and an on-site septic system.		Fire Station	Ribbonwood Road and Mazanita Dulce 612-020-47-00	Mitigated Negative Declaration received December 6, 2011.	35

APPENDIX B

Response Travel Times for Medical and Facility Fire at Tierra Del Sol



DUDEK

SOURCE: SANGIS 2012

APPENDIX B

Facility Fire and Medical Emergency Scenario

7345-01

NOVEMBER 2012

SOITEC SOLAR PORTFOLIO EMERGENCY SERVICE CAPABILITIES ASSESSMENT

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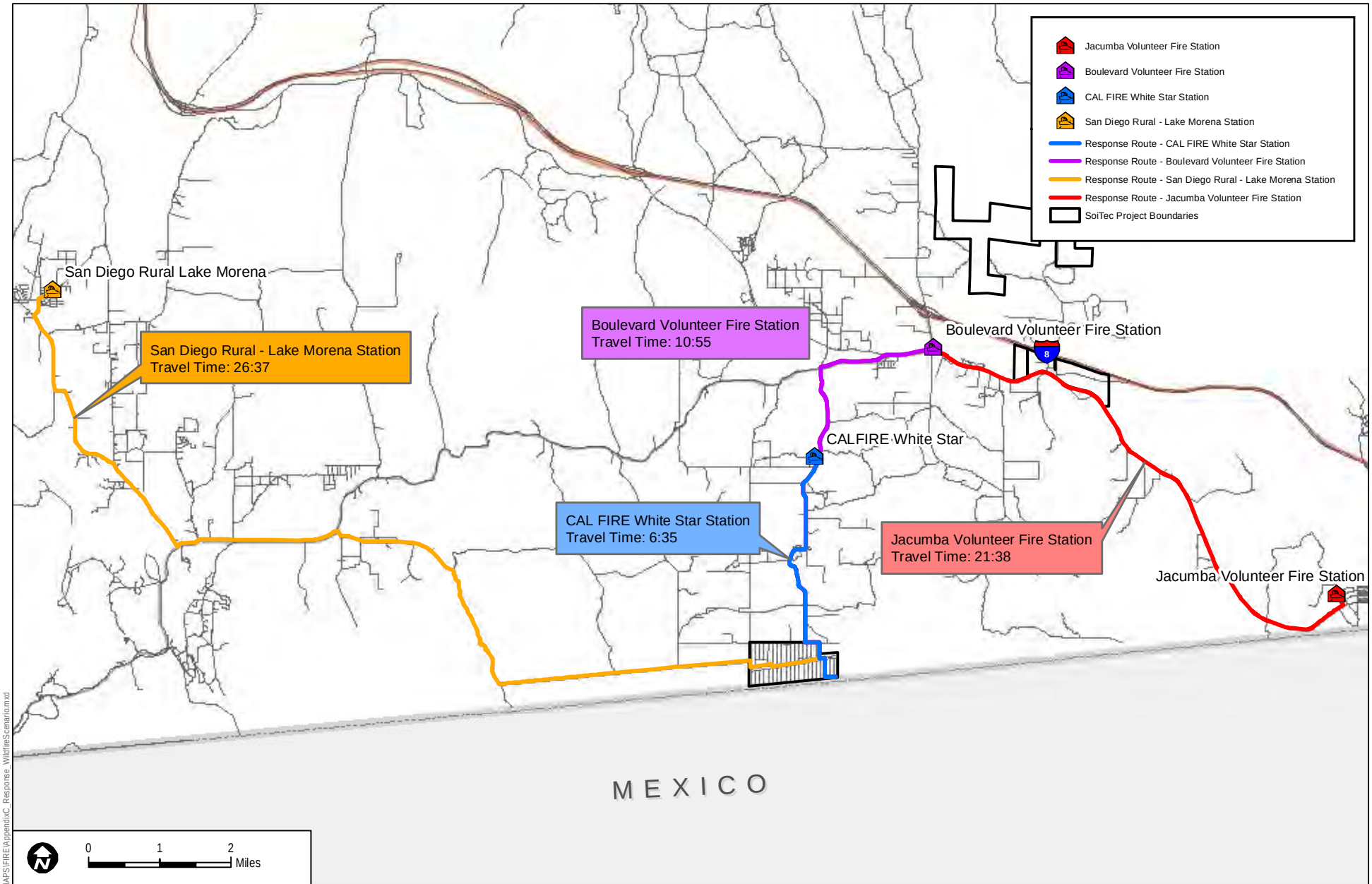
APPENDIX C

Response Travel Time for Wildland Fire near Tierra Del Sol



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SOURCE: SANGIS 2012

APPENDIX C

Wildland Fire Scenario

7345-01

NOVEMBER 2012

SOITEC SOLAR PORTFOLIO EMERGENCY SERVICE CAPABILITIES ASSESSMENT

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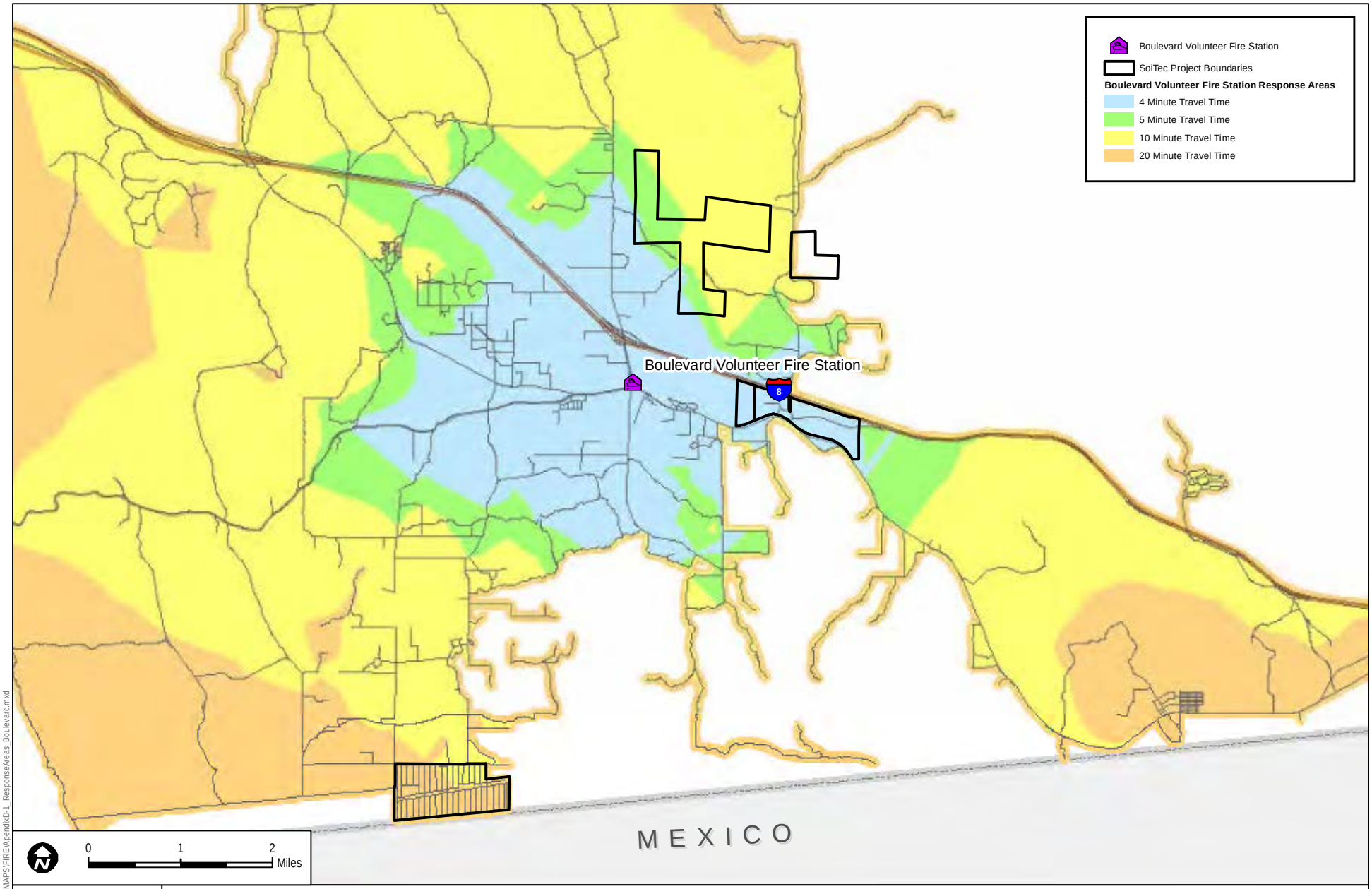
APPENDIX D-1

Boulevard Fire Station Coverage Area
Response Capabilities



DUDEK

SOURCE: SANGIS 2012

APPENDIX D-1

Response Coverage Area - Boulevard Fire Station

7345-01

NOVEMBER 2012

SOITEC SOLAR PORTFOLIO EMERGENCY SERVICE CAPABILITIES ASSESSMENT

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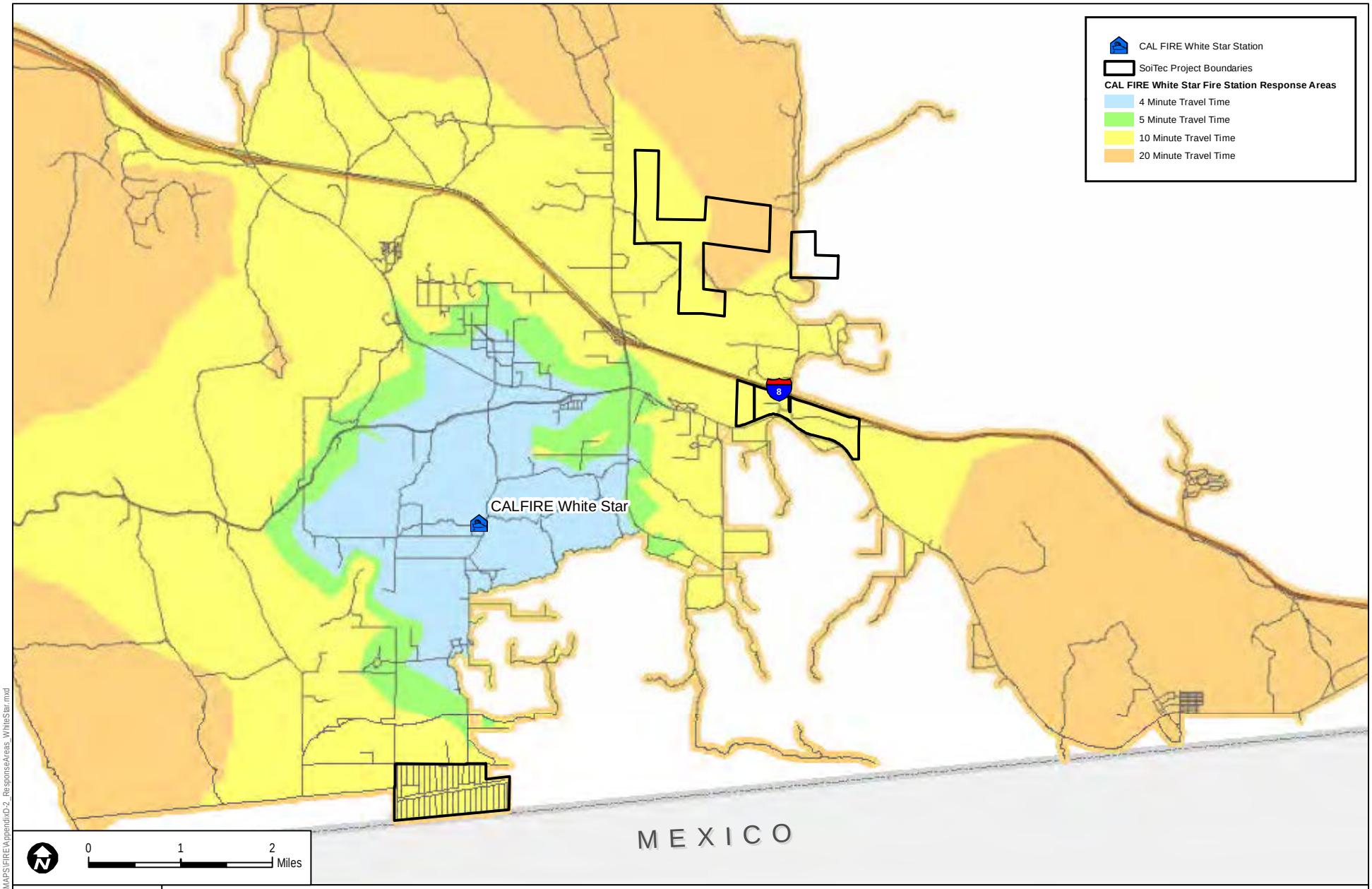
APPENDIX D-2

CAL FIRE Whitestar Station Coverage Area
Response Capabilities



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DUDEK

7345-01

NOVEMBER 2012

SOURCE: SANGIS 2012

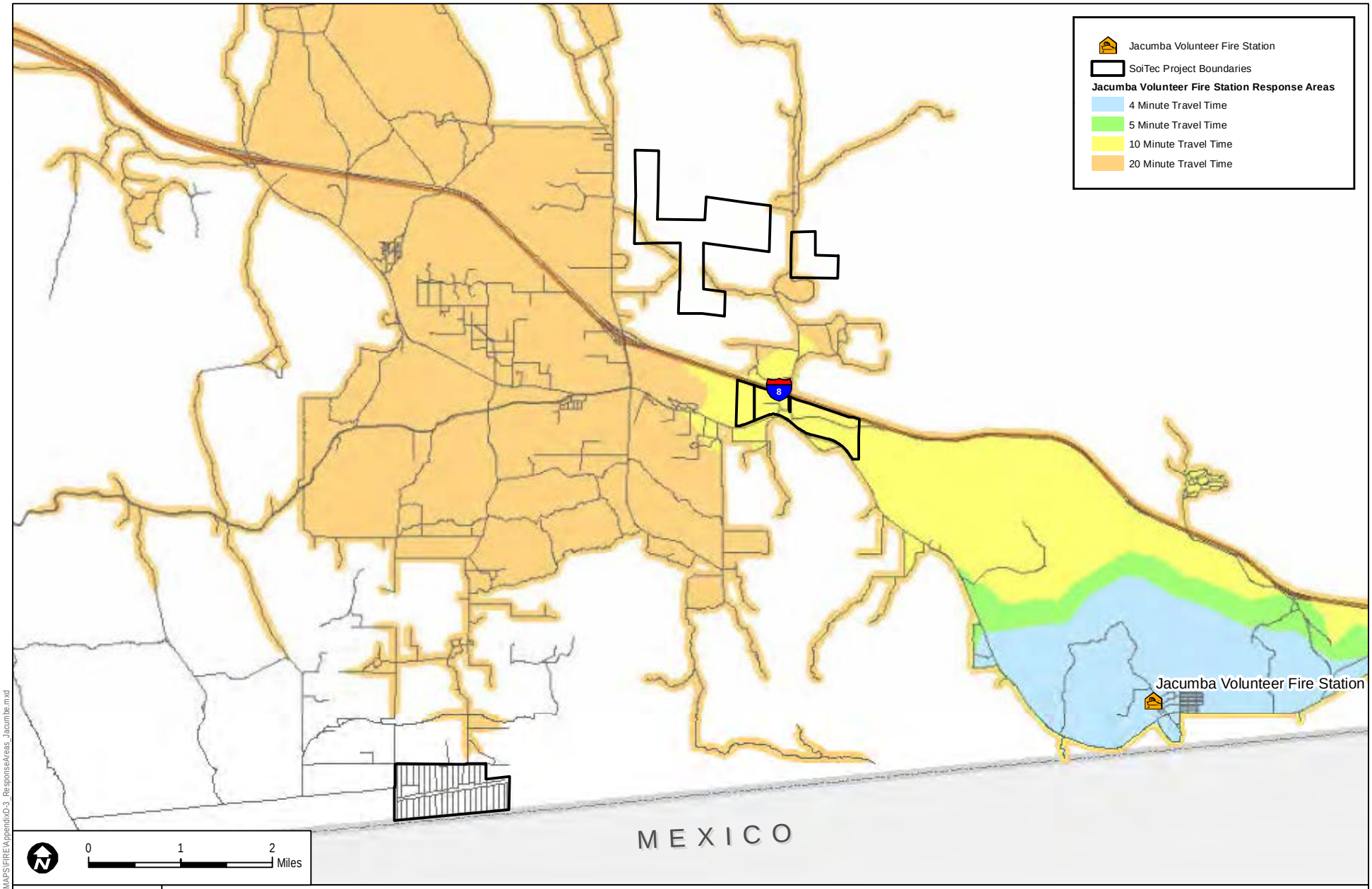
APPENDIX D-2

Response Coverage Area - CAL FIRE Whitestar

SOITEC SOLAR PORTFOLIO EMERGENCY SERVICE CAPABILITIES ASSESSMENT

APPENDIX D-3

San Diego Rural Fire Department Jacumba Station Coverage Area Response Capabilities



DUDEK

SOURCE: SANGIS 2012

APPENDIX D-3

Response Coverage Area - Jacumba Volunteer

7345-01

NOVEMBER 2012

SOITEC SOLAR PORTFOLIO EMERGENCY SERVICE CAPABILITIES ASSESSMENT

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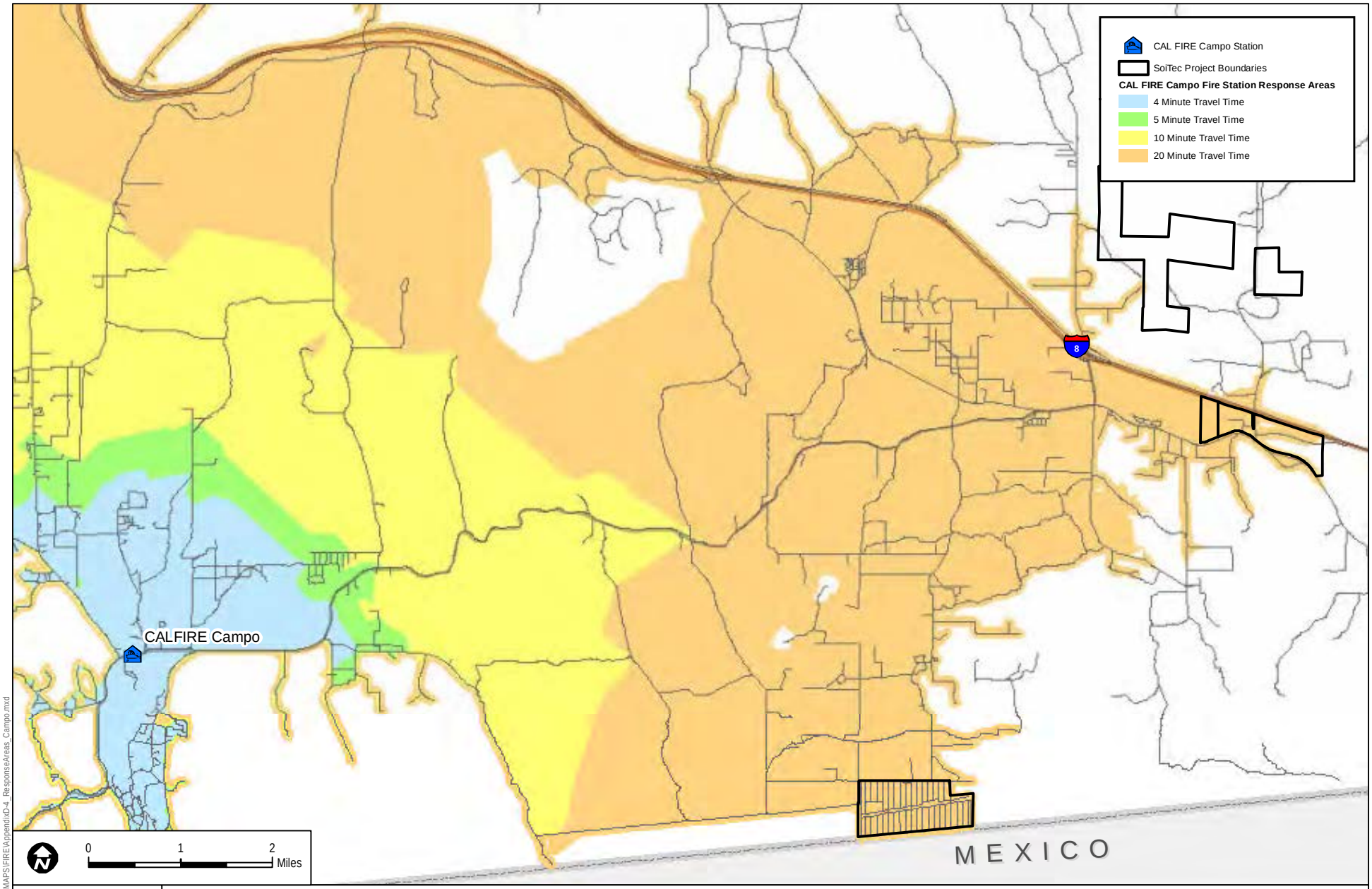
APPENDIX D-4

CAL FIRE Campo Station Coverage Area
Response Capabilities



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DUDEK

SOURCE: SANGIS 2012

APENDIX D-4

Response Coverage Area - CAL FIRE Campo

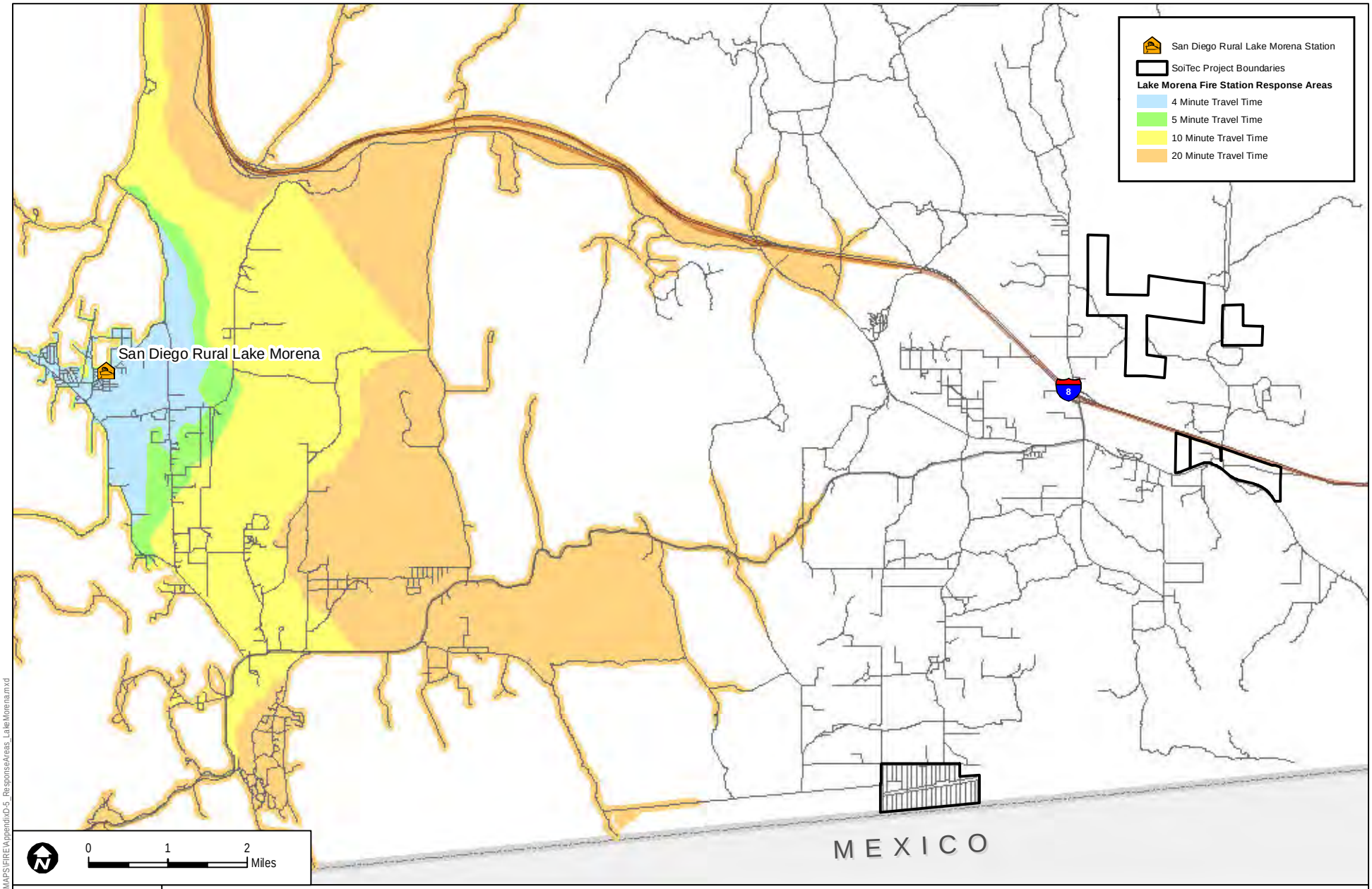
7345-01

NOVEMBER 2012

SOITEC SOLAR PORTFOLIO EMERGENCY SERVICE CAPABILITIES ASSESSMENT

APPENDIX D-5

San Diego Rural Fire Protection District Lake Morena Station Coverage Area Response Capabilities



DUDEK

SOURCE: SANGIS 2012

APPENDIX D-5

Response Coverage Area - SDRFPD Lake Morena

7345-01

NOVEMBER 2012

SOITEC SOLAR PORTFOLIO EMERGENCY SERVICE CAPABILITIES ASSESSMENT

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