Michael Baker
INTERNATIONAL

We Make a Difference

August 24, 2015 JN: 145597

County of San Diego
Department of Planning and Development Services
5510 Overland Avenue, Suite 310
San Diego, CA 92123

San Diego County Fire Authority – Public Safety Group
c/o James Pine, County Fire Marshal
5510 Overland Avenue
3rd Floor, Suite 310
San Diego, California 92123

SUBJECT: FIRE PROTECTION PLAN - LETTER REPORT WITH FIRE BEHAVIOR MODELING
GRANGER SOLAR PROJECT - VALLEY CENTER, CA
APN: 129-162-07

Dear Mr. Pine:

This Fire Protection Plan (FPP) – Letter Report is being submitted pursuant to Chapter 49 of the County Fire Code as an evaluation of the adverse environmental effects that a proposed project may have from wildland fire and as mitigation of those impacts to ensure that the above-referenced Project does not unnecessarily expose people or structures to a significant risk of loss, injury, or death involving wildland fires.

PROJECT DESCRIPTION

The Project proponent (Granger Solar, LLC) is preparing an application for development and operation of a photovoltaic (PV) solar facility to be located on privately-held lands near Valley Center, California. The subject site is bordered by Mesa Crest Road to the west and Avenida Annalie to the south. The Project requires approval by the County of San Diego for a Major Use Permit (MUP) to allow for the construction, operation, and maintenance of such facilities for the long-term generation of clean renewable power from solar energy.

The County Assessor Parcel Number (APN) for the Project site is 129-162-07, totaling approximately 40.1 acres (gross). The proposed MUP development footprint for the Project includes approximately 27.1 acres of the 40.1 acres. The remainder of the affected parcel would remain in its natural state. Refer to Figure 1, Regional Location Map; Figure 2A, Local Vicinity Map; and, Figure 2B, USGS Quad Map: Pala Quadrangle.

The proposed PV solar facilities would be located with an approximately 27.1-acre land area ("MUP area") on the affected parcels, allowing the remaining acreage onsite to remain in its present state as undeveloped land. Project development would require a balanced cut and fill grading quantity of 24,000 cubic yard (c.y.).

The Project design would consist of PV solar panels mounted on a collection of single-axis tracking (SAT) systems supported by machine-driven metal "H" piles or round pipe columns. The solar panels would face to the east in the morning and to the west in the evening hours, thereby tracking the sun along the vertical axis to maximize solar absorption during the hours of daylight. The panels would be mounted on a rack system, measuring approximately 7-11 feet in height as measured from the ground surface to the top of panel. As such, the solar panels would not represent elements of large scale or height within the existing landscape. The length of each row of panels would measure approximately 170 feet along the north/south axis. The ultimate arrangement/number of PV solar panels, racking, inverter pads and structures, and internal access are shown on the MUP Plot Plan to illustrate the general configuration of the proposed solar collection system; however, this layout is subject to modification at final engineering design. Refer to Figures 3A and 3B, which show the MUP Plot Plan and associated Elevations/Details.

The direct current (DC) power generated by the PV panels would be transmitted via underground cable to one proposed inverter/transformer pad and/or one proposed switchgear pad located within the proposed onsite development area where the DC power would be converted to alternating current (AC) power. The inverter/transformer equipment pad would be approximately 16 feet wide by 33 feet long; the switchgear pad would be approximately 7.5 feet wide by 8.5 feet long. The equipment installed on the pads would measure a maximum of approximately 10 feet in height (above pad elevation). The pad would support two 1,500 kilowatt (kW) inverters and one three (3) megavolt ampere (MVA) transformer. All inverter/transformer and switchgear structures would be constructed of non-flammable materials (e.g. steel). The AC power from the inverter stations would be transmitted via underground AC cable to the switchgear. The switchgear would contain breakers, relays, and monitoring and metering equipment necessary to provide for the safe and efficient transfer of power to SDG&E.

Energy generated by the Project would be delivered to the existing San Diego Gas & Electric (SDG&E) 12 kilovolt (kV) distribution line from the Project site via overhead connection, with ultimate connection to the Lilac Substation (69/12kV), located approximately 1.8 miles to the southwest of the property along Gabler Drive. No offsite improvements to either the existing transmission lines or substation are required or proposed. The point of interconnection (POI) would occur at an existing utility pole within the Mesa Crest Road right-of-way (ROW) adjacent to the western Project boundary.

Primary access to the site would occur from Mesa Crest Road. Minor improvements are required to improve the entrance drive into the site at Mesa Crest Road to 24 feet in width. A 40-foot AC taper would be constructed to provide adequate access to/from the site.

Per VCFPD standards, ground-mounted photovoltaic arrays 10 acres or larger in size are required to provide a fire apparatus access roadway around the perimeter of the project, in compliance with Section 503. Onsite circulation would be facilitated via 24-foot wide onsite service/fire

access roads that would serve the invertor pad/equipment. A 20-foot wide perimeter fire access road would run along the perimeter of the proposed development area. A number of 10-foot wide roads running north-south are also proposed within the panel fields to allow for Project management.

All fire access roads would be designed and maintained to support the imposed loads of fire service apparatus (not less than 75,000 lbs) and would have an approved surface so as to provide all-weather driving capabilities. The fire access roads would be constructed to facilitate a maximum fire hose pull of approximately 215 feet. Although Valley Center Fire Protection District (VCFPD) approval of a variance would be required to allow for the fire hose pull to exceed 150 in length, it is anticipated that the proposed looped perimeter road (and other interior roadways) would provide continual circulation throughout the site, allowing for adequate maneuvering of emergency vehicles and ability for such vehicles to reach all areas of within the development footprint in the event of a fire. Further, the purpose of the interior fire access roads is to allow fire service apparatus access to the inverter/transformer unit. Structural elements would be constructed of non-flammable materials (metal, glass, etc.), further reducing the potential for combustion to occur.

In order to control dust during the life of the Project, a non-toxic, biodegradable, permeable soil-binding agent or permeable rock material would be applied to all disturbed or exposed surface areas as follows: a) A permeable soil-binding agent suitable for both traffic and non-traffic areas shall be used. These agents shall be biodegradable, eco-safe, with liquid copolymers that stabilize and solidify soils or aggregates and facilitate dust suppression; or, b) Alternatively, a permeable rock material consisting of either river stone decomposed granite or gravel could be placed in a thin cover over all exposed surface area in-lieu of the binding agent referenced above. The binding agent would be reapplied approximately every two years for maintenance purposes.

It is anticipated that overall construction of the Project would take approximately four months to complete, with crews working five days per week, eight hours per day. Weekend and/or holiday work is not anticipated to be required. Construction of the Project would occur at one time, and phasing is not proposed.

The Project would be served by the Valley Center Fire Protection District (VCFPD) from Fire Station No. 1 located at 28234 Lilac Road just southeast of the Project site. As the Project would have the potential to result in additional demands on the VCFPD and/or other area emergency service providers, the Project would be conditioned to participate in a Community Facilities District (CFD) of the VCFPD or similar approved mechanism to generate adequate funding for emergency and prevention services in perpetuity; refer to CFD-2008-01 VCFOD Requirements. The Project applicant shall comply with all requirements of the CFD, as applicable, and once such specific requirements have been identified. Joining the CFD for fire protection services and payment of the required fees will ensure that fire protection services will be adequate to serve the Project, and that no significant cumulative effects occur as the result of Project implementation.

ENVIRONMENTAL SETTING

1. Location: The proposed Project site for the Granger Solar Project is located within the community of Valley Center, California, within north-central San Diego County. The Project site is located approximately 5.5 miles east of Interstate 15 (I-15) and immediately east of Mesa Crest Road. The affected County Assessor Parcel Number (APN) is 129-162-07, totaling approximately 40.1 acres (gross); however, only a portion (27.1 acres) of the subject parcels would be developed as part of the Project; refer to Figure 1A, Regional Location Map, and Figure 2A, Local Vicinity Map.

2. Topography: Onsite topography within the MUP area is generally flat. Onsite elevations within the proposed MUP footprint range from approximately 1,365 feet above mean sea level (amsl) in the northwestern portion of the site to approximately 1,422 feet amsl near the southeast corner of the MUP area. Of the 27-acre MUP area, approximately 91 percent of lands (or 25 acres) have a slope of zero to 15 percent; seven percent (1.54 acres) of lands have a slope of 15-25 percent; and, two percent (0.56 acre) have slopes of greater than 25 percent within the MUP footprint. Steep slopes (rise greater than 25% over a 50-foot run, as defined by the County's Resource Protection Ordinance) are present in the eastern portion of the property, outside of the MUP area. The Project as designed would not encroach into any County defined steep slopes. No areas prone to landslide or subsidence occur onsite or on adjacent lands.

3. Geology: The Project area and the surrounding community of Valley Center are generally underlain by Quaternary alluvium. The site does not contain geological features that would pose any increased danger of wildfire potential or human safety issues.

4. Flammable Vegetation: The property formerly supported a container nursery. Onsite habitat within the MUP area includes ornamental, California buckwheat scrub, coast live oak woodland (disturbed), coastal sage scrub, coastal sage scrub (disturbed), disturbed, non-native grassland, agriculture, southern mixed chaparral. Disturbed areas are present onsite in the form of dirt roads.

The subject site is identified by the California Department of Forestry and Fire Protection (CalFire) as being located in a Fire Hazard Severity Zone designated as "Very High" within a State Responsibility Area (SRA), and in the County of San Diego General Plan Safety Element as being in an area with a potential fire threat of "High" to "Very High." Additionally, the site is identified as being within a Wildland Urban Interface zone.

5. Climate: The climate in Valley Center is typically warm during summer when temperatures tend to be in the 70's and cool during winter when temperatures tend to be in the 50's. The warmest month of the year is August with an average maximum temperature of 89 degrees Fahrenheit, while the coldest month of the year is December with an average minimum temperature of 42 degrees Fahrenheit. Temperature variations between night and day tend to be moderate during summer with a difference that can reach 27 degrees Fahrenheit, and moderate during winter with an average difference of 25 degrees Fahrenheit. The annual average precipitation at Valley Center is 15.1 inches. Rainfall in is fairly evenly distributed throughout the year. The wettest month of the year is January with an average rainfall of 3.37 inches.

PROJECT EXPOSURE TO WILDLAND FIRES

1. Water Supply: Water for construction would be provided by the Valley Center Municipal Water District (VCMWD) via proposed connection to an existing water line in Mesa Crest Road. To allow for ongoing maintenance of the solar panels, potable water would be used for the panel washing. A commercial vendor would arrive onsite and load water from the meter for Project use. The vendor would de-ionize the water prior to high-pressure washing the panels for maintenance. The use of groundwater is not proposed for construction or operation of the Project.

Two existing fire hydrants are located within the right-of-way of Mesa Crest Road at the western Project boundary. The VCFPD personnel would connect to the fire hydrants for the provision of water fire suppression in the event of an emergency. The installation of new fire hydrants is not proposed or required with the Project.

2. Fire Access Roads:

Construction Access

All materials for Project construction would be delivered to the site by truck. The majority of truck traffic would occur on designated truck routes and/or major streets. Access to the site during construction would be provided directly from Mesa Crest Road.

Traffic resulting from Project construction activities would be temporary and may occur along area roadways as workers and materials are transported to and from the Project area. If directed by the County, the Project applicant would prepare a Traffic Construction Mitigation Plan to ensure that circulation on roadways utilized during construction is not adversely affected and that public safety is maintained.

Long-Term Access and Onsite Circulation

Permanent access to the site would occur from Mesa Crest Road. Minor improvements are required to improve the entrance drive into the site at Mesa Crest Road to 24 feet in width and to provide a 40-foot AC taper to ensure adequate access to/from the site; refer to Figure 3A, Major Use Permit Plot Plan. Onsite circulation would be facilitated via 24-foot wide onsite service/fire access roads that would serve the invertor pad/equipment. A 20-foot wide perimeter fire access road would run along the perimeter of the proposed development area. A number of 10-foot wide roads running north-south are also proposed within the panel fields to allow for Project management. A waiver of the 24-foot road requirement is being requested.

The fire access roads would be designed and maintained to support the imposed loads of fire service apparatus (not less than 75,000 lbs) and would have an approved surface so as to provide all-weather driving capabilities. The interior fire access roads would be constructed to facilitate a maximum fire hose pull of approximately 215 feet. The purpose of the interior fire access roads is to allow for access of fire service apparatus throughout the Project site and in order to reach the inverter/transformer and switchgear units. A waiver of the 150 foot house pull requirement is being requested.

In order to control dust during the life of the Project, a non-toxic, biodegradable, permeable soil-binding agent or permeable rock material would be applied to all disturbed or exposed surface areas as follows: a) A permeable soil-binding agent suitable for both traffic and non-traffic areas shall be used. These agents shall be biodegradable, eco-safe, with liquid copolymers that stabilize and solidify soils or aggregates and facilitate dust suppression; or, b) Alternatively, a permeable rock material consisting of either river stone decomposed granite or gravel could be placed in a thin cover over all exposed surface area in-lieu of the binding agent referenced above. The binding agent would be reapplied approximately every two years for maintenance purposes.

To facilitate circulation onsite, illuminated signage would be installed at the Project entrance off of Mesa Crest Road and at the onsite inverter/transformer pad. All Project lighting would conform to County of San Diego outdoor lighting requirements.

Access to Multiple Evacuation Routes: Interior emergency access would be provided by fire access roads that would remain unsurfaced (covered with a binding agent) and would serve as a fire buffer. In addition, a system of internal roadways would be provided between the running rows of solar panels to allow for routine maintenance (surfaced with decomposed granite (d.g.).

Dead Ends: No dead-end roads are proposed with the Project; refer to Figure 3A, Major Use Permit Plan.

Width: The improved width of the interior fire access roads would be 24 feet with a base designed and maintained to support the imposed loads of fire apparatus of not less than 75,000 lbs to serve the invertor pad/equipment. A 20-foot wide perimeter fire access road would run along the perimeter of the proposed development area also with a base designed and maintained to support the imposed loads of fire apparatus of not less than 75,000 lbs. In addition, a number of internal roadways of 10-foot width would be provided between the running rows of solar panels to allow for routine maintenance.

Grade: A maximum 10% grade will be maintained along all Project roadways used for purposes of emergency access.

Surface: Surface improvements for onsite roadways shall consist of an all-weather material with binding agent design, and shall be constructed to VCFPD standards. All roadway surfacing material for Project roads to be used for emergency access purposes shall be compacted per County standards and suitable for travel by 75,000-lb. fire protection service apparatus (bearing load).

Gates: The perimeter of the MUP area would be fenced with a 7-foot high chain link fence (8-foot maximum) with plastic or wooden slats to minimize views into the development area. A gate is proposed at the entrance off of Mesa Crest Road to provide secured access to the Project site. The gate would meet the requirements of San Diego County Fire Code Section 96.1.503.6 for automatic operation with battery back-up. The gates would open immediately upon emergency vehicle strobe light activation from direction of approach and would include a Knox box key-operation switch.

Emergency Response Time: Emergency response time is the estimated time it would take for a responding agency to travel from the fire station serving a site to the furthest structure within the proposed development boundary. The emergency response time is determined by measuring the safest, most direct, and reliable route, with consideration for safe speeds at which heavy fire apparatus can operate.

The most remote portions of the Project are located approximately 8 miles from VCFPD's Station #1 located at 28234 Lilac Road. Emergency response time to the site is estimated to be approximately sixteen minutes when calculated by Table C.1.11 (b) NFPA 1142.

3. Setback from Property Lines: Minimum setbacks as regulated by the County of San Diego Zoning Ordinance Section 4800 will be maintained. A schedule summarizing the specific zoning designation for the affected parcel is as follows:

Zone		
APN:	**129-162-07**	
Use Regulations	**A72**	
Neighborhood Regulations	**N**	
Development Regulations	**Density**	**--**
	Lot Size	**2 AC**
	Building Type	**C**
	Maximum Floor Area	**--**
	Floor Area Ratio	**--**
	Height	**G**
	Lot Coverage	**--**
	Setback	**C**
	Open Space	**--**
Special Area Regulations		**A**

4. Building Construction: Building construction for onsite structures would be limited to non-combustible construction primarily of concrete block or steel. Project structures would consist of a varied number of inverters/transformers constructed on equipment building pads, and distributed within the MUP development footprint. Fire access roads would serve all equipment pads.

5. Fire Protection Systems: Two existing fire hydrants are located within the ROW of Mesa Crest Road, one at the northwestern Project boundary and one at the southwestern Project boundary.

The VCFPD personnel would connect to one of the two fire hydrants for the provision of water fire suppression in the event of an emergency.

6. Defensible Space: A 30-foot wide fuel management zone (FMZ) (measured outward from the boundary of the proposed development area) would be provided around each of the onsite areas proposed for development with the PV solar facilities. Additionally, 20-foot wide fire access roads would be constructed within the interior of the site along portions of the development area to provide a fire buffer and to ensure adequate onsite circulation of fire/emergency vehicles, as needed.

7. Vegetation Management: The VCFPD requires the property owner to monitor and reduce the combustible fuel load on the property and at all property line areas as specified by VCFPD Ordinance 2008-35 also known as the California Urban-Wildland Interface Code. The Code regulates and governs the mitigation of hazards to life and property from the intrusion of fire from wildland exposures, fire from adjacent structures, and prevention of structure fires spreading to wild land fuels in the VCFPD.
All onsite vegetation will be maintained/weed-whipped on an annual basis to a maximum of six inches, unless otherwise requested by the VCFPD. A minimum 30-foot wide FMZ shall be maintained around the perimeter of the onsite area proposed for development to reduce the potential for the spread of wildfire. Areas under the panels would be dirt with an erosion control binding agent. The brush clearing zone shall be maintained year-round by the Project proponent as required by this FPP Letter Report and VCFPD fire regulations. The Project site shall be annually maintained to remain free of dead vegetative material.

8. Fire Behavior Computer Modeling: Per the request of the VCFPD, Computer Fire Behavior Modeling was prepared for the Project to determine the potential for the Project to increase the risk for wildfire to occur as proposed by Dudek in August 2015; refer to Appendix B of this report.

The Computer Fire Behavior Modeling completed by Dudek using BehavePlus modeling software was conducted to document the type and intensity of fire that would be expected on the site given various site-specific factors: topography, vegetation, and weather. The modeling provided a conservative (near worst-case) estimate of fire behavior, including estimates of flame length (feet), fire intensity (BTU/feet/second), and spread rate (mph), among others.

The completed modeling consists of four scenarios which vary in location and weather conditions. Two of the modeling scenarios analyzed potential fire behavior along the western and southern edges (Scenarios 3 and 4) during summer weather conditions with on-shore winds. The other two modeling scenarios (Scenarios 1 and 2) analyzed potential fire behavior along the eastern and northern edges of the development during Peak weather conditions with off-shore Santa Ana winds.

The modeling conducted for the Project site concluded that, as designed, and with consideration of conditions onsite and on surrounding lands, the Project would not result in a substantial increase in the risk for occurrence or spread of wildfire. No additional mitigation or design measures are required to reduce such potential effects.

The Project design includes a number of measures that would help to reduce the potential for wildfire. The Project components would be constructed of non-combustible materials (i.e. metal, glass, concrete). Additionally, existing vegetation within the MUP area would be largely removed to allow for Project construction, and as a condition of approval, vegetation within the interior of the solar field (under the panels) would be routinely maintained to not exceed a height of 6 inches. Therefore, substantial vegetation would not be present within the MUP area to support a significant wildfire event. Due to the non-combustible nature of the Project components, the solar panel field would assist in reducing the spread of fire from properties abutting the Project site to other adjacent lands. Additionally, an existing hydrant located within the Mesa Crest Road right-of-way is available and adequate to provide water for fire suppression services, and no new such infrastructure improvements are required or proposed with the Project. The onsite looped roadway system (20-foot wide roadways) would provide adequate circulation for emergency vehicles. The required 30-foot wide FMZ would further reduce the potential for wildfire to occur onsite or to spread to adjacent properties.

9. Signage: An illuminated directory sign (activated via motion sensor) would be located at the entrance of the facility and at the inverter/transformer and switchgear stations. The signage would depict the overall site plan and the location of the inverter structure and electrical grid disconnect and circuit breaker. Each inverter/switchgear structure shall be numbered and signed to be plainly visible to the satisfaction of the VCFPD.

10. Disconnects: Switchgear for the Project will be housed onsite on an approximately 8.4-foot by 7.5-foot platform; refer to Figures 3A and 3B which show location and details of the switchgear platform. An override (or cut-off) switch will be provided that will be used to disconnect and disrupt all AC power leaving the inverter structures spaced throughout the site.

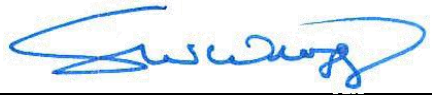
11. Waivers: In accordance with the attached Request for Agency Recommendations Letter from the Valley Center Fire Protection District (dated July 1, 2015) the following waivers are requested:

- In accordance with County Consolidated Fire Code/VCFPD Ordinance No: 2014-44, a waiver to increase maximum hose line access from interior fire access roadways and perimeter access road to 215 feet as the panels are non-combustible and there is a looped road system. These roads would be designed to be capable of accommodating emergency vehicles, as needed. A number of 10-foot wide roads running north-south are also proposed within the panel fields to allow for Project maintenance.
- In accordance with County Consolidated Fire Code/VCFPD Ordinance No: 2014-44, a waiver to satisfy the requirement of on-site fire hydrants every 300 feet. There are two fire hydrants on site, located along the western boundary of the site on Mesa Crest Road, therefore the need for hydrants at 300 foot spacing throughout the site is unnecessary.
- In accordance with County Consolidated Fire Code/VCFPD Ordinance No: 2014-44, a waiver to utilize a 20’ wide perimeter roadway and a 20’ wide north-south interior roadway, the entrance road which provides access to the inverter will be 24’wide. There

is also a turnaround provided at the inverter. This reduced roadway provides adequate access for emergency vehicles due to the unmanned nature of the site which eliminates the need for fire vehicles to pass other vehicles on site during a fire event and because the panels and all structures on the site are non-combustible.

12. Training: Formal training would be provided to the VCFPD. Fire service training and an educational program shall be provided to VCFPD personnel for all shifts of the fire emergency responders.

SIGNATURES:

	8-24-2015	Nicole Marotz, Senior Envn. Planner
Prepared by (Signature)	Date	Printed Name, Title
	8-24-2015	NLP Granger A82, LLC Steve Wragg, Vice President, Agent
Property Owner or Agent (Signature)	Date	Printed Name, Title
		James Pine, County Fire Marshal
Fire Marshal (Signature)	Date	Printed Name, Title
		George Lucia, VCFPD Fire Marshal
Fire Marshal (Signature)	Date	Printed Name, Title

Attachments: Figures 1, 2A-2B, 3A-3B; Fire Service Availability Form
Appendix A: Wildfire Technical Report
Appendix B: Fire Behavior Modeling

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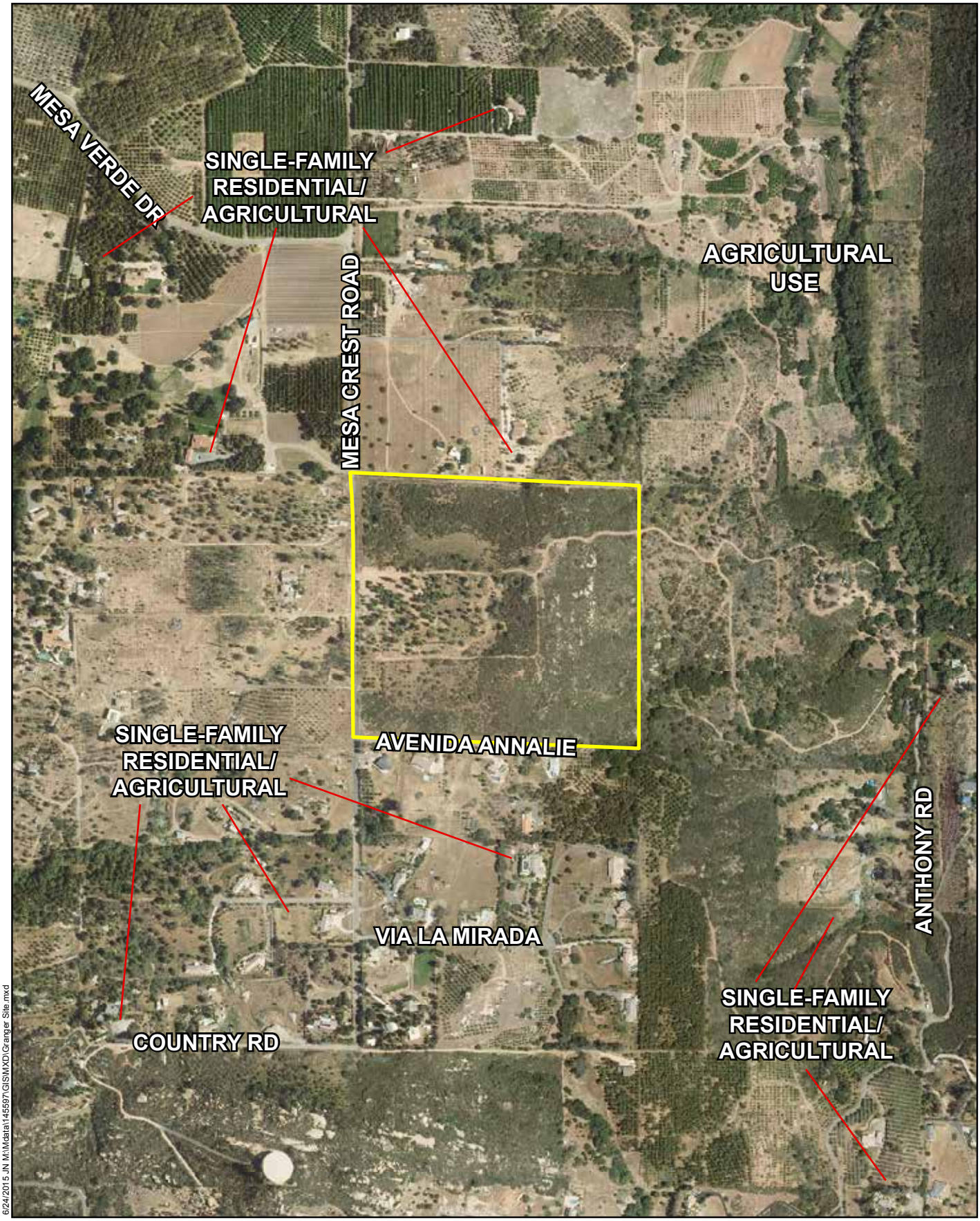
0 2.5 5 10 Miles

Source: ESRI

Granger Solar

REGIONAL LOCATION MAP

Figure 1



6/24/2015 JN M:\Mdata\145597\GIS\MXD\Granger Site.mxd

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Source:

N

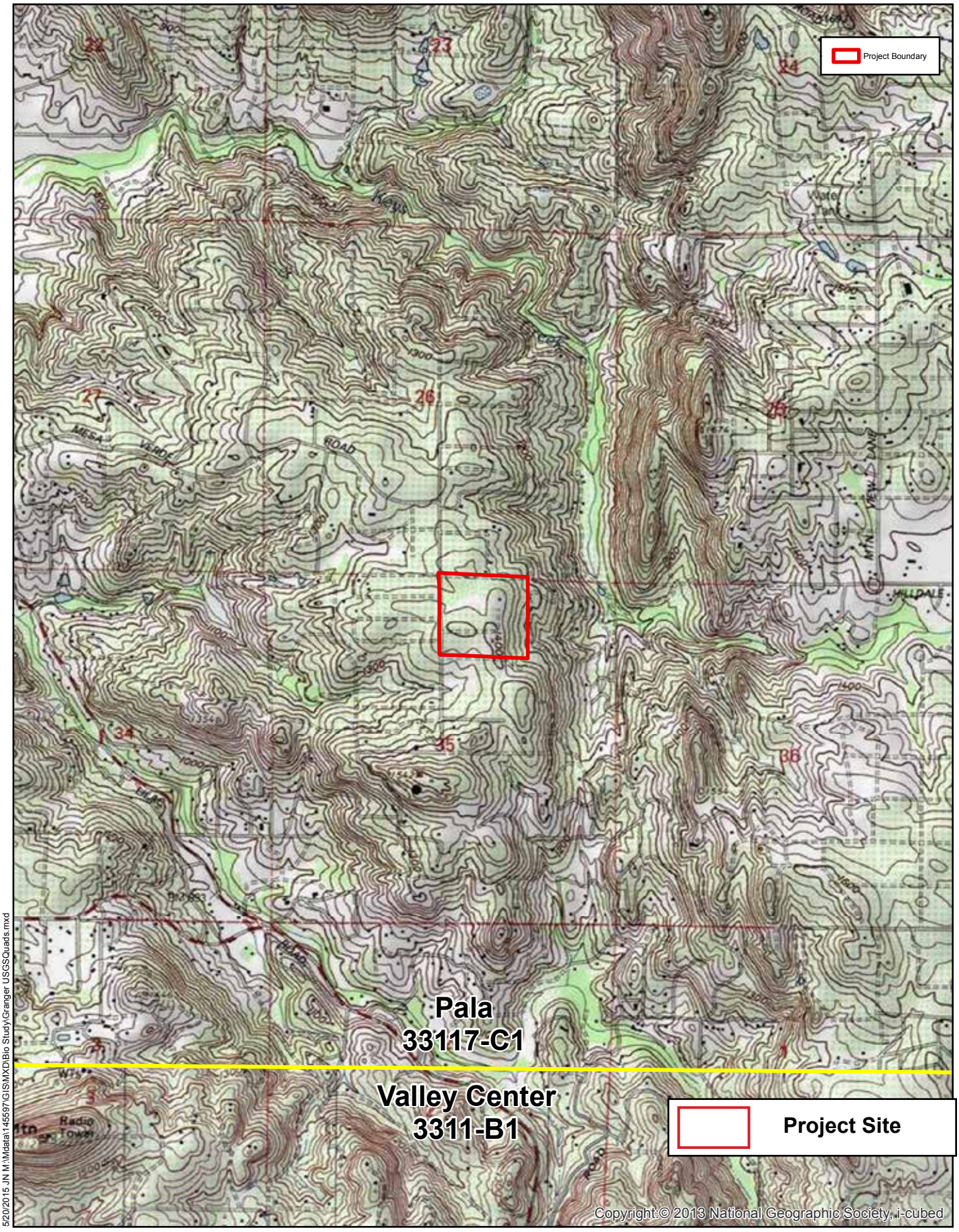
Not to Scale

Project Site

Granger Solar

LOCAL VICINITY MAP/SURROUNDING LAND USES

Figure 2A



5/20/2015 JN M:\Mdata\145597\GIS\MXD\Bio Study\Granger USGSQuads.mxd

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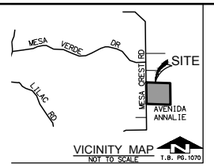
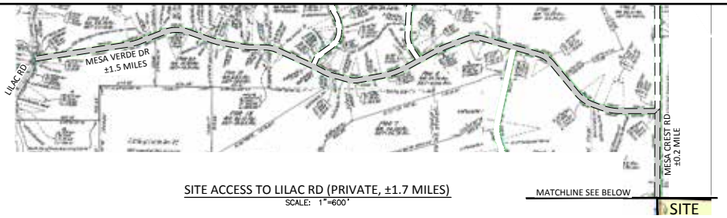
0 1,000 2,000 4,000 Feet

Source: USGS, SanGIS

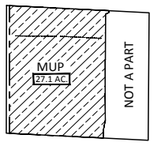
USGS QUAD MAP: PALA QUADRANGLE

Figure 2B

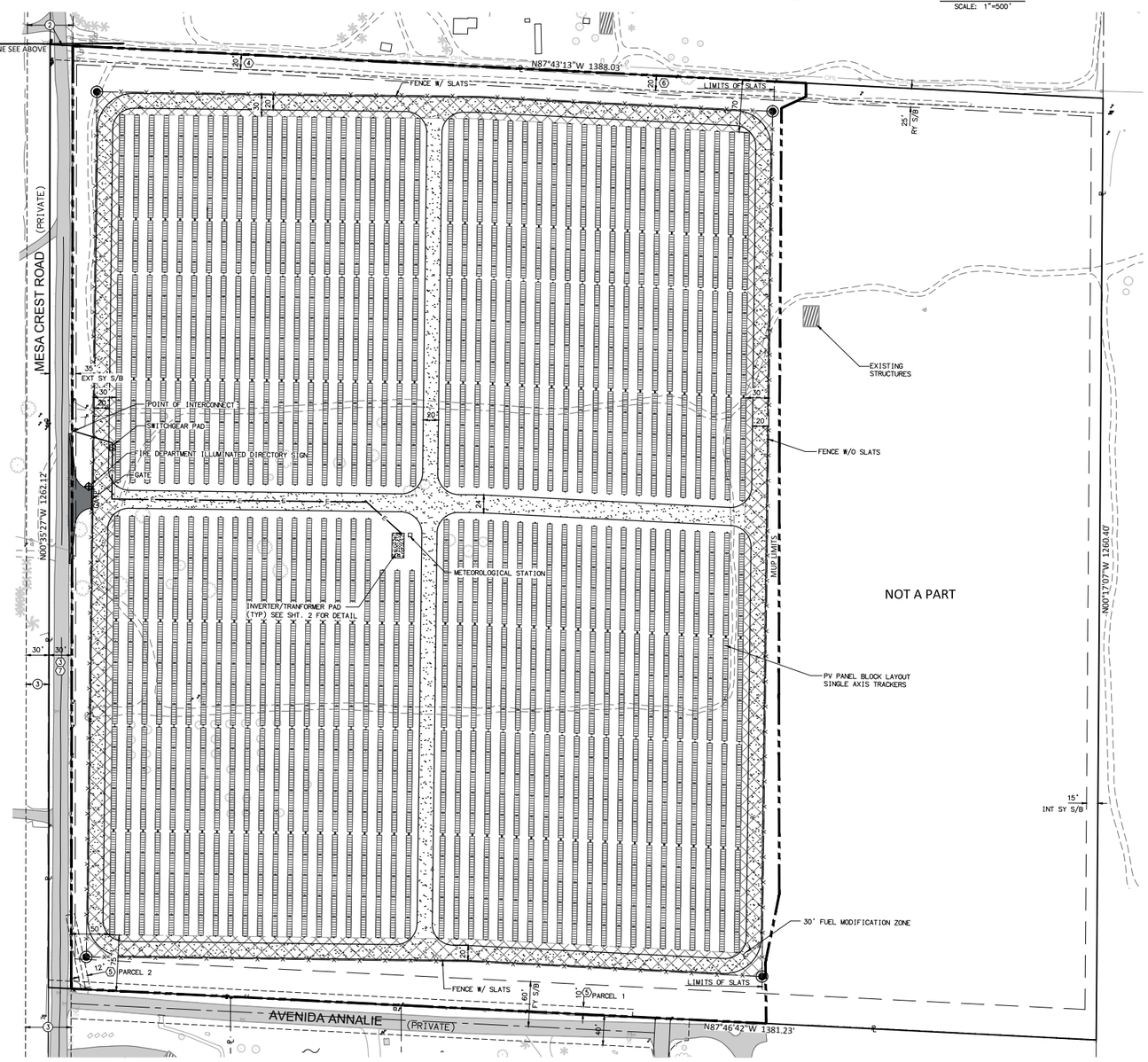




SITE ACCESS TO LILAC RD (PRIVATE, ±1.7 MILES)
SCALE: 1"=600'



MUP BOUNDARY
SCALE: 1"=500'



NOTES

1. GROSS AREA: 40.1 ACRES
2. NET AREA: 39.2 ACRES
   (MESA CREST ROAD EASEMENT = 0.9 AC)
3. MUP BOUNDARY AREA: 27.1 AC
4. GENERAL PLAN: SEMI-RURAL RESIDENTIAL (SR-2)
5. REGIONAL CATEGORY: SEMI-RURAL LANDS
6. TOPOGRAPHIC SOURCE: AEROTECH MAPPING INC, FLOWN 3/10/2015
7. ASSOCIATED REQUESTS: NONE
8. WATER DISTRICT: VALLEY CENTER MUNICIPAL WATER DISTRICT
9. FIRE DISTRICT: VALLEY CENTER FIRE PROTECTION DISTRICT
10. THE APPROVAL OF THIS MAJOR USE PERMIT (MUP) AUTHORIZES THE FOLLOWING: CONSTRUCTION, OPERATION, AND MAINTENANCE OF A PHOTOVOLTAIC SOLAR FARM PURSUANT TO SECTION 6952 OF THE SAN DIEGO COUNTY ZONING ORDINANCE.
11. THIS PLAN IS PROVIDED TO ALLOW FOR FULL AND ADEQUATE DISCRETIONARY REVIEW OF A PROPOSED DEVELOPMENT PROJECT. THE PROPERTY OWNER ACKNOWLEDGES THAT ACCEPTANCE OR APPROVAL OF THIS PLAN DOES NOT CONSTITUTE AN APPROVAL TO PERFORM ANY GRADING SHOWN HEREON, AND AGREES TO OBTAIN VALID GRADING PERMISSIONS BEFORE COMMENCING SUCH ACTIVITY.
12. ALL SOLAR EQUIPMENT STRUCTURES TO BE CONSTRUCTED OF NON-COMBUSTIBLE MATERIALS (CONCRETE, BLOCK, METAL) OR SIMILAR AND PAINTED EARTHTONE COLORS.
13. LIGHTING FOR MAINTENANCE AND SECURITY PROPOSES ONLY. SHIELDED LIGHTING LOCATED AT ENTRANCE GATES AND INVERTER/TRANSFORMER PADS & SHALL CONFORM TO COUNTY OF SAN DIEGO OUTDOOR LIGHTING REQUIREMENTS. SEE DETAIL ON SHEET 2.
14. PHASING - PROJECT MAY BE IMPLEMENTED IN SEVERAL PHASES WITHOUT REGARD TO SEQUENCE.
15. ALL DISTURBED AREAS WOULD BE COVERED WITH GRAVEL OR A BINDING AGENT TO REDUCE DUST.
16. SEE PRELIMINARY GRADING PLAN FOR PROPOSED GRADING.
17. SITE ACCESS GATE(S) TO BE EQUIPPED WITH FIRE DEPARTMENT APPROVED STROBE LIGHT ACTIVATION AND KNOX KEY-OPERATED SWITCH.
18. SOLAR RELATED FACILITIES (PANELS, RACKING, ELECTRICAL CONNECTIONS, INVERTER/TRANSFORMER PADS, SWITCHGEAR, MET STATION, FENCING, AND INTERNAL ACCESS, ETC.) SHOWN ON THE PLOT PLAN MAY BE RELOCATED, RECONFIGURED, AND/OR RESIZED WITHIN THE SOLAR FACILITY DEVELOPMENT AREA WITH THE ADMINISTRATIVE APPROVAL OF THE DIRECTOR OF PDS WHEN FOUND IN CONFORMANCE WITH THE INTENT AND CONDITIONS OF PERMIT'S APPROVAL. INVERTER/TRANSFORMER LOCATIONS CAN BE RELOCATED/RECONFIGURED WITHOUT REQUIREMENT OF MINOR DEVIATION. THE INVERTER/TRANSFORMER MUST COMPLY WITH THE NOISE ORDINANCE AND MUST BE ELEVATED 1' ABOVE FLOOD ELEVATION. THE 24' FIRE ACCESS ROAD WIDTHS MAY BE REDUCED ADMINISTRATELY WITH THE APPROVAL OF THE COUNTY AND FIRE AUTHORITY HAVING JURISDICTION OVER THE PROJECT.
19. A SYSTEM IDENTIFICATION SIGN SHALL BE LOCATED AT THE GATE ENTRANCE. SIGN SHALL BE 12'X18. SIGN SHALL LIST NAME OF SITE AND CONTACT INFORMATION AS PROVIDED BY SDGE.
20. PRIVATE PROPERTY/NO TRESPASSING AND HIGH VOLTAGE SIGNS SHALL BE LOCATED AT THE GATE ENTRANCE AND EVERY 100' MINIMUM ON FENCE, THE SIGN SHALL BE 10'X14'.MISCELLANEOUS INTERIOR DIRECTIONAL AND SAFETY SIGNAGE ARE PERMITTED.
21. OUTDOOR LIGHTING CIRCUITS SHALL INCORPORATE DUSK-TO-DAWN PHOTOCELL CONTROLLERS, OCCUPANCY SENSORS, AND/OR SWITCHES AS APPROPRIATE.
22. A METEOROLOGICAL (MET) STATION SHALL BE LOCATED ADJACENT TO THE INVERTER/EQUIPMENT PAD.

LEGEND

PROPERTY BOUNDARY	
EXISTING EASEMENT	
RIGHT-OF-WAY	
MUP BOUNDARY (27.1 AC)	
SETBACK LINE	
PROPOSED 7' CHAINLINK FENCE W/ SLATS (8' MAX.)	X X
PROPOSED ACCESS GATE	GATE
EXISTING AC PAVEMENT	
PROPOSED AC PAVEMENT	
PROPOSED FIRE ACCESS ROAD-ALL WEATHER (WIDTH PER PLAN)	
EXISTING OVERHEAD POWERLINE	OHL
EXISTING POWER POLE	
PROPOSED UNDERGROUND INTERCONNECTION	E
PROPOSED PV PANEL	
PROPOSED INVERTER/TRANFORMER PAD (1)	
30' FUEL MODIFICATION ZONE UNLESS OTHERWISE NOTED	
VIDEO CAMERA ON 10' POLE (4)	
FRONT YARD SETBACK	FY S/B
REAR YARD SETBACK	RY S/B
EXTERNAL SIDE YARD SETBACK	EXT SY S/B
INTERNAL SIDE YARD SETBACK	INT SY S/B

ASSESSOR PARCEL NUMBER

129-162-07

LEGAL DESCRIPTION

ALL THOSE PORTIONS OF THE WEST HALF OF THE NE QUARTER SECTION 35, TOWNSHIP 10 SOUTH, RANGE 2 WEST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN DIE STATE OF CALIFORNIA.

BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CALIFORN COORDINATE SYSTEM OF 1983 (CCS83, EPOCH: NSRS 2007, C 2011), ZONE 6, BASED LOCALLY UPON CONTROL STATIONS P4 PMOB, PUBLISHED BY THE CALIFORNIA SPATIAL REFERENCE CENTER (CSRC) WITH A BEARING OF S 50°43'25" E.

BENCHMARK

STATION NAME: "13525" PER RECORD OF SURVEY 17997. FOUN BRASS DISK STAMPED 51-61-XP30 FLUSH IN BOULDER.

ELEVATION = 1679.00 DATUM: NAVD88

SITE ADDRESS:

THE NE CORNER OF MESA CREST RD AND AVENIDA ANNALIE VALLEY CENTER, CA 92082

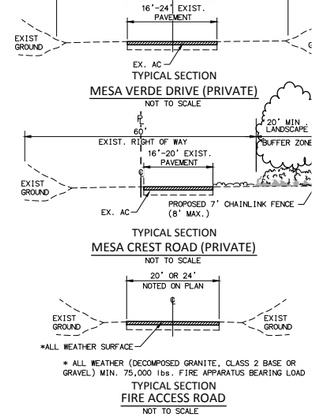
EXISTING EASEMENTS*

	DESCRIPTION	DISPOSITI
3	PRIVATE ROAD AND PUBLIC UTILITY	TO REMAIN
4	PUBLIC UTILITIES	TO REMAIN
5	SDG&E PUBLIC UTILITIES	TO REMAIN
6	SDG&E PUBLIC UTILITIES	TO REMAIN
7	PRIVATE ROAD AND PUBLIC UTILITY	TO REMAIN

*INDICATES EXCEPTION NUMBER IN LAWYERS TITLE COMPANY PRELIMINARY REPORT ORDER NUMBERS 613671458, DATED MAY 30, 2013.
2 PARCEL 2 OF PTR 613621458, 5/30/2013
3 PARCEL 3 OF PTR 613671488, 5/30/2012

ZONING

ZONE		
USE REGULATIONS		A72
ANIMAL REGULATIONS		N
DEVELOPMENT REGULATIONS	DENSITY	---
	LOT SIZE	2 AC
	BUILDING TYPE	C
	MAXIMUM FLOOR AREA	---
	FLOOR AREA RATIO	---
	HEIGHT	G
	LOT COVERAGE	---
	SETBACK	C
	OPEN SPACE	---
SPECIAL AREA REGULATIONS		A



Michael Baker INTERNATIONAL

N

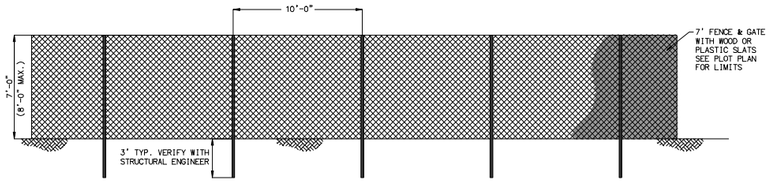
Not to Scale

Source: 145597Figures.indd

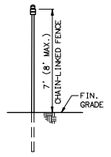
Granger Solar

MAJOR USE PERMIT PLOT PLAN

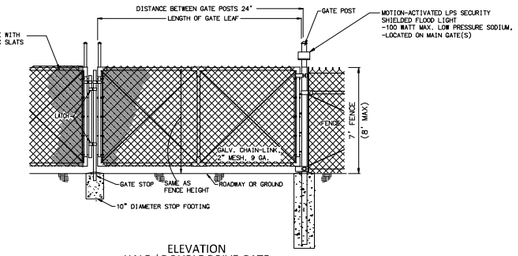
Exhibit 3A



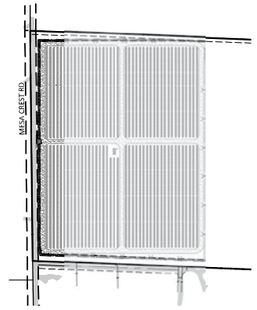
ELEVATION
CHAINLINK FENCE
N.T.S.



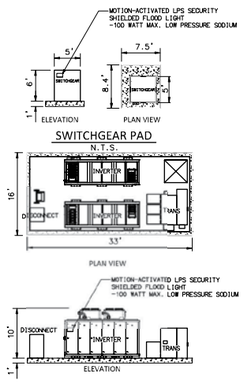
SECTION
TYPICAL FENCE



ELEVATION
HALF / DOUBLE DRIVE GATE
N.T.S.



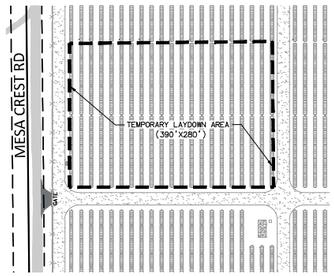
CHAINLINK FENCE W/ SLATS &
LANDSCAPE BUFFER LOCATION
N.T.S.



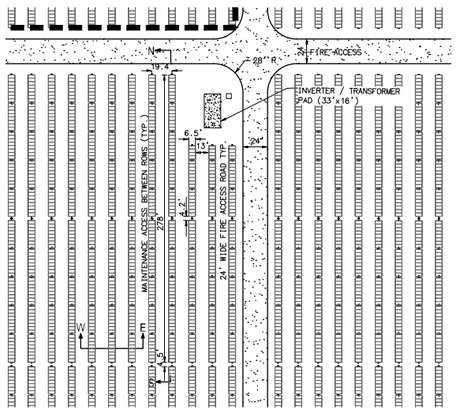
INVERTER / TRANSFORMER PAD
N.T.S.

* NOTE: INVERTER / TRANSFORMER FINISH SURFACE TO BE A MIN. 1' ABOVE BASE FLOOD ELEVATION (BFE) PER PRELIMINARY DRAINAGE STUDY.

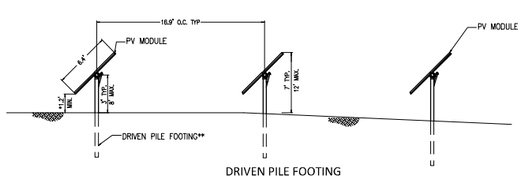
- EQUIPMENT CABINETS (INVERTER/TRANSFORMER) SHALL BE PAINTED WITH EARTH TONE COLORS TO BLEND WITH THE SURROUNDINGS.



CONSTRUCTION PLAN DETAIL
N.T.S.



PLAN VIEW
TYPICAL BLOCK LAYOUT
N.T.S.

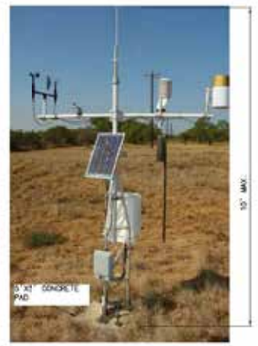


DRIVEN PILE FOOTING
POLE HEIGHTS MAY VARY TO FIT EXISTING TERRAIN

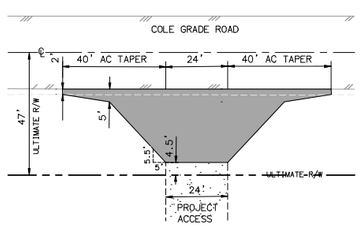
** DEPTH OF FOOTING TO BE DETERMINED BY STRUCTURAL ENGINEER

TRACKER ELEVATION W-E
N.T.S.

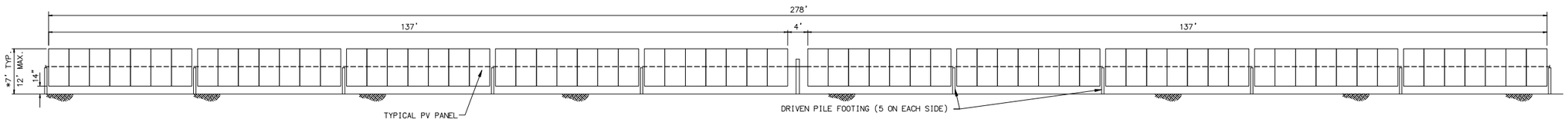
* NOTE: BOTTOM OF PANEL TO BE A MIN. 1' ABOVE BASE FLOOD ELEVATION (BFE).



METEOROLOGICAL STATION
N.T.S.



MODIFIED AC DRIVEWAY (DS-07)
N.T.S.



* SOIL UNDER PV ARRAY MAY UNDULATE WHICH MAY RESULT IN A MAXIMUM PANEL HEIGHT OF 12'.

TRACKER ELEVATION N-S
N.T.S.

- DRIVEN PILE FOOTING MAY BE H-PILES OR PIPE COLUMNS
- DEPTH / TYPE OF FOOTING TO BE DETERMINED BY STRUCTURAL ENGINEER.
- ALL SOLAR PANELS (AT MAXIMUM TILT) SHALL BE ELEVATED SO THAT THE LOWEST HORIZONTAL STRUCTURAL MEMBER IS AT LEAST ONE FOOT ABOVE THE BASE FLOOD ELEVATION (BFE) PER PRELIMINARY DRAINAGE STUDY.

Michael Baker INTERNATIONAL

N

Not to Scale

Source:
145597Figures.indd

Granger Solar

MAJOR USE PERMIT PLOT PLAN (DETAILS)

Exhibit 3B

VALLEY CENTER FIRE PROTECTION DISTRICT

Administrative Office & Fire Prevention Bureau
28234 Lilac Road
Valley Center, CA 92082
Tel: 760-751-7600 Fax: 760-749-3892

Thursday, July 02, 2015

Michael Baker International
9755 Clairemont Mesa Blvd
Ste. 100
San Diego, CA 92124

Subject: Request for Project Availability FIRE (PDS-399F)
Granger A82, LLC Photovoltaic Solar System (commercial)
Mesa Crest Road & Avenida Annalie / 129-162-07-00
Valley Center Fire Protection District (VCFPD)

Gentlemen:

The following are the Valley Center Fire Protection District Fire Marshal's comments regarding the subject project, based on the current information available to us at this preliminary project stage. Fire conditions may change and be clarified as more detailed plans are received.

PROJECT DESCRIPTION

This proposed photovoltaic solar system project is ground mounted within 27 acres of the 40 acre site.
The system will be PV solar panels mounted on a single-axis tracking system.

The project is located in designated Wildland Urban Interface, State Responsibility Area, and "Very High" Fire Severity Zone (the highest category.)
Note: setbacks are 30 feet in the very high zone.
The County Consolidated Fire Code and Valley Center Fire Protection District Fire Code apply. The State Board of Forestry and Fire Protection certified the current San Diego County Consolidated Fire and Building Codes as a package as meeting the CCR Title 14 requirements, and authorizing it's use in lieu of Title 14. The County, as land planning authority, is obligated to enforce it. Because the project is in State Responsibility Area, minimum County Consolidated Fire Code requirements must be applied in addition to Valley Center Fire Protection District Fire Code.

GENERAL PLAN CONFORMANCE

TBD

FIRE JURISDICTION

The subject property is within the Valley Center Fire Protection District, which provides structural, wildland fire protection, and emergency medical services on a year around basis. Wildland fire protection is provided by the California Department of Forestry and Fire Protection (CAL FIRE).

TRAVEL TIME. (*VCFPD Ordinance No: 2014-44 Fire Code section 202*)

The estimated time it would take for a responding agency to travel from the fire station to the furthest structure in this proposed development project, determined by measuring the safest, most direct, appropriate and reliable route with consideration given to safe operating speeds for heavy fire apparatus.
The most remote portions of this project are located approximately 8 miles from Valley Center Fire Protection District's Station #1 located at 28234 Lilac Road, with an emergency travel time of about 16 minutes when calculated by Table C.1.11 (b) NFPA 1142.

IMPACT (*VCFPD Ordinance: CFD-2008-01*)

This and other projects will have a cumulative impact on the availability of fire services. The level of fire service availability will, if not mitigated, decline. Mitigation is required in the form of participation in a Community Facility District or similar approved mechanism to generate adequate funding for emergency and prevention services in perpetuity. See CFD-2008-01 Valley Center Fire Protection District Requirements. Additional impacts, such as access, fuel (vegetation) modification and water supply, are identified below.
Note, Project Facility Availability status is "fire protection facilities are not expected to be adequate to serve the proposed development within the next five years" until the CFD-2008-01 is perfected.

FIRE ACCESS ROADWAYS - Road design

(*County Consolidated Fire Code / VCFPD Ordinance No: 2014-44*)
On-site fire access roadways are required around and from arrays and components to a public way. The fire access roadway shall be extended to within 150 feet of acceptable fire fighter hose line access to all ground level exterior portions of any arrays and components. Fire apparatus access roadways in residential and commercial areas shall have an unobstructed, improved width of not less than 24 feet all-weather paved, designed and maintained to support the imposed load of fire apparatus (not less than 75,000 lbs. GVW.). Fire apparatus access roads shall be provided and maintained for purposes of rapid and reliable fire apparatus access and for unobstructed traffic circulation for evacuation or relocation of civilians during an emergency event.
Ground-mounted photovoltaic arrays 10 acres or larger in size shall provide a fire apparatus access roadway around the perimeter of the project. The perimeter fire apparatus access roadway shall comply with section 503.

EMERGENCY KEY ACCESS

All central station-monitored fire detection systems and fire sprinkler systems shall have an approved emergency key access box on site in an approved location. The owner or occupant shall provide and maintain current keys for any structure for fire department placement in the box and shall notify the fire department in writing when the building is re-keyed. (Sec. 506.1.3).

IDENTIFACTION

Ground-mounted photovoltaic arrays with multiple equipment structures shall include a means of readily identifying each equipment structure. The fire code official may require a lighted directory map of the project to be installed on-site near the entrance to the facility for projects of 10 or more acres in size.

TRAFFIC CALMING DEVICES

Traffic calming devices (including, but not limited to, speed bumps, speed humps, speed control dips, etc.) shall be prohibited unless approved by the fire code official. (Sec. 503.4.1)

MARKINGS

When required by the fire code official, approved signs or other approved notices shall be provided for fire apparatus access roads to identify such roads or prohibit the obstruction thereof. Signs or notices shall be maintained in a clean and legible condition at all times and will be replaced or repaired when necessary to provide adequate visibility. All new public roads, all private roads within major subdivisions and all private road easements serving four or more parcels shall be named. Road name signs shall comply with County of San Diego Department of Public Works Design Standard #DS-13. (Sec. 503.3).

FIRE PROTECTION PLAN

(County Consolidated Fire Code / VCFPD Ordinance No: 2014-44
FIRE CODE SECTION 4903 / FIRE PROTECTION PLAN
When required. *Planning and Development Services or the FAHJ may require an applicant for a parcel map, subdivision map, specific plan or major use permit for any property located in a wildland-urban interface fire area to submit a Fire Protection Plan (FPP) as part of the approval process. (Sec. 4903.1).*
Content. *The FPP shall consider location, topography, geology, aspect, combustible vegetation (fuel types), climatic conditions and fire history. The plan shall address the following in terms of compliance with applicable codes and regulations including but not limited to: water supply, vehicular and emergency apparatus access, travel time to nearest serving fire station, structural ignitability, structure set back, ignition-resistive building features, fire protection systems and equipment, impacts to existing emergency services, defensible space and vegetation management.*
The FPP shall be prepared as prescribed in the County of San Diego Land Use and Environment Group "Guidelines for Determining Significance and Report Format and Content Requirements for Wildland Fire and Fire Protection" document. (Sec. 4903.2).
A Fire Protection Plan (FFP), (Long Format) submitted to and approved by the VCFPD Fire Marshal, is required. It must meet VCFPD Guidelines for Determining Significance and Report Format and Content

SECURITY GATES

No person shall install a security gate or security device across a fire access roadway without the fire code official's approval.

- An automatic gate across a fire access roadway or driveway shall be equipped with an approved emergency key-operated switch overriding all command functions and opening the gate.
- A gate accessing hazardous institutional, educational or assembly occupancy group structure, shall also be equipped with an approved emergency traffic control-activating strobe light sensor or other device approved by the fire code official, which will activate the gate on the approach of emergency apparatus.
- An automatic gate shall be provided with a battery back-up or manual mechanical disconnect in case of power failure.
- An automatic gate shall meet fire department policies deemed necessary by the fire code official for rapid, reliable access.
- When required by the fire code official, an automatic gate in existence at the time of adoption of this chapter is required to install an approved emergency key-operated switch or other mechanism approved by the fire code official, at an approved location, which overrides all command functions and opens the gate. A property owner shall comply with this requirement within 90 days of receiving written notice to comply.
- Where this section requires an approved key-operated switch, it may be dual-keyed or equipped with dual switches provided to facilitate access by law enforcement personnel.
- All gates providing access from a road to a driveway shall be located a minimum of 30 feet from the nearest edge of the roadway and shall be at least two feet wider than the width of the traffic lane(s) serving the gate.
- Electric gate openers, where provided, shall be listed in accordance with UL 325. Gates intended for automatic operation shall be designed, constructed and installed to comply with the requirements of ASTM F2200. (Sec. 503.6).

BRIDGES AND ELEVATED SURFACES

(County Consolidated Fire Code / VCFPD Ordinance No: 2014-44)
Where a bridge or an elevated surface is part of a fire apparatus access road, the bridge shall be constructed and maintained in accordance with AASHTO HB-17. Bridges and elevated surfaces shall be designed for a live load sufficient to carry the imposed loads of fire apparatus. Vehicle load limits and clearance limitations shall be posted at both entrances to bridges when required by the fire code official. Where elevated surfaces designed for emergency vehicle use are adjacent to surfaces which are not designed for such use, approved barriers, approved signs or both shall be installed and maintained when required by the fire code official

RESPONSE MAP UPDATES

Any new development which necessitates updating emergency response maps due to new structures, hydrants, roadways or similar features shall be required to provide map updates in a format compatible with current department mapping services and shall be charged a reasonable fee for updating all response maps. At a minimum, the map updates shall be provided in PDF or a CAD format approved by the FAHJ. (Sec. 505.5)

FIRE FLOW – water supply

(County Consolidated Fire Code / VCFPD Ordinance No: 2014-44
Provide on-site fire hydrants every 300 feet. Locations shall be approved by the Valley Center FPD Fire Marshal. In hazardous fire areas the required fire flow in the water mains is 2,500 gallons per minute. Fire Hydrants shall meet County standards identified in the Consolidated Fire Code. Waterline extension will be required for purposes of hydrant installation. (Required if the property is within a water district and a water main is 1500 feet or less from the property line.) Waterlines must be installed, and hydrants accepted by the water district and capable of full required fire flow prior to combustible materials being brought to the construction site. Water lines, fire hydrants, durable all weather fire access must be in place prior to combustible materials being on site.

FUEL MODIFICATION

(County Consolidated Fire Code / VCFPD Ordinance No: 2014-44)
Any person doing construction of any kind which requires a permit under this code or the County Building Code shall install a fuel modification zone prior to allowing any combustible material to arrive on the site and shall maintain the zone during the duration of the project. Combustible vegetation within the array and to a distance of 30 feet from the array and associated equipment shall be reduced to a height of no more than 6 inches. The fuel modification zone may be increased when required by the fire code official or as recommend by a fire protection plan.

FIRE SAFETY PRECAUTIONS BEFORE AND DURING CONSTRUCTION

During the ownership transition and permit process, this property may fall into an unsafe condition from lack of maintenance. The VCFPD Fire Code and Vegetation Compliance program has proven effective in mitigating the spread of fires and has played a part in keeping the destruction from these fires to a minimum. Please ensure this property meets all fire safety requirements at all times prior to grading and during construction. Doing so will reduce the loss of life and property from fire. VCFPD requires the property owner to monitor and reduce the combustible fuel load on this property and at all property line areas as specified by Valley Center Fire Protection District Ordinance 2008-35 also known as the California Urban-Wildland Interface Code regulating and governing the mitigation of hazards to life and property from the intrusion of fire from wildland exposures, fire from adjacent structures, and prevention of structure fires spreading to wild land fuels in the Valley Center Fire Protection District.

Yours in Safety,

George E. Lucia Sr.
Battalion Chief / Fire Marshal
Valley Center Fire Protection District

Cc; County of San Diego / Planning & Development Services / 5510 Overland Avenue Suite 110 / San Diego, CA 92123

County of San Diego, Planning & Development Services
PROJECT FACILITY AVAILABILITY - FIRE
ZONING DIVISION

Please type or use pen

NLP Granger A82 LLC — 619-733-2649
Owner's Name — Phone

17901 Von Karman Ave, Suite 1050
Owner's Mailing Address — Street

Irvine, CA 92614
City — State — Zip

ORG____ ACCT____ ACT____ TASK____ DATE____ AMT $____

DISTRICT CASHIER'S USE ONLY

F

SECTION 1. PROJECT DESCRIPTION — TO BE COMPLETED BY APPLICANT

A.
- ☐ Major Subdivision (TM)
- ☐ Minor Subdivision (TPM)
- ☐ Boundary Adjustment
- ☐ Rezone (Reclassification) from________to________zone.
- ☒ Major Use Permit (MUP), purpose: Solar Project
- ☐ Time Extension…Case No.________
- ☐ Expired Map…Case No.________
- ☐ Other________
- ☐ Specific Plan or Specific Plan Amendment
- ☐ Certificate of Compliance:________

B.
- ☐ Residential . . . . . . Total number of dwelling units________
- ☐ Commercial . . . . . Gross floor area________
- ☐ Industrial . . . . Gross floor area________
- ☐ Other . . . . Gross floor area________

C. Total Project acreage ~26 Total lots 1 Smallest proposed lot N/A

Assessor's Parcel Number(s)
(Add extra if necessary)

129-162-07	

Thomas Guide. Page 1070 Grid B3

Mesa Crest Road and Avenida Annalie
Project address — Street

Valley Center Fire Protection District — 92082
Community Planning Area/Subregion — Zip

OWNER/APPLICANT AGREES TO COMPLETE ALL CONDITIONS REQUIRED BY THE DISTRICT.

Applicant's Signature: [signature] Date: 5/8/2015

Address: 9755 CLAIREMONT MESA BLVD, SAN DIEGO, CA 92124 Phone: 858-614-5059

(On completion of above, present to the district that provides fire protection to complete Section 2 and 3 below.)

SECTION 2: FACILITY AVAILABILITY — TO BE COMPLETED BY DISTRICT

District Name: VALLEY CENTER FIRE PROTECTION DISTRICT

Indicate the location and distance of the primary fire station that will serve the proposed project:
28234 LILAC ROAD (FIRE STATION #1) AT 8 MILES (16 MINUTES)

A.
- ☒ Project is in the District and eligible for service.
- ☐ Project is not in the District but is within its Sphere of Influence boundary, owner must apply for annexation.
- ☐ Project is not in the District and not within its Sphere of Influence boundary.
- ☐ Project is not located entirely within the District and a potential boundary issue exists with the ________ District.

B.
- ☐ Based on the capacity and capability of the District's existing and planned facilities, fire protection facilities are currently adequate or will be adequate to serve the proposed project. The expected emergency travel time to the proposed project is ________ minutes.
- ☒ Fire protection facilities are not expected to be adequate to serve the proposed development within the next five years.

C.
- ☒ District conditions are attached. Number of sheets attached: 5
- ☐ District will submit conditions at a later date.

Owner/Applicant must annex into the Valley Center Fire Protection District CFD 2008-01 prior to approval of the Final Map

SECTION 3. FUELBREAK REQUIREMENTS

Note: The fuelbreak requirements prescribed by the fire district for the proposed project do not authorize any clearing prior to project approval by Planning & Development Services.

- ☒ Within the proposed project 100' feet of clearing will be required around all structures.
- ☒ The proposed project is located in a hazardous wildland fire area, and additional fuelbreak requirements may apply. Environmental mitigation requirements should be coordinated with the fire district to ensure that these requirements will not pose fire hazards.

This Project Facility Availability Form is valid until final discretionary action is taken pursuant to the application for the proposed project or until it is withdrawn, unless a shorter expiration date is otherwise noted.

[signature] — George E. Lucia - SR FM — 760 751-7600 — 7-2-2015
Authorized Signature — *Print Name and Title* — *Phone* — *Date*

On completion of Section 2 and 3 by the District, applicant is to submit this form with application to:
Planning & Development Services – Zoning Counter, 5510 Overland Ave, Suite 110, San Diego, CA 92123

APPENDIX A:

WILDFIRE TECHNICAL REPORT

Table of Contents

1 INTRODUCTION

This Fire Protection Plan (FPP) identifies and prioritizes the measures necessary to adequately mitigate potential fire hazards associated with photovoltaic (PV) solar energy generating facilities. It considers the property location, topography, geology, flammable vegetation (fuel types), and climatic conditions. It also considers the water supply, fire access roads, setbacks from the property lines, structure ignitability and fire resistive building materials, fire protection systems, defensible space, and vegetation management.

The Granger Solar Project proposes the use of PV technology for the production of solar energy. The FPP Wildfire Technical Report has been prepared to identify pre-suppression actions that would reduce risk directly associated with the proposed PV solar facilities, actions that would protect and enhance fire suppression resources, and actions that could protect the development from ignition caused by other sources.

In addition to the historical challenges that firefighters are faced with when arriving at a fire event, solar energy systems introduce new hazards including electrical shock both during and post fire incident, as well as concerns associated with the inhalation of unusual materials. These new hazards require that firefighters are able to adapt to new firefighting procedures, strategies, and tactics.

This report outlines the potential hazards associated with the proposed systems, strategies, and tactics, and provides an overall incident plan for use by emergency responders. In addition, as recommended by the California Department of Forestry and Fire Protection (CAL FIRE), this report provides a basic framework advancing the knowledge and understanding for the emergency responders of the hazards and related implementation measures to reduce the potential for fire events to occur.

A. PROJECT EFFECTS ON POTENTIAL FIRE RISK

The installation, operation, and maintenance of a PV solar facility would include activities that could elevate the probability of ignition. Typical fire risk associated with electricity-generating projects, such as solar facilities, include the following:

1. Transmission lines directly contacting vegetation that could cause an ignition.

2. Maintenance equipment and activities associated with the solar energy system or vegetation clearing along the transmission lines that could result in an ignition.

3. Vehicles used for operation of the solar energy system that could result in an ignition (catalytic converter, faulty brakes, etc.).

4. Malfunction of components of the solar energy system, resulting in an ignition.

B. HAZARDS TO EMERGENCY RESPONDERS

This report has been prepared to identify the specific hazards to emergency responders and firefighters as related to the installation, operation, and maintenance of a PV solar facility. These hazards include the following:

1. Contact with the system components (including any conduit or components between the modules and disconnect/isolation switches).

2. During daylight hours, the panels in such a solar system are always producing energy, or are energized.

3. Incidences involving solar energy generating systems are unique in that components may remain energized within the system components, even after all power has been de-energized.

4. Depending on the level of damage to the solar energy system, the connection to "ground" may have been lost.

5. Electrical conductive tools create a hazard of electrical shock as the system may still be energized.

6. Burning of PV solar modules produces toxic vapors.

7. The inverters and combiner boxes are protected within the inverter structures and present hazardous conditions for emergency responders. The inverters convert the Direct Current (DC) produced by the solar units into Alternating Current (AC), which would be transferred from the inverters via underground gathering lines that ultimately connect to a utility pole. The power would then be transferred via overhead lines to the point of interconnect (POI), located within the right-of-way (ROW) of Mesa Crest Road. Depending on the design and manufacturer, these components could be located at various locations on the inverter structure.

8. Inadequate signage for emergency responders to enable location of the inverters, emergency access routes, and/or other essential controls.

C. PROTECTION OF THE PROJECT SITE FROM OFFSITE WILDLAND FIRE EXPOSURE

If a solar energy generation facility is identified as being located within a very high fire hazard severity zone, the project would need to be designed to provide fuel modification zones (FMZs), fire breaks, and/or separation from onsite or adjacent offsite vegetation. Implementation of these design measures would reduce the risk of exposure resulting from wildland fires. In addition, vegetation within the solar array area should be

maintained at a height of six inches or less to reduce the potential for wildfire to occur and/or provide fuel for the spread of wildfire. Lastly, setbacks should be designed to further reduce the potential from exposure to wildland fire occurring on offsite lands.

2. FIRE OPERATIONS AND TACTICS FOR SOLAR SYSTEMS

Following a size-up (visual assessment of site conditions) of a fire incident, the choice of a strategic mode should be made by the Incident Commander (IC) following normal fire department standard operating procedures (SOPs). The tactics used to implement the strategy should also be based upon normal SOPs for responding to an emergency incident for a solar energy generating facility.

A. STRATEGY

When a fire incident occurs in the vicinity of or within the boundaries of a solar field, CALFIRE requires that the following items be considered when developing a strategy:

1. Fire conditions found on arrival;
2. Whether the solar field itself is burning or if fire is confined to the surrounding vegetation;
3. Threatened exposures, including wildland areas; and,
4. Water and additional resources available.

Once the IC has completed a size-up, he/she should determine the strategy and assign tasks to the fire suppression resources assigned to the incident. Due to the hazards associated with solar energy generating facilities, the IC must adjust the strategy and potentially rearrange the order of the tactics to deal with the specific solar technology. If the IC chooses an offensive strategy, it needs to be supported as any other fire operation, with an emphasis on disabling all power sources to and from the solar energy generating facility.[1]

B. TACTICS

With the increase in fire emergency responders to solar system emergencies, firefighters need to understand the hazards and related factors necessary for fire operations involving PV solar sites. CALFIRE encourages all emergency responders to be trained for the following:

[1] Fire Operations for Photovoltaic Emergencies. CAL FIRE - Office of the State Fire Marshal. November 2010.

- Ability to recognize solar energy generating systems
- Ability to identify system locations
- Ability to identify hazards with solar energy generating systems
- Ability to perform size-up
- Have knowledge of strategies and tactics

Operating at incidents where solar energy generating systems are present may require firefighters to adjust their actions somewhat; however, these adjustments should be similar to those that are necessary with many other types of electrical equipment or power generating sources.

The primary danger to firefighters working around a solar energy generating system is electrical shock. Following are the hazards and recommendations for firefighting tactics for a fire incident at a solar energy generation facility.

FIREFIGHTER ELECTRICAL SAFETY – INCIDENT PLAN

"Components are always hot!"

The single most critical message of emergency response personnel is to always consider PV fields and all of their components as electrically energized. The inability to power-down solar panels exposed to sunlight makes this an obvious hazard during the daytime.[2] All hazards should be appropriately marked or barricaded.

Ingress and Egress

Long-term primary access to the site would occur from Mesa Crest Road. Minor improvements would be required to ensure adequate access at the entrance (24-foot wide drive with a 40-foot wide driveway taper onto Mesa Crest Road).

Interior access would be provided by a system of 24-foot wide access drive that would allow for adequate emergency access tothe inverter/transformer pad and 20-foot drives that would provide looped access along the perimeter of the site, and 10-foot drive to all PV panel blocks. All fire access roads would be designed with an all-weather surface (decomposed granite or gravel) and capable of supporting a minimum 75,000-pound fire apparatus bearing load. These drives would also be used for purposes of maintenance. The

[2] Fire Fighter Safety and Emergency Response for Solar Power Solar Farms. A DHS/Assistance to Firefighter Grants (AFG) Funded Study. Prepared by: Casey C. Grant, P.E. Fire Protection Research Foundation. The Fire Protection Research Foundation One Batterymarch Park Quincy, MA, USA 02169-7471. May 2010.

fire access roads would be constructed to facilitate a maximum fire hose pull of approximately 215 feet. Although Valley Center Fire Protection District (VCFPD) approval of a variance would be required to allow for the fire hose pull to exceed 150 in length, it is anticipated that the proposed looped perimeter road (and other interior roadways) would provide continual circulation throughout the site, allowing for adequate maneuvering of emergency vehicles and ability for such vehicles to reach all areas of within the development footprint in the event of a fire.

Signage would be installed onsite to identify those roadways intended for use by emergency vehicles. Additionally, a series of 20-foot wide roads are proposed within the interior of the development areas to allow for maintenance of the facilities. These roads would also be designed to be capable of accommodating emergency vehicles, as needed. Additional 10-foot wide drive aisles running east-west would also be constructed within the field of solar arrays to provide access to maintenance purposes.

In order to control dust during the life of the Project, a non-toxic, biodegradable, permeable soil-binding agent or permeable rock material would be applied to all disturbed or exposed surface areas as follows: a) A permeable soil-binding agent suitable for both traffic and non-traffic areas shall be used. These agents shall be biodegradable, eco-safe, with liquid copolymers that stabilize and solidify soils or aggregates and facilitate dust suppression; or, b) Alternatively, a permeable rock material consisting of either river stone decomposed granite or gravel could be placed in a thin cover over all exposed surface area in-lieu of the binding agent referenced above. The binding agent would be reapplied approximately every two years for maintenance purposes.

A secured gate would be provided at the main access on Mesa Crest Road. The gate would meet San Diego County Fire Code Section 96.1.503.6 requirements for automatic operation with battery back-up. The gates would open immediately upon emergency vehicle strobe light activation from either direction of approach and would include a Knox-box key operation.

An illuminated directory sign would be located at the entrance of the facility and at the inverter/transformer station. The signage would depict the overall site plan and the locations of each numbered inverter structure and electrical grid disconnect and circuit breaker (switchgear). The inverter structure shall be numbered and signed to be plainly visible to the satisfaction of the VCFPD.

Avoid Hazards

During the overall fire suppression and mop-up phases of an onsite fire, firefighters should avoid all potential electrical hazards until there is confirmation that the solar facilities no

longer pose an electric shock hazard. Firefighters must avoid inadvertently damaging solar components with their tools.[3]

Provide Ability for Electrical Solar Farm Isolation for Emergency Responders

A key task by emergency response personnel is the isolation or shutdown of electrical power. This is especially important for commercial PV solar facilities, as they have the potential to generate high levels of electricity and may therefore pose significant fire-fighting challenges. The inverters and DC combiner boxes are contained within the inverter structures. An override (or cut-off) switch will be provided that would be used to disconnect and disrupt all AC power leaving the inverter structures.

The solar arrays would be arranged in blocks with disconnects for each block of solar arrays located at the inverter structures. Though utilization of the disconnect would disrupt all AC power leaving the inverter structure, the solar arrays and all DC power lines would still be energized during the daytime. If a fire or emergency action is isolated to one block of inverter structures, this would not require de-energizing the entire solar field. It is important, however, to have a disconnect to quickly de-energize the entire solar field in the event that a fire or emergency action involves multiply panels/arrays within the site. An override (or cut-off) switch will be used to disconnect and disrupt all AC power leaving the inverter structures. A disconnect would also be provided for any other power source(s) that may be connected to the solar energy generating facilities.

Damaged solar panels/arrays should never be touched without verifying whether or not the solar panels/arrays are energized. Firefighters should never cut the wiring utilized for any component within the solar field. Specialized tools may be required for disconnecting the module wiring. Firefighters should consider controlling fires within a solar field rather than removal, due to the inherent electrical hazard. Solar modules, support structures, tracking assemblies, and conduit should not be disassembled, damaged, or removed by firefighters until all of the solar components are isolated or de-energized by a qualified technician or electrician.

The phone number of a responsible entity who can dispatch a local technician in a timely manner should be displayed on the lighted directory at the entrance and on the inverter structures. Firefighters should limit their activities to containment of the fire until it can be confirmed that the solar energy generating facilities are isolated or de-energized.

In extraordinary circumstances, where all other tactics or options have been exhausted, solar panels must be removed. Care should be taken to use non-conductive tools since the modules and frames may still be energized. Damaged solar components should not be touched without verifying whether or not the Solar Farm is energized. Specialized tools

[3] Fire Operations for Photovoltaic Emergencies. CAL FIRE - Office of the State Fire Marshal. November 2010.

may be required to disconnect wiring. Firefighters should consider containing fires within a solar field rather than removal due to the inherent hazard and limited electrical safety training afforded to firefighters.

Isolation of Inverters

Isolation of the inverters and disconnecting the solar field from the main electrical panel will be an important task. It is recommended that assistance from a local solar technician be utilized to disable and confirm that all the hazards have been mitigated.

At any incident where a solar energy generating facility is present, the IC should designate a "Utilities Group" early to aid in locating and disabling inverter structures and other solar energy generating components. This can greatly decrease the electric shock hazard to all crews operating on the fire ground. Firefighters must remember that all solar components must be considered "HOT" during daylight. Additionally, firefighters must be aware that if only a single array of multiple arrays is isolated, all of the other arrays would most likely remain energized. Care must be exercised when operating the other energized arrays.

Preparation of an emergency response plan identifying all tasks and the parties responsible for providing the electrical isolation for emergency responders is recommended.

Isolating the Fire

Another priority would be preventing further extension of a fire and isolating it to its area of origin. If components within the solar field are on fire, it must be assumed that such components are "hot" during daylight. Fire suppression crews should avoid physical contact with such components until it can be confirmed by a qualified solar technician or electrician that all power sources have been isolated. It may take time for the technician to respond and locate all of the associated controls.

Extinguishing Fires

CALFIRE recommends that dry chemical extinguishers be used to contain or extinguish electrical fires. Water should be used to extinguish any ordinary combustibles under or near the solar field, or if the volume of fire requires its use. If water is used, a 30º fog pattern from at least a 30-foot distance, at 100 pounds per square inch (psi) is recommended. Full PPE must be used, due to the potential toxic inhalation hazard if panels are burning. Fire crews should position themselves upwind and out of any toxic atmosphere.[4]

CALFIRE also recommends that the IC request the assistance from a local solar technician to assist with disabling the solar energy generating components and confirmation that all

[4] Ibid

of the hazards have been mitigated before the incident is terminated and the scene is turned over to the owner or responsible party.

Water for fire-fighting purposes for the Project would be provided via connection to an existing water line within the Mesa Crest Road right-of-way.

TRIP, SLIP OR FALL HAZARDS

Solar systems are comprised of metal, glass, conduit and cable, all of which are slippery when wet. As previously noted, firefighters should avoid contact with solar system components. In addition, firefighters should use caution if using narrow maintenance access ways for a fire incident onsite.

FIREFIGHTER INHALATION HAZARDS

Inhalation hazards from chemicals inherent in solar modules engulfed in a fire or explosion can be mitigated through the use of firefighters wearing Self Contained Breathing Apparatus (SCBA's) and personal protective equipment during firefighting and overhaul operations. It is the decision of the IC whether or not the emergency constitutes sheltering the population "in-place" downwind of the emergency. Fire or explosion emergencies involving large number of solar arrays, as in the proposed application, may necessitate evacuating downwind of the emergency.[5]

BATTERY HAZARDS

In some PV solar systems, batteries are used to store solar-generated electricity. Batteries are used most frequently in off-grid PV solar systems, although batteries are also used in grid-tied applications to have electricity available in the event of a power failure.[6]

The proposed solar energy generating facility does not include the use of batteries for the storage of electricity. Solar modules themselves have no storage capacity. Inverters have capacitors that do store energy; however, the energy within the capacitors is discharged soon after power to the inverters is disconnected.[7]

3. SUMMARY

CALFIRE recommends that the first line at attack in a fire incident, in which a PV solar system is involved, is ensuring that firefighters on the scene are trained in identifying such systems and the methods to control them. In addition, CALFIRE stresses that they must know how to adjust their assessment of the incident involving solar components to ensure

[5] Ibid
[6] Ibid
[7] Ibid

appropriate actions are applied to the incident. In any incident, the desired outcome is to always mitigate and/or control the situation in a safe and efficient manner.8

The strategy and tactics firefighters choose are critical to both the outcome and the safety of all members working on the scene. CALFIRE indicates that the basics for ensuring safe, controlled, and mitigated incidents involving PV solar sites are as follows:

- Always wear protective clothing and SCBA
- Avoid wearing jewelry
- Use hand tools with insulated handles
- Locate battery storage area (if applicable)
- Be aware that biting and stinging insects could inhabit the module frame and electrical junction boxes
- Lock out/tag out system disconnects should be located and disconnected
- It is recommended that minimally, the fire emergency responders attend training entitled, "Fire Operations for Photovoltaic Emergencies," CALFIRE-Office of the State Fire Marshal, November 2010. The Fire Service Training and Education Program (FSTEP), provides this specific training need to local fire agencies in California.
- Proper signage must be installed at the site to accurately identify and locate project components (as appropriate) and potential hazards. Recommended signage requirements are as follows:
    - The phone number of a responsible entity with the authority and ability to dispatch a local technician in a timely manner should be displayed on the lighted directory at the entrance to the site and on each inverter structure.
    - Provision of signage at each disconnecting point to identify the location of the disconnecting point and the equipment it de-energizes.
    - Numbering of each onsite inverter structure with a sign that is plainly visible and with numbers that contrast with their background, to the satisfaction of the VCFPD.

[8] Ibid

- A lighted directory located at the entrance to the site depicting the overall site plan and the locations of each numbered inverter structure (as shown on the plot plan) for the site. Access to the site would be from Mesa Crest Road.

- Installation of signage at the end of each fire access road onsite, as appropriate, to identify those roadways intended for use by emergency vehicles.

- The solar arrays would be arranged in blocks with disconnects for each block of solar arrays located at the inverter structures. Though the utilization of the disconnect would disrupt all AC power leaving an inverter structure, the solar arrays and all DC power lines would still be energized during the daytime.

The tactical approach to a fire incident near or within a solar field must be stressed with all fire suppression personnel (i.e., stay clear). Serious injury can occur with such solar developments on a sunny day, and the danger to fire service personnel is real.[9]

At the conclusion of an incident, emergency personnel should leave the property in the safest condition possible. A post-incident focused size-up and safety analysis should be conducted.

REFERENCES

Fire Operations for Photovoltaic Emergencies. CAL FIRE - Office of the State Fire Marshal. November 2010.

Fire Fighter Safety and Emergency Response for Solar Power Solar Farms. A DHS/Assistance to Firefighter Grants (AFG) Funded Study. Prepared by: Casey C. Grant, P.E. Fire Protection Research Foundation. The Fire Protection Research Foundation One Batterymarch Park Quincy, MA, USA 02169-7471. May 2010.

Project Fire Service Availability Form. Valley Center Fire Protection District. Received July 2, 2015.

[9] Fire Fighter Safety and Emergency Response for Solar Power Solar Farms. A DHS/Assistance to Firefighter Grants (AFG) Funded Study. Prepared by: Casey C. Grant, P.E. Fire Protection Research Foundation. The Fire Protection Research Foundation One Batterymarch Park Quincy, MA, USA 02169-7471. May 2010.

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August 14, 2015

Mr. Patrick Brown
Project Manager
NLP Granger A82, LLC
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Subject: ***Fire Behavior Analysis for Granger Photovoltaic Solar Farm, County of San Diego, California***

Dear Mr. Brown,

This letter report presents the approach, methods, and results of Dudek's fire behavior modeling efforts for Granger Solar Farm (Project), located in the County of San Diego, California. To complete our scope of work, Dudek performed the following tasks:

- Reviewed applicable Project documents and maps;
- Retrieved, processed, and summarized fire weather data;
- Conducted fire behavior modeling runs using BehavePlus software.

This fire behavior analysis is a stand-alone document intended to support the preparation of the Project's fire protection plan (FPP), being prepared by RBF Consulting, a Michael Baker International Company. Dudek understands that the Project proponent is preparing an application for development and operation of a photovoltaic (PV) solar facility to be located on privately-held land. Project design and fire safety measures for the Major Use Permit (MUP) are described in the FPP. The Project site is located on a relatively flat mesa north of Valley Center, California at the northeast corner of Mesa Crest Road and Avenida Annale. The Project Area is situated in the U.S. Geological Survey (USGS) 7.5 minute Pala quadrangle map in the west half of the northeast quarter in section 35, Township 10 South, and Range 2 West.

The Project site is bounded by undeveloped land to the east, rural residential and orchards to the north, west, and south. The Project area lies within County Assessor Parcel Number 129-162-07, totaling approximately 40.1 acres (gross). The proposed MUP area for the Project includes approximately 27.1 acres of the 40.1 acres. The remainder of the property to the east of the MUP would remain as mixed chaparral fuel type.

The following sections summarize the methods, data sources, and results associated with our scope of work.

FIRE BEHAVIOR MODELING

Prior to fire behavior modeling efforts, Dudek fire protection planners conducted a site evaluation on July 21, 2015, to confirm existing fuel conditions, which informed the overall fire modeling effort. Following field evaluations, site data was compiled and processed for inclusion in the BehavePlus fire model.

Fire behavior modeling was conducted to document the type and intensity of fire that would be expected on this site given characteristic site features such as topography, vegetation, and weather. The most commonly used modeling software packages (including BehavePlus 5.0.5) provide reliable estimates of flame length, fire intensity, and spread rate, among other fire behavior variables. Although fire behavior modeling has some limitations, it provides valuable estimated fire behavior predictions, which can be used as a tool in the decision-making process and fuel modification considerations. In order to make reliable estimates of fire behavior, and interpret fire spread models, one must understand the relationship of fuels to the fire environment and be able to recognize the variations in these fuels, and have experience with wildland fires or applicable knowledge of how fire reacts in similar fuels.

Fire behavior modeling conducted for the Project site includes a relatively high-level of detail and analysis which results in reasonably accurate representations of how wildfire may move through available fuels. Fire behavior calculations are based on site-specific fuel characteristics supported by fire science research that analyzes heat transfer related to specific fire behavior. To objectively predict flame lengths and intensities, this analysis incorporated predominant fuel characteristics, slope percentages, and representative fuel models documented adjacent to the Project site. The BehavePlus 5.0.5 fire behavior modeling system was used to analyze anticipated fire behavior in key areas just outside of proposed Project development areas.

Predicting wildland fire behavior is not an exact science. As such, the movement of a fire will likely never be fully predictable, especially considering the variations in weather and the limits of weather forecasting. Nevertheless, practiced and experienced judgment, coupled with a validated fire behavior modeling system, results in useful fire protection planning information. The following sections provide background on the various fire environment inputs utilized for the fire behavior modeling conducted for the Project site.

BEHAVEPLUS MODEL INPUTS

Fuel Models

Vegetation is comprised of living and dead fuel. The type and quantity will depend upon the soil, climate, geographic features, and the fire history of the site. The major fuel groups of grass, shrub, trees and slash are defined by their constituent types and quantities of litter and duff layers, dead woody material, grasses and forbs, shrubs, regeneration, and trees. Fire behavior can be predicted largely by analyzing the characteristics of these fuels. Fire behavior is affected by topography (slope, aspect, and elevation), weather (wind, air temperature) and seven principal fuel characteristics: fuel loading, size and shape, compactness, horizontal continuity, vertical arrangement, moisture content and chemical properties.

The seven fuel characteristics help define the 13 standard fire behavior fuel models[1] and the more recent custom fuel models developed for Southern California[2]. According to the model classifications, fuel models used for BehavePlus fire behavior modeling have been classified into four groups, based upon fuel loading (tons/acre), fuel height, and surface-to-volume ratio. Documentation of field conditions determines which fuel models should be applied in modeling efforts. The following describes the distribution of fuel models among general vegetation types for the standard 13 fuel models and the custom Southern California fuel models (SCAL):

Grasses	Fuel Models 1 through 3
Brush	Fuel Models 4 through 7, SCAL 14 through 18
Timber	Fuel Models 8 through 10
Logging Slash	Fuel Models 11 through 13

In addition, the aforementioned fuel characteristics were utilized in the recent development of 40 new fire behavior fuel models[3] developed for use in the BehavePlus modeling system. These new models attempt to improve the accuracy of the 13 standard fuel models outside of severe fire season conditions, and to allow for the simulation of fuel treatment prescriptions. The following

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1 Anderson, Hal E. 1982. Aids to Determining Fuel Models for Estimating Fire Behavior. USDA Forest Service Gen. Tech. Report INT-122. Intermountain Forest and Range Experiment Station, Ogden, UT.

2 Weise, D.R. and J. Regelbrugge. 1997. Recent chaparral fuel modeling efforts. Prescribed Fire and Effects Research Unit, Riverside Fire Laboratory, Pacific Southwest Research Station. 5p.

3 Scott, Joe H. and Robert E. Burgan. 2005. Standard fire behavior fuel models: a comprehensive set for use with Rothermel's surface fire spread model. Gen. Tech. Rep. RMRS-GTR-153. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 72 p.

describes the distribution of fuel models among general vegetation types for the 40 more recently-developed fuel models:

Non-Burnable	Models NB1, NB2, NB3, NB8, NB9
Grass	Models GR1 through GR9
Grass Shrub	Models GS1 through GS4
Shrub	Models SH1 through SH9
Timber Understory	Models TU1 through TU5
Timber Litter	Models TL1 through TL9
Slash Blowdown	Models SB1 through SB4

Fuel models were assigned to vegetation types documented by Dudek's Fire Planners adjacent to the site, specifically in the undeveloped area to the east of the proposed Project. Attachment 1 provides photographs showing the locations and representative fuel types that were used during fire modeling.

Weather

Weather and fuel moisture inputs incorporated into fire behavior modeling for the site were determined by utilizing the guidelines and standards presented by the County of San Diego, Department of Planning and Land Use.[4] These guidelines identify acceptable fire weather inputs for extreme fire conditions during summer months and Santa Ana fire weather patterns. The County analyzed and processed fire weather from Remote Automated Weather Stations (RAWS) between April 15 to December 31 in order to represent the general limits of the fire season. Data provided by the County's analysis included temperature, relative humidity, and sustained wind speed and is categorized by weather zone, including Maritime, Coastal, Transitional, Interior, and Desert.

To evaluate potential fire behavior for the Project site, Dudek utilized the BehavePlus (v. 5.0.5) fire behavior modeling software package to determine fuel moisture values and expected fire behavior for the site. The temperature, relative humidity, and wind speed data for the Transitional[5] weather zone were utilized for this fire behavior analysis based on the Project

[4] County of San Diego Report Format and Content Requirements – Wildland Fire and Fire Protection (August 31, 2010). On-line at http://www.sdcounty.ca.gov/dplu/docs/Fire-Report-Format.pdf

[5] http://mappingsandiego.com/viewMap.html

location. Reference fuel moistures were calculated in BehavePlus and were based on site-specific topographic data inputs. Fire behavior for the site was calculated in four different locations using worst-case fuels and topography (steepest slopes). Two of the modeling scenarios analyzed potential fire behavior along the western and southern edges (Scenarios 3 and 4) during summer fire weather conditions. The other two modeling scenarios (Scenarios 1 and 2) analyzed potential fire behavior along the eastern and northern edges of the development during Peak weather conditions. Table 1 presents the weather and fuel moisture input variables used for the fire behavior modeling.

Table 1
Fire Behavior Weather and Fuel Moisture Inputs

Model Variable	Summer Weather (Onshore Flow)	Peak Weather (Offshore/Santa Ana conditions)
1 h fuel moisture	5%	2%
10 h fuel moisture	7%	3%
100 h fuel moisture	10%	5%
Live herbaceous moisture	60%	30%
Live woody moisture	88%	60%
20 ft. wind speed (mph)	10-20 mph	30-40 mph (50 mph gusts)
Wind direction	upslope	upslope
Slope steepness	variable by location	variable by location

Note: mph = miles per hour

Wind speed values derived from RAWS data represent 20-foot wind speeds. BehavePlus incorporates a wind adjustment factor to model mid-flame wind speeds. For this analysis, a wind speed adjustment factor of 0.4 was utilized to account for vertical differences in wind speed from the 20-foot recording height to mid-flame height prior to BehavePlus modeling efforts. A conservative wind adjustment factor of 0.4 indicates a fuel bed that is unsheltered from the wind with a fuel bed depth greater than 2.7 feet. It should be noted that mid-flame wind speeds may be only 10% of the wind speeds recorded or predicted at 20 feet, resulting in a conservative calculation.

Topography

Slope is a measure of angle in degrees from horizontal and can be presented in units of degrees or percent. Slope is important in fire behavior analysis as it affects the exposure of fuel beds. Additionally, fire burning uphill spreads faster than those burning on flat terrain or downhill as uphill vegetation is pre-heated and dried in advance of the flaming front, resulting in faster ignition rates. Slope values were measured from U.S. Geological Survey (USGS) topographic

maps and are presented in units of percent. The Project site and surrounding terrain to the north, west and south consists of relatively flat to gentle slopes with gradients less than 10%. Outside and to the east of the MUP, the terrain slopes down to the Keys Creek drainage with an average gradient of 25%.

BEHAVEPLUS MODELING RUNS

Focused fire behavior modeling utilizing BehavePlus 5.0.5 was conducted for the Project. Based on slope and fuel conditions, four different fire scenarios were evaluated for the Project site, including:

- **Scenario 1:** Peak weather with off-shore, Santa Ana winds and a fall fire burning in mowed grassland with sparse shrub cover along the northern edge of the Project site. The fuel types occur on a rural residential property that is relatively flat (8% slope) which eventually drops off at a 20% slope into the Keys Creek Drainage along the northern edge of the Project site. Potential ignition sources are adjacent residential area activities (i.e., weed whacking during fire season) or from the SDG&E transmission line traversing west and east along the northern border of the property.
- **Scenario 2:** Peak weather with off-shore, Santa Ana winds and a fall fire burning in chaparral with pockets of Coast live oak (*Quercus agrifolia*) trees along the eastern edge of the Project site. This area is moderately steep (20 to 25% slope) with potential ignition sources from adjacent activities occurring in the rural residential areas, or from the SDG&E transmission line.
- **Scenario 3:** Summer weather with on-shore winds and a fire burning in maintained landscape and mowed, grassland fuels along the southern edge of the Project site. This area is relatively flat (less than 5% slope) with potential ignition sources along nearby surface streets (Avenida Annale and Mesa Crest Road), or adjacent rural residential areas.
- **Scenario 4:** Summer weather with on-shore winds and a fire burning in maintained landscape and mowed grassland fuels as well as an orchard in declining health (standing dead trees and tall weed/grass understory) along the southwestern edge of the Project site. This area slopes uphill towards the site with gradients ranging from 5 to 10%. Potential ignition sources occur along nearby surface streets (Mesa Crest Road) or adjacent rural residential areas and orchards.

The unique terrain and fuel models used for BehavePlus modeling for the Project site are summarized in Table 2.

Table 2
Fire Behavior Model Variables

Scenario (Model Run)	Weather	Vegetation/Fuel Model	Slope	Aspect
1	Santa Ana	Grassland with very sparse shrubs (gr2)	6%-20%	Flat to East
2	Santa Ana	Chaparral – High Load, Dry Climate Shrub (sh5)	25%	East
3	Summer	Grassland-low load (gr2)	<5%	South
4	Summer	Orchard/grassland (moderate load) mix (gr4)	5%-10%	South/Southwest

Note: gr = fire behavior fuel model for short grasslands (see footnote #3 for cited reference)
Sh5 = fire behavior fuel model for high load, shrubs

BEHAVEPLUS FIRE BEHAVIOR MODELING RESULTS

Three fire behavior variables were selected as outputs from the BehavePlus analysis conducted for the Project site, and include flame length (feet), rate of spread (mph), and fireline intensity (BTU/feet/second). The aforementioned fire behavior variables are an important component in understanding fire risk and fire agency response capabilities. 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[6]. 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[7]. Fireline intensity is a measure of heat output from the flaming front, and also affects the potential for a surface fire to transition to a crown fire. Fire spread rate represents the speed at which the fire progresses through surface fuels and is another important variable in initial attack and fire suppression efforts. The information in Table 3 presents an interpretation of these fire behavior variables as related to fire suppression efforts. The results of fire behavior modeling efforts are presented in Table 4. Additionally, identification of modeling run locations is presented graphically in Attachment 2.

[6] 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, Utah: Department of Agriculture, Forest Service, Rocky Mountain Research Station. 132p.

[7] Rothermel, R.C. 1983. How to Predict the Spread and Intensity of Forest and Range Fires. USDA Forest Service Gen. Tech. Report INT-143. Intermountain Forest and Range Experiment, Ogden, Utah.

Table 3
Fire Suppression Interpretation

Flame Length (ft)	Fireline Intensity (Btu/ft/s)	Interpretations
Under 4 feet	Under 100 BTU/ft/s	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.
4 to 8 feet	100-500 BTU/ft/s	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 feet	500-1000 BTU/ft/s	Fires may present serious control problems -- torching out, crowning, and spotting. Control efforts at the fire head will probably be ineffective.
Over 11 feet	Over 1000 BTU/ft/s	Crowning, spotting, and major fire runs are probable. Control efforts at head of fire are ineffective.

Source: BehavePlus 5.0.5 fire behavior modeling program (Andrews, Bevins, and Seli 2004)

Table 4
BehavePlus Fire Behavior Modeling Results

Model Run	Flame Length (feet)	Fireline Intensity (Btu/ft/s)	Surface Rate of Spread (mph)
1	12.7 to 14.1	1,418 to 1,791	3.3 to 4.2
2	33.8 to 44.5	11,946 to 21,732	3.9 to 7.2
3	4.6 to 7.2	156 to 413	0.38 to 1.0
4	8.6 to 13.5	616 to 1,637	0.78 to 2.1

The results presented in Table 4 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. Additionally, fuel model assignments are based on site and aerial photograph evaluation. 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.

FIRE POTENTIAL SUMMARY

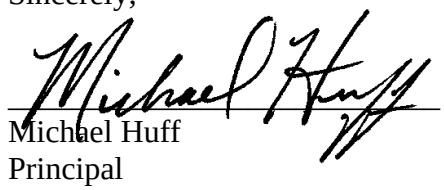
Given the climatic, vegetation, and topographic characteristics of the analysis area, along with the fire behavior modeling results discussed herein, the Project site is considered potentially vulnerable to wildfire starting in, burning onto, or spotting onto the site. The fire behavior results described herein depict values based on inputs to the BehavePlus software. Localized changes in slope, weather, or pockets of different fuel types are not accounted for in this analysis, but

assumed across the landscape. Further, this modeling analysis assumes a correlation between the available vegetation data and fuel model characteristics. Wildfire activity may temporarily alter fuel beds, but fire behavior modeling efforts conducted for this site assume natural succession of burned areas to more mature stand conditions, resulting in a conservative (near worst-case) estimate of fire behavior. Since fire behavior for a given location will be affected by many factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns, modeling results are applicable as a basis for planning, but need to be considered in context with other site variables.

As presented, wildfire behavior in the chaparral east of the Project site would be the fuels predominately affecting the constructed Project. Based on the observed fuel beds, a relatively high-intensity fire can be expected during extreme weather conditions with flame lengths reaching approximately 45 feet and peak intensity of over 21,000 Btu/ft/s. This type of fire would be relatively short-duration as vegetative fuels are consumed rapidly. As such, there would not be a sustained source of heat and or flame associated with site-adjacent wildland fuels. Adjacent native and undisturbed fuels would readily carry fire, especially during portions of the year where vegetation moisture content falls and warm temperatures, low humidity and high winds become common. However, fires approaching the Granger Solar Project would burn into the Project's fuel modification zones and with little fuel, would be extinguishable. Embers produced from a wind driven fire would likewise find few receptive fuel beds within the Project. The site will be largely free of combustible vegetation with only a ground cover of maintained vegetation adjacent and beneath the solar trackers.

If you have any questions regarding this Fire Behavior Analysis, please contact me at 619.992.9161.

Sincerely,



Michael Huff
Principal
Sr. Fire Protection Planner

Att: Attachment 1, Photograph Log
Attachment 2, BehavePlus Fire Behavior Modeling Exhibit

ATTACHMENT 1

Photograph Log

Attachment 1
Site Photographs of BehavePlus Modeling Run Locations

Photograph 1. Photograph shows view of mowed, non-native grasses and ornamental shrub and tree species that were modeled for fire run #1. Fuel type is located north of Project site.

Photograph 2. Hillside to the east of Project site is vegetated with mixed chaparral fuel type. Photograph depicts fuels modeled for fire run #2.

Attachment 1
Site Photographs of BehavePlus Modeling Run Locations

Photograph 3. View looking south of Project site where rural residential lots are located. These properties are being maintained and represent fuel types for fire run #3.

Photograph 4. The majority of the fuel types to the southwest and west of the Project site consist of rural residential lots. However, some properties to the southwest and aligned with onshore wind patterns have standing dead orchard trees with grass fuel type understory. The dead tree-grass fuel type was modeled in fire run #4.

ATTACHMENT 2

Fire Behavior Analysis Exhibit

Modeling Inputs:

Summer Weather - Onshore flow (RUN 3 & 4):
1h Fuel Moisture: 3%
10h Fuel Moisture: 5%
100h Fuel Moisture: 7%
Live Herbaceous Moisture: 60%
Live Woody Moisture: 90%
20-foot Wind Speed: 10,20 mph
Wind Adjustment Factor: 0.4

Peak Weather - Offsore/Santa Ana Condition (RUN 1 & 2):
1h Fuel Moisture: 2%
10h Fuel Moisture: 3%
100h Fuel Moisture: 5%
Live Herbaceous Moisture: 30%
Live Woody Moisture: 50%
20-foot Wind Speed: 30-40 mph (50 mph gusts)
Wind Adjustment Factor: 0.4

RUN 1

Run 1
Slope: 6 - 20%
Fuel Model: Grasslands, (gr2)
Flame Length: 12.7 to 14.1 feet
Fireline Intensity: 1,418 to 1,791 Btu/ft/s
Spread Rate: 3.3 to 4.2 mph

RUN 2

Run 2
Slope: 20 - 25%
Fuel Model: Mixed Chaparral, (sh5)
Flame Length: 33.8 to 44.5 feet
Fireline Intensity: 11,946 to 21,732 Btu/ft/s
Spread Rate: 3.9 to 7.2 mph

RUN 4

Run 4
Slope: 5 -10%
Fuel Model: Grasslands,(gr4)
Flame Length:8.6 to 13.5 feet
Fireline Intensity: 616 to 1,637 Btu/ft/s
Spread Rate: 0.78 to 2.1 mph

RUN 3

Run 3
Slope: 5 - 8%
Fuel Model: Grasslands, (gr2)
Flame Length: 4.6 to 7.2 feet
Fireline Intensity: 156 to 413 Btu/ft/s
Spread Rate: 0.38 to1.0 mph

Mesa Crest Rd

Avenida Anna Lie Camino Sin Nombre

Crest Rd

MUP Boundary
Property Line

0 100 200 Feet

DUDEK

9121

GRANGER SOLAR PROJECT

ATTACHMENT 2

BehavePlus Fire Behavior Modeling

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