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Project Title:	Compass Battery Energy Storage
TN #:	255561-5
Document Title:	Appendix 4-17A_Fire Protection Technical Report
Description:	The appendix analyzes fire behavior and wildfire risk and provide recommendations based on the fire environment at the Project site.
Filer:	Erin Phillips
Organization:	Dudek
Submitter Role:	Applicant Consultant
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Docketed Date:	4/8/2024

Appendix 4.17A

Fire Protection Technical Report

Fire Protection Technical Report

Compass Battery Energy Storage System Project

FEBRUARY 2024

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Printed on 30% post-consumer recycled material.

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
AC	Alternating current
APN	Assessor's Parcel Number
BESS	battery energy storage system
BMS	Battery management system
BTU	British Thermal Units
CAISO	California Independent System Operator
CFC	California Fire Code
DC	Direct current
ESS	Energy storage system
FMZ	Fuel modification zone
HVAC	Heating, ventilation and air conditioning
kV	Kilo volt
Mph	Miles per hour
MV	medium voltage
MW	Mega watt
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Prevention Association
OCFA	Orange County Fire Authority
PCS	Power Conditioning System
SCADA	supervisory control and data acquisition
SDG&E	San Diego Gas and Electric
UL	Underwriters Laboratory
UPRR	Union Pacific Railroad

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1 Project Description

1.1 Project Location

The Project site is located in the northern portion of the City of San Juan Capistrano, adjacent to Camino Capistrano with Interstate-5 located to the east. The Project site is adjacent to the Saddleback Church Rancho Capistrano to the north and currently used by the church for various ancillary activities. The land uses to the south are primarily Oso Creek and open space to the south and east, Union Pacific Railroad and Interstate-5 to the east, and open space and residences outside of the City limits to the west.

1.2 Project Description

The Project will include the development of an approximately 250-1000 MW battery energy storage system (BESS) and associated infrastructure within a development area totaling approximately 12.4 acres within a 40.8-acre parcel owned by the Saddleback Church (Parcel B1 of APN 637-082-71). The proposed Project also consists of an offsite access road comprising approximately 1.6 acres, for a total of 14 acres.

A BESS is stationary equipment that receives electrical energy and then utilizes batteries to store that energy to supply electrical energy at a future time. Power released or captured by the proposed Project will be transferred to and from the SDG&E Trabuco to Capistrano 138kV transmission line via a loop-in generation transmission line that will interconnect to a SDG&E switchyard that will be constructed within the Project site. The Project will consist of lithium-iron phosphate, or similar technology batteries, installed in racks and contained inside non-habitable enclosures; inverters; medium voltage (MV) transformers; a SDG&E switchyard; a project substation; and other associated equipment.

In addition to the BESS, the Project will include the following components, which are described in more detail following the bulleted list:

- **Battery Energy Storage System:** Lithium-iron phosphate, or similar technology cells form the core of the battery energy storage system. The cells are the basic functional electrochemical unit containing an assembly of electrodes, electrolyte, separators, container, and terminals. Cells are the source of electrical energy by direct conversion of chemical energy, and they would be installed on racks and enclosed in either prefabricated or site-built, non-habitable enclosure. Compass Energy Storage LLC will use battery storage systems that are NFPA 855 Standard compliant, and UL certified that include built-in failsafe and cooling systems designed to prevent thermal runaway and the spread of fire. A fire protection system will be installed to automatically shut down any affected battery storage components and prevent the spread of fire to the other battery storage modules.
- **Power Inverters and Transformers:** The battery cells operate on direct current (DC), while the electric grid uses alternating current (AC). Inverters will be installed to convert AC to DC when the energy is transferred from the grid to the battery and from DC to AC when the energy is transferred from the battery to the grid. Transformers step up the electrical voltage between the battery cells and the grid. The inverters and transformers will be located on concrete pads adjacent to the battery enclosures.
- **Project Substation:** A project substation will be installed that will include open rack, air insulated switch gear and the main power transformer to step up from 34.5 kilovolts (kV) to 138 kV.

- **SDG&E Switchyard:** A SDG&E switchyard will be installed adjacent to the project substation that will include open rack, air insulated switch gear and the main power transformer to deliver power to the nearby Trabuco to Capistrano 138kV transmission line.
- **Telecommunication Facilities:** Telecommunication equipment, including underground fiber optics or supervisory control and data acquisition (SCADA), will be installed to remotely manage and monitor communication between the BESS and the electrical grid.
- **Perimeter Wall:** A perimeter wall will be constructed that consists of a pre-fabricated decorative wall that will be utilized for both visual enhancement and fire protection.
- **Water Detention Basins:** To meet regulatory standards and reduce potential for stormwater to be discharged off site in exceedance of existing conditions, off site and on site will flow to on-site water detention structures and pumped to existing outfalls which flow into the channelized portion of Oso Creek owned and maintained by Orange County Flood Control District (OCFCD). A waterline will be constructed from the water detention structures to the existing outfalls.
- **Landscaping:** The Project will incorporate landscaping around the perimeter walls as included on the preliminary landscaping plans.
- **Site Access and Security:** On-site access driveways, perimeter precast walls, and nighttime directional lighting will be provided for the project. An access road for construction and operation will be developed from the church property northern entrance that will extend south along the parcel's eastern boundary to the main project entrance as shown in the project engineering plans.
- **Loop-In Transmission Line:** A 138 kV loop-in transmission line will be constructed to transfer power between the SDG&E Trabuco to Capistrano 138kV transmission line and the SDG&E switchyard constructed on site.

The facilities will be remotely operated year-round and be available to receive or deliver energy through the existing adjacent Trabuco to Capistrano 138kV transmission line. 24 hours a day and 365 days a year. After commissioning and during the operational life of the Project, qualified technicians would routinely inspect the battery energy storage system and conduct necessary maintenance to ensure safe operational readiness. If an issue arises, the system can remotely shut down and de-energized.

Battery Energy Storage System Enclosures

The lithium-iron phosphate batteries (LFP) will be housed in non-flammable steel cabinets which contain racks similar to common computer server racks. The racks are typically made of aluminum, but sometimes may be composed of steel. The LFP technology is considered one of the safest, best understood, and most efficient methods of energy storage on the market. The proposed facility will use a LFP technology that has a long lifespan and boasts superior safety and stability characteristics. The battery cabinets and racks will be designed and installed in accordance with the local seismic design requirements.

The battery racks will be housed in non-habitable steel enclosures. The BESS will be designed and installed in conformance with the nationally recognized National Fire Protection Association (NFPA) 855 Standard for the Installation of Stationary Energy Storage Systems, along with all applicable state and City fire protection requirements. The BESS development area will be connected with an improved access road that will meet Orange County Fire Authority (OCFA) requirements. Future augmentation will be located within the BESS yard.

A Battery Management System (BMS) is used in conjunction with the energy storage system (ESS), which can monitor the battery voltage, current, temperature, managing energy absorption and release, thermal management, low voltage power supply, high voltage security monitoring, fault diagnosis and management, external communication with Power Conditioning System (PCS) and Emergency Management System (EMS), and ensure the stable operation of the energy storage system.

Included in the BESS are the fire suppression system (FSS) and the heating, ventilation, and air conditioning (HVAC) system. The FSS system is composed of smoke detectors, gas detectors and aerosols, which serve the primary purpose of preventing fire spread should any open flame or gas signal appear in the battery system. The HVAC system is essentially liquid cooling, with the main function of maintaining the temperature of the battery system within the allowable operating temperature range. An auxiliary distribution box will also be included which provides auxiliary power for the whole control system and liquid cooling system. In addition, the site will include infra-red sensors and visual monitoring by the operations team as part of its Hazard Mitigation and Emergency Response program.

A 10-foot-tall masonry perimeter wall will be constructed that consists of prefabricated concrete that will be utilized for both visual enhancement and fire protection. This wall will be combined with perimeter landscaping to minimize or eliminate visual impacts from public views.

Fire Protection System

Compass Energy Storage, LLC will use battery storage systems that are NFPA 855 Standard compliant, and UL certified that include built-in failsafe and cooling systems designed to prevent thermal runaway and the spread of fire. A fire protection system will be installed to automatically shut down any affected battery storage components and prevent the spread of fire to other battery storage modules. The installation will also be compliant with 2022 CFC 1206 regarding installation of outdoor systems (see Appendix A).

The LFP batteries utilized are certified and listed to national and international product safety standards from entities such as Underwriter's Laboratories (UL) and the International Electrotechnical Commission (IEC).

These certifications include, but are not limited to:

- UL 1642: This certification standard is applicable to secondary (rechargeable) lithium-ion cells and batteries used as a power source (such as BESS). The standard's requirements are intended to reduce the risk of fire or explosion when the battery is used in a product. For example, the standard subjects lithium-ion batteries to severe abuse conditions and evaluates if they can safely withstand them.
- UL 1973: This certification standard is applicable to batteries and battery systems utilized for energy storage. The standard evaluates the battery system's ability to safely withstand simulated abuse conditions. For example, the standard subjects module-level stationary batteries to an internal fire exposure test to force a thermal runaway in one cell to ensure it does not explode, propagate fire to neighboring cells, or propagate to the rest of the modular battery system. UL 1973 applies to stationary BESS applications, such as photovoltaic installations and wind turbine energy storage systems, as well as other specialized energy storage systems, such as light electric rail (LER) operations.
- IEC 62619: This safety standard specifies requirements and tests to ensure the safe operation of secondary (rechargeable) lithium-ion cells and batteries used in ESS and in other industrial applications. Electrical safety is covered under Clause 8 of the standard, which requires the completion of a risk analysis to determine specific electrical safety issues associated with the intended use of a given battery system or device.

The batteries are also certified, tested, and listed to national and international product safety standards and test methods, including, but not limited to:

- IEC 62933-5-2: This safety standard addresses various aspects of BESS, including the requirements for grid-integrated BESS.
- UL 9540: This standard covers energy storage systems (including lithium-ion BESS) for stationary indoor and outdoor installations and establishes the system-level certification for energy storage systems and its associated equipment.
- UL 9540A: The test methodology evaluates the fire characteristics and thermal runaway fire propagation of a BESS (including lithium-ion BESS). The test method provides a means to evaluate thermal runaway and fire propagation at the cell level, module level, and unit level. The data generated from the test method can be used to determine the fire and explosion protection required for a BESS installation based on fire test data. This test is specifically referenced by the IFC, NFPA 1 and 855 to demonstrate the functionality of the BESS fire protection features during large-scale fire testing.

The batteries also meet all the regulatory installation level codes and standards for a BESS when it is installed These regulatory codes and standards include the CFC and NFPA 855. The perimeter wall discussed above (10 feet tall, see Appendix B) will also serve for fire protection purposes – both to prevent wildfire from impacting the site and to reduce the chance of an on-site fire from escaping beyond the property. BESS containers will also be set back approximately 20 feet from the perimeter wall to provide an added internal buffer for prevention, protection and management.

The Orange County Fire Authority (the authority having jurisdiction) will have review and approval rights for the facility fire protection and suppression plans and the project HMA and ERP will be developed in coordination with the OCFA. The review/approval by the authority having jurisdiction will cover all applicable design, construction, and testing requirements of the NFPA 855 Standard.

Loop-In Transmission Line

A loop-in transmission line will be constructed that will transfer power to and from the proposed project and the SDG&E Trabuco to Capistrano 138kV transmission line approximately 500 feet to the east of the project site, running north-south adjacent to the railroad. The loop-in transmission line will be supported by up to 5 pole structures which will be sited to fully avoid Oso Creek.

Outdoor Electrical Equipment

MV transformers and additional electrical equipment will be installed outside the BESS enclosure. The collector substation will be located within the Project site. Components will include a main power transformer, control house, and switchgear. Underground wires and cabling will run from the battery cable collection box to a concrete pad housing the inverter and transformer. From the MV transformer, cabling will be run to the collector substation. All outside electrical equipment will be housed in the appropriate National Electrical Manufacturers Association (NEMA) rated enclosures and screened from view, to the extent possible, on all sides.

Inverters

Compass Energy Storage, LLC uses only industry-standard, nationally (and internationally) recognized equipment. These inverters are stand-alone units that operate in all conditions inside the BESS yard. They operate in both a charge mode and a discharge mode. There will be on-site disconnects which may be used in the event of an emergency or unscheduled maintenance.

Telecommunication Facilities

The Project will include telecommunication facilities for communication with the SDG&E/CAISO facilities and to support remote Project operations monitoring. To provide for communication with SDG&E facilities, a fiber-optic cable will be used to connect the Project site switchyard with the SDG&E point of interconnection. Utility interconnection regulations require the installation of a second, separate, redundant fiber-optic cable. The redundant fiber-optic cable will also be installed within the Project footprint. For remote monitoring and operations communication, the Project will use local exchange carrier services, connecting to existing telecommunication fiber-optic lines owned and managed by local telecommunication providers.

Site Access and Security

Interstate-5 is the largest highway in the area and provides regional access to the Project site from the north and south. Access to the Project site will be provided via an existing access road off of Camino Capistrano approximately 0.6 miles northeast of the Project site. Existing agricultural roads will be improved from the entry access road off Camino Capistrano along the east side of the property to the Project site. Road improvements shall consist of converting dirt roads into gravel roads and widening the roads to meet OCFA and SDG&E standards (30-feet wide).

As noted above, precast walls will be installed around the perimeter of the Project site for safety and security purposes as well as for visual screening. Access will only be available to authorized personnel. A Knox box will be provided at all access gates to allow for emergency access. Permanent motion-sensitive, directional security lights will be installed to provide adequate illumination around the substation area and points of ingress/egress. All lighting will be shielded and directed downward to minimize the potential for glare or spillover onto adjacent properties. Security cameras will be placed on site and monitored 7 days a week and 24 hours per day.

1.3 Fire Environment

1.3.1 Fire Risk Setting

The Project site is not located within a State Responsibility Area (SRA) or Local Responsibility Area (LRA) Very High Fire Hazard Severity Zone. The closest SRA/VHFHSZ to the east is across the I-5 Freeway in the Mission Viejo area, about one mile from the project site. To the west the closest SRA/VHFHSZ is west of Laguna Niguel about 2.5 miles from the project site (see Figures 1 and 2). Neither is the Project located within a California Public Utilities Commission (CPUC) High Fire Threat District. The closest districts are about ½ mile to the east and two miles to the west (see Figure 3).

2 Fire Behavior Analysis

2.1 Fire Scenario Assessment

Because of the site and topography, scenario runs from off-site have been limited to wildfire approaching from the north or south in alignment with the Oso Creek stream channel which would likely dominate wind patterns and fire behavior in the area. To the east is the railroad, Camino Capistrano and I-5 Freeway. To the west are uphill slopes (up and away from the project to the west) with residential development on the bluffs above. While a flaming front is possible from the due west approaching the Project in a downhill, backing fire, it is unlikely. A flaming front from the due east out of the stream channel also seems unlikely based on the limited fuel sources.

An on-site run scenario was included from an on-site fire ignition with a flaming front moving to the southwest uphill from the site on the adjacent slope. See Figure 4 for Fire Behavior Map.

- **Scenario 1.** Fire flaming front approaching the Project site from agricultural land to the north driven by northern winds (offshore conditions), burning through mowed grass and forbs approaching the recommended perimeter walls surrounding the site.
- **Scenario 2.** Fire flaming front approaching the Project site from the agricultural land, upland mustards and riverine vegetation to the south driven by southern winds (onshore conditions), burning through mowed grass and forbs approaching the recommended perimeter walls surrounding the site.
- **Scenario 3.** Fire flaming front approaching adjacent lands to the southwest from the Project site driven by northeastern winds (offshore conditions), burning through upland mustard vegetation through the adjacent open space.

2.2 Fire Behavior Modeling

As presented in Table 1, wildfire behavior in upland mustard fuel beds, presented as Fuel Model GR7, represents the most extreme conditions in Scenario 3 (on-site origin moving away from Project towards adjacent lands), significantly affected by the steep 30% uphill slope. In this case, flame lengths are calculated to reach 61.3 feet with 40 mph northeast winds; spread rates reach 15 mph. The spotting distance, where airborne embers can ignite new fires downwind of the initial fire, is calculated at 2.6 miles. [*Note: In Scenario 3 the fire front would be moving away from the project site and onto the adjacent open space lands, hence the extreme calculated flame lengths. The slope gradient and vegetation changes further uphill resulting in reduced fire front conditions.]* In comparison, a mowed grass/forb fuel type in Scenario 1 (off-site origin moving towards Project) could generate flame lengths up to 3.1 feet high with a spread rate of 0.5 mph. The fire could potentially be spotting for a distance of 0.3 mile. Even though the northeast winds are modeled at 40 mph, the level terrain and maintained vegetation tempers the anticipated wildfire behavior.

Table 1. Fire Behavior Modeling Results for Existing Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (BTU/feet/ second)	Spread Rate (mph)	Spotting Distance (miles)
Scenario 1: 5% slope, 40 mph N wind (off-site origin approaching proposed project site)				
Fuel Model GR1 (mowed grass/forbs)	3.1	67	0.5	0.3
Scenario 2: 5% slope, 20 mph S wind (off-site origin approaching proposed project site)				
Fuel Model GR1 (mowed grass/forbs)	2.3	35	0.3	0.2
Scenario 3: 30% slope, 40 mph NE wind (on-site origin through adjacent land)				
Fuel Model GR7 (upland mustard)	61.3	43624	15.0	2.6

As presented in Table 2, Dudek conducted modeling of the site for post-development fuel modification recommendations. Fuel modification recommendations include irrigated landscaping where applicable, precast concrete walls on the periphery of the proposed project site, a gravel base within the interior of the facility with no vegetation or combustible materials and a 20' wide FMZ around the inside of the perimeter. The existing fuel model assignments were re-classified for each scenario to reflect the fuel modification recommendations.

Figure 5 presents the proposed fuel modification plan and the location of the perimeter walls. The FMZ areas would experience a reduction in flame length and intensity. The 10' tall precast concrete perimeter walls are not combustible and would significantly reduce the radiant heat and potential flame impingement from impacting the project. More importantly, the precast concrete walls would limit the possibility of an on-site fire from generating enough heat to ignite the nearest unmaintained vegetation. The walls would absorb and deflect heat and represent an important fire safety measure for preventing project-caused wildfires.

Table 2. Fire Behavior Modeling Results for Post-Project Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (BTU/feet/ second)	Spread Rate (mph)	Spotting Distance (miles)
Scenario 1: 5% slope, 40 mph N wind (off-site origin approaching perimeter precast wall)				
Fuel Model GR1 (mowed grass/forbs)	3.1	67	0.5	0.3
Scenario 2: 5% slope, 20 mph S wind (off-site origin approaching perimeter precast wall)				
Fuel Model GR1 (mowed grass/forbs)	2.3	35	0.3	0.2
Scenario 3: 30% slope, 40 mph NE wind (on-site origin)				
Fuel Model GR7 (upland mustard)	61.3	43624	15.0	2.6

The results presented in Tables 1 and 2 depict values based on inputs to the BehavePlus software and are not intended to capture changing fire behavior as it moves across a landscape. Changes in slope, weather, or pockets of different fuel types are not accounted for in this analysis. For planning purposes, the averaged worst-case fire behavior is the most useful information for conservative fuel modification design. Model results should be used as a basis for planning only, as actual fire behavior for a given location will be affected by many factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns.

As previously mentioned, Dudek conducted modeling of the site for post-fuel modification zones. Typical fuel modification includes establishment of minimum 20-foot wide FMZ within the inside perimeter of the facility along with a 10' tall precast concrete perimeter wall. For modeling the post-FMZ treatment condition, the fuel model assignment was re-classified according to the proposed fuels management treatment.

3 Discussion

The following section addresses basic Project related potential impact questions that must be evaluated and provided a Project-specific response.

A. Project potential influence on local emergency response/evacuation plans

Local emergency response or evacuation plans and a description of how the proposed project could influence their effectiveness.

The Project would not be expected to impact local emergency evacuation plans. The Project does not include on-site personnel on a daily basis which results in zero or a very low number of vehicles that would be evacuating the area during a wildfire event. Emergency Response plans will need to be updated to document the presence of the BESS at this location along with BESS firefighting strategies, which are already part of the local fire authority's response training and preparedness for other BESS facilities within its jurisdiction. The project will also develop a site specific Hazard Mitigation Analysis (HMA) and Emergency Response Plan (ERP) in coordination with the OCFA. Therefore, the anticipated influence on emergency response plans is anticipated to be minimal.

B. Containment of potential pollutants on site during a wildfire

Discuss how potential project pollutants could be contained on site during a wildfire event.

Potential pollutants generated in the event of a wildfire would be contained within the on-site battery enclosures as described in Section 1 above. The enclosures are NFPA Standard 855 compliant and are equipped with a fire extinguishing system to ensure fire safety. If potential pollutants are able to escape the enclosures, they will be nominal in quantity, will dissipate to an insignificant level within a short distance of the enclosure and the non-combustible perimeter wall will serve as an additional method of containment.

C. Infrastructure built/maintained that may exacerbate the risk of wildfire

Describe infrastructure that would be built or maintained (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate the risk of wildfire.

The infrastructure built or maintained on site includes roads, fuel breaks, emergency water sources, power lines and substation. The roads, fuel breaks and water sources will all contribute to reducing or mitigating the risk of wildfire. The roads will improve access to and egress from the site in the event of an emergency. The fuel breaks will reduce the potential for wildland fire to impact the site and escape from the site. The water sources will provide water for the fire department to help extinguish an approaching wildfire and protect the project site. The site will also contain infrared cameras for heat monitoring.

The power lines, substation and related infrastructure may exacerbate the risk of wildfire. Recent legislation and mitigation efforts on behalf of electric utilities companies have improved the reliability of overhead power transmission lines and substation. In conjunction with the site's fire safety and overall mitigation efforts the potential impacts on wildland fire will be significantly reduced.

D. People/structures that may be impacted from post-fire flooding or landslides

Describe people or structures downslope or downstream of the proposed project that could be impacted by flooding or landslides, as a result of runoff, post-fire slope instability, or drainage change.

The project site will be located on gravel-covered, level land immediately adjacent to Oso Creek, hence there are no structures or people downslope of the proposed project. There is a 40-foot elevation difference from the project site to the stream bed below with a bluff in between. A concrete perimeter wall, drainage infrastructure and setbacks will further secure the site from potential erosion or landslides (see Section 1).

Any post-fire related runoff or drainage impacts from the project site vicinity would likely follow the natural drainage patterns and utilize installed stormwater management infrastructure, and eventually and flow into Oso Creek. It is unlikely that any people or structures would be impacted by the limited contribution of runoff from the project site vicinity as the creek flows unimpeded south through the cities of San Juan Capistrano and Dana Point into the Pacific Ocean.

4 Recommendations

The following recommendations are provided based on an evaluation of the proposed project and the fire environment at the project location.

- Project to be compliant with 2022 CFC 1206, Electrical Energy Storage Systems (Attachment 1)
- Project to be compliant with OCFA Guideline G-10, Stationary Storage Battery Systems (Stationary Lead-Acid Battery Systems (ocfa.org)
- Fire suppression systems inside each container as proposed (NFPA 855 Standard compliant)
- 20’ FMZ – entire area within walls to be void of vegetative fuel – gravel or similar surface.
- 10’ tall perimeter precast, decorative concrete walls to OCFA satisfaction (Attachment 2)
- Landscaped areas to include fire-resistant landscaping consistent with fuel modification zone requirements
- Maintain FMZs twice-yearly or more as needed
- 20’ wide access roads per OCFA standards
- Hydrants located per OCFA standards

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5 References

2019 California Fire Code. California Code of Regulations. Title 24, Part 9. Section 1206.2.8.7

National Fire Protection Association. 2021. Guideline 855 - Standard for the Installation of Stationary Energy Storage Systems.

Orange County Fire Authority. Guideline G-10, Stationary Storage Battery Systems. 6 pp.

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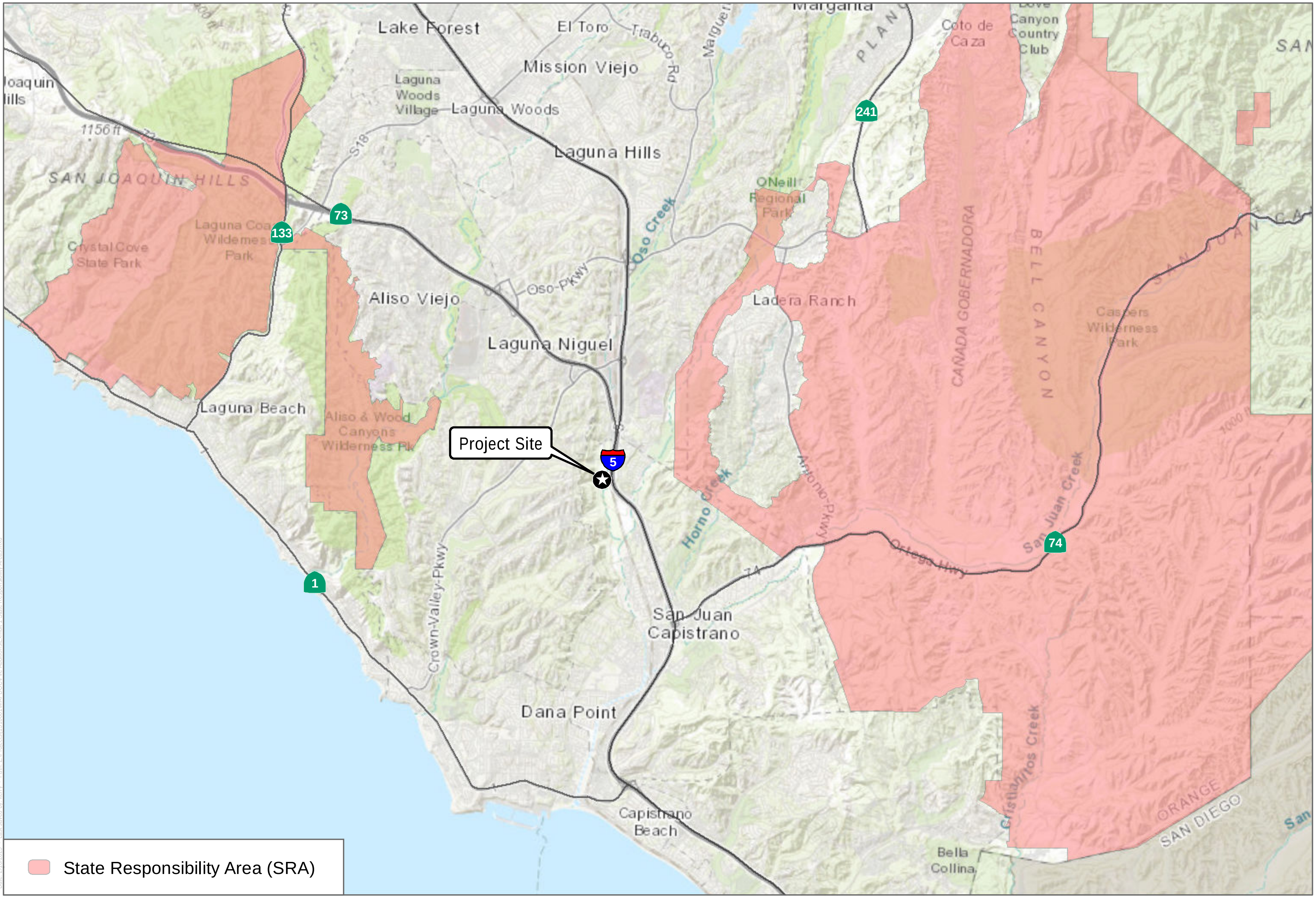

SOURCE: ESRI IMAGERY 2022

DUDEK

0 1 2 Miles

EXHIBIT 1

State Responsibility Areas

Compass BESS Project

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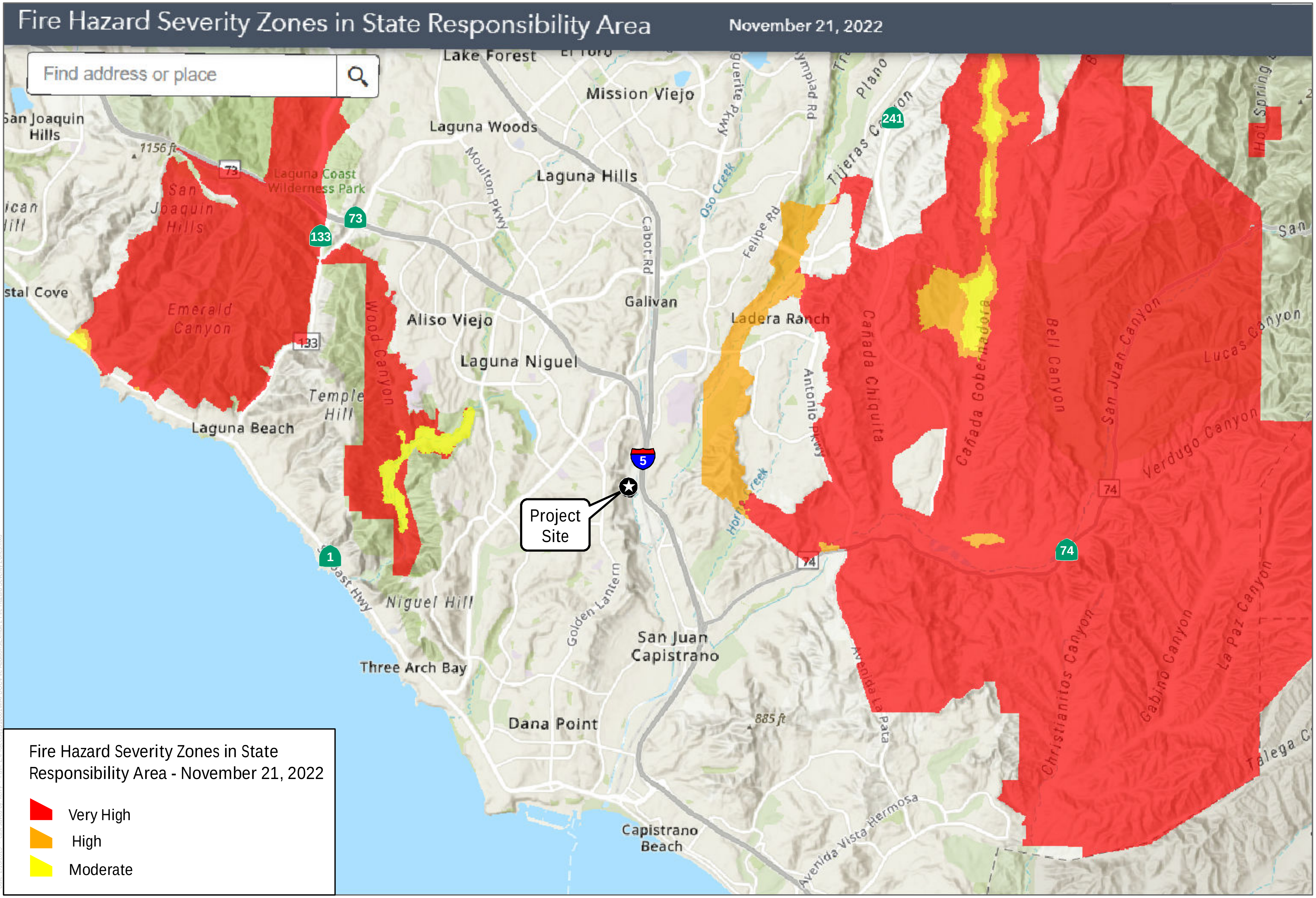

SOURCE: ESRI IMAGERY 2022; CAL FIRE 2022

DUDEK

0 1 2 Miles

EXHIBIT 2

Fire Hazard Severity Zones

Compass BESS Project

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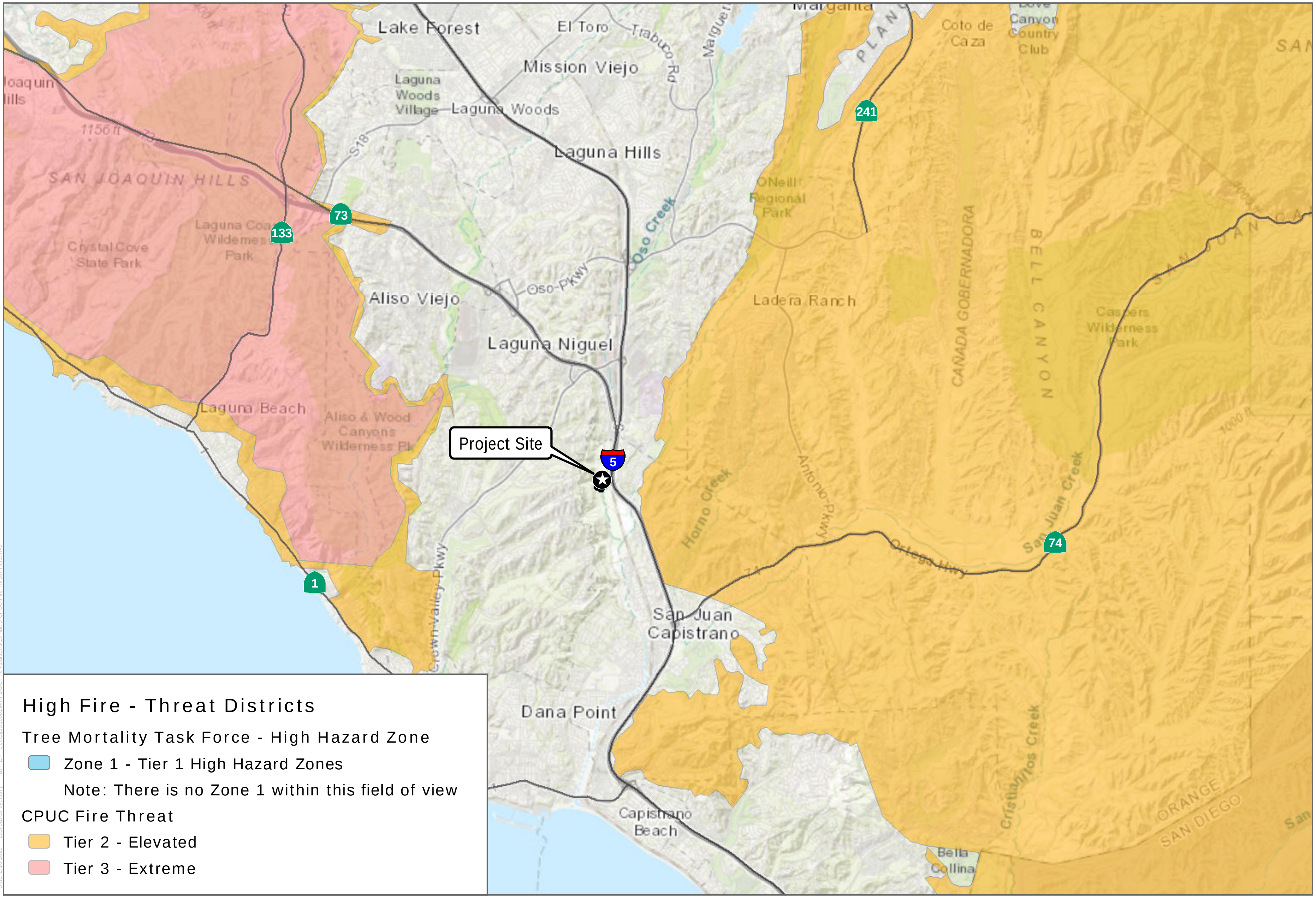

SOURCE: ESRI IMAGERY 2022; CPUC 2022

DUDEK

0 1 2 Miles

EXHIBIT 3

CPUC Fire Threat Tiers

Compass BESS Project

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Table 1. Fire Behavior Modeling Results for Existing Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph)	Spotting Distance (miles)
Scenario 1: 5% slope, 40 mph N wind (offsite origin approaching proposed project site)				
Fuel Model GR1 (mowed grass/forbs)	3.1	67	0.5	0.3
Scenario 2: 5% slope, 20 mph S wind (offsite origin approaching proposed project site)				
Fuel Model GR1 (mowed grass/forbs)	2.3	35	0.3	0.2
Scenario 3: 30% slope, 40 mph NE wind (onsite origin through adjacent land)				
Fuel Model GR7 (upland mustard)	61.3	43624	15.0	2.6

Table 2. Fire Behavior Modeling Results for Post-Project Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph)	Spotting Distance (miles)
Scenario 1: 5% slope, 40 mph N wind (offsite origin approaching perimeter precast wall)				
Fuel Model GR1 (mowed grass/forbs)	3.1	67	0.5	0.3
Scenario 2: 5% slope, 20 mph S wind (offsite origin approaching perimeter precast wall)				
Fuel Model GR1 (mowed grass/forbs)	2.3	35	0.3	0.2
Scenario 3: 30% slope, 40 mph NE wind (onsite origin)				
Fuel Model GR7 (upland mustard)	61.3	43624	15.0	2.6

SOURCE: AERIAL-ESRI IMAGERY SERVICE 2023

DUDEK

0 250 500 Feet

FIGURE 4

BehavePlus Analysis

Compass BESS Project

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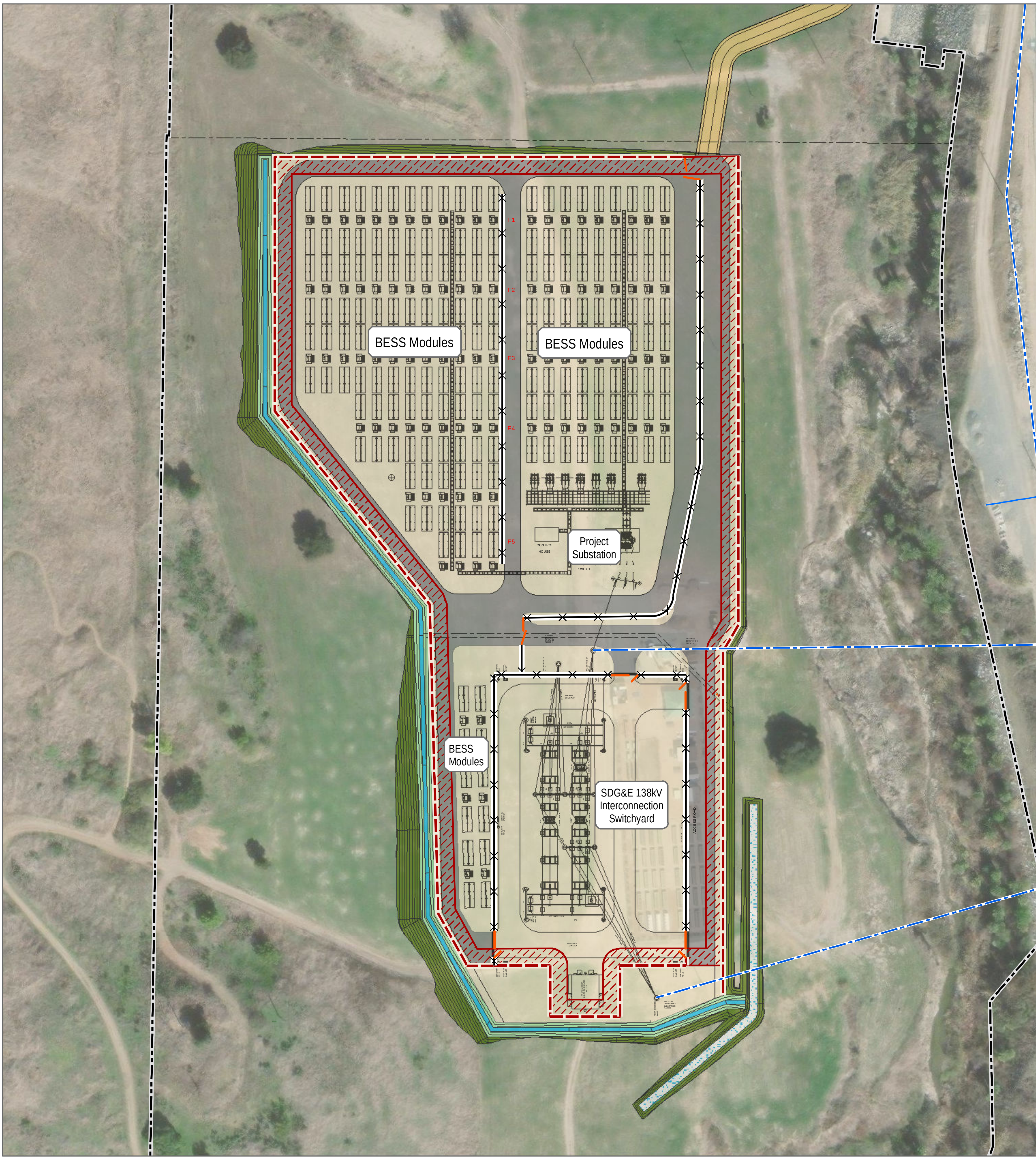

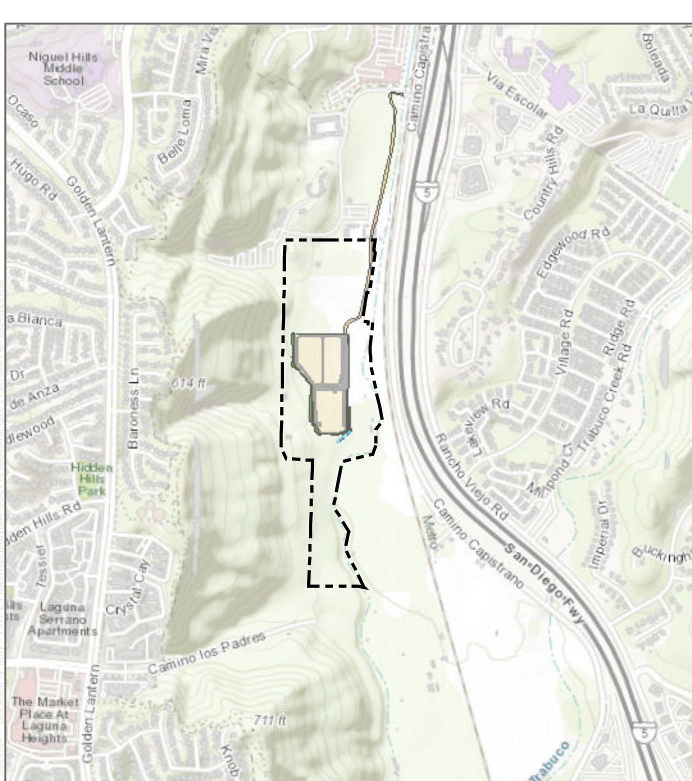

- 10-Ft Precast Fire Wall
- 6-Ft tall Security Fence with 3-strand Barbed Wire
- Gates

ExistingTransmission Alignment

- SDG&E Trabuco to Capistrano transmission line (138kV)
- Fiber
- APN 637-082-71
- 20-Ft Fuel Modification Zone
- Non-combustible Surface/Graded Work
- Internal Access Roads for Emergency Access
- Contour Grading
- Drainage Ditch
- Drainage Side Slopes
- Channel
- Offsite Access Road/Emergency Vehicle Access

FIRE RECOMMENDATIONS:

-Project to be compliant with 2022 CFC 1206, Electrical Energy Storage Systems

-Project to be compliant with OCFA Guideline G-10, Stationary Storage Battery Systems

- Fire suppression systems inside each container as proposed (NFPA 855 compliant)

- 10' tall perimeter precast, decorative concrete walls to OCFA satisfaction

- 20' FMZ - entire area within walls to be void of vegetative fuel - gravel or similar surface

- Landscaped areas to include fire-resistant landscaping consistent with fuel modification zone requirements

- Maintain FMZs twice-yearly or more as needed

- 20' wide access roads per OCFA standards

- Hydrants located per OCFA standards

SOURCE: AERIAL-ESRI IMAGERY SERVICE 2022; SITE PLAN-SARGENT & LUNDY 2024

DUDEK

0 60 120 Feet

FIGURE 5

Fuel Modification Plan

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Appendix A

Excerpt from California Fire Code – Battery Storage

Excerpt from California Fire Code regarding stationary storage battery systems.

1206.2.8.7 Outdoor installations.

Stationary storage battery systems located outdoors shall comply with Sections 1206.2.8.7 through 1206.2.8.7.4, in addition to all applicable requirements of Section 1206.2. Installations in outdoor enclosures or containers that can be occupied for servicing, testing, maintenance and other functions shall be treated as battery storage rooms.

Exception: Stationary battery arrays in noncombustible containers shall not be required to be spaced 3 feet (914 mm) from the container walls.

1206.2.8.7.1 Separation.

Stationary storage battery systems located outdoors shall be separated by a minimum 5 feet (1524 mm) from the following:

1. Lot lines.
2. Public ways.
3. Buildings.
4. Stored combustible materials.
5. Hazardous materials.
6. High-piled stock.
7. Other exposure hazards.

Exception: The fire code official is authorized to approve smaller separation distances if largescale fire and fault condition testing conducted or witnessed and reported by an approved testing laboratory is provided showing that a fire involving the system will not adversely impact occupant egress from adjacent buildings, or adversely impact adjacent stored materials or structures.

1206.2.8.7.2 Means of egress.

Stationary storage battery systems located outdoors shall be separated from any means of egress as required by the fire code official to ensure safe egress under fire conditions, but not less than 10 feet (3048 mm).

Exception: The fire code official is authorized to approve lesser separation distances if large-scale fire and fault condition testing conducted or witnessed and reported by an approved testing laboratory is provided showing that a fire involving the system will not adversely impact occupant egress.

1206.2.8.7.3 Security of outdoor areas.

Outdoor areas in which stationary storage battery systems are located shall be secured against unauthorized entry and safeguarded in an approved manner.

1206.2.8.7.4 Walk-in units.

Where a stationary storage battery system includes an outer enclosure, the unit shall only be entered for inspection, maintenance and repair of batteries and electronics, and shall not be occupied fo other purposes.

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Appendix B
Example Pre-Cast Concrete Fire Protection Wall

Appendix B. Examples pre-cast, decorative wall at battery energy storage site. Note height compared to battery storage containers. Note also ground cover and lack of vegetation.

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