AIS.0 ADDITIONAL INFORMATION STATEMENT FOR THE SOITEC SOLAR DEVELOPMENT PROGRAM EIR

1.0 Introduction

This Additional Information Statement provides information regarding a new, optional component of the Soitec Solar Development Project (Proposed Project) that was not analyzed in the Draft Program Environmental Impact Report (DPEIR) dated January 2014. Rugged LLC proposes to include an optional energy storage system in the Rugged solar farm as part of the Proposed Project. This Additional Information Statement describes the energy storage system, analyzes its potential to have a significant environmental impact, and concludes that the addition of the energy storage system on the Rugged solar farm would not affect the conclusions of the DPEIR prepared and circulated for the development of the Proposed Project. The analysis is based on the review of technical information provided for the energy storage unit, as well as the following documents prepared for this component of the Proposed Project:

- *Aesthetics Analysis – Energy Storage* (AIS-1);
- *Supplemental Air Quality and Greenhouse Gas Analysis – Energy Storage* (AIS-2);
- *Addendum to the Acoustical Assessment Report for Rugged Solar* (AIS-3); and
- *Addendum to the Fire Protection Plan for Rugged Solar* (AIS-4).

1.1 Purpose and Need

The State of California adopted Assembly Bill 2514 on September 29, 2011, which set out a mandate for the California Public Utilities Commission (CPUC), by March 1, 2012, to open a proceeding to determine appropriate targets, if any, for each load-serving entity to procure viable and cost-effective energy storage systems and, by October 1, 2013, to adopt an energy storage system procurement target, if determined to be appropriate, to be achieved by each load-serving entity by December 31, 2015, and a 2nd target to be achieved by December 31, 2020. The bill requires the governing board of a local publicly owned electric utility, by March 1, 2012, to open a proceeding to determine appropriate targets, if any, for the utility to procure viable and cost-effective energy storage systems and, by October 1, 2014, to adopt an energy storage system procurement target, if determined to be appropriate, to be achieved by the utility by December 31, 2016, and a 2nd target to be achieved by December 31, 2021.

The California Legislature's purpose for requiring energy storage is as follows:

a) Expanding the use of energy storage systems can assist electrical corporations, electric service providers, community choice aggregators, and local publicly owned

electric utilities in integrating increased amounts of renewable energy resources into the electrical transmission and distribution grid in a manner that minimizes emissions of greenhouse gases.

b) Additional energy storage systems can optimize the use of the significant additional amounts of variable, intermittent, and off peak electrical generation from wind and solar energy that will be entering the California power mix on an accelerated basis.

c) Expanded use of energy storage systems can reduce costs to ratepayers by avoiding or deferring the need for new fossil fuel-powered peaking power plants and avoiding or deferring distribution and transmission system upgrades and expansion of the grid.

d) Expanded use of energy storage systems will reduce the use of electricity generated from fossil fuels to meet peak load requirements on days with high electricity demand and can avoid or reduce the use of electricity generated by high carbon-emitting electrical generating facilities during those high electricity demand periods. This will have substantial co-benefits from reduced emissions of criteria pollutants.

e) Use of energy storage systems to provide the ancillary services otherwise provided by fossil-fueled generating facilities will reduce emissions of carbon dioxide and criteria pollutants.

On October 17, 2013, the CPUC adopted an order establishing a first-in-the-nation target for the state's three Independently Operated Utilities (IOUs)—San Diego Gas & Electric (SDG&E), Southern California Edison (SCE), and Pacific Gas & Electric (PG&E)—to procure 1.3 gigawatts (GW) of energy storage by 2020. Order Instituting Rulemaking Pursuant to Assembly Bill 2514 to Consider the Adoption of Procurement Targets for Viable and Cost-Effective Energy Storage Systems, Rulemaking 10-12-007, at 2 (CPUC 2013), available at http://docs.cpuc.ca.gov/PublishedDocs/ Published/G000/M078/K912/78912194.PDF. SCE and PG&E each have a 580 MW procurement target, and SDG&E has a 165 MW target. The order seeks to use energy storage as one of many mechanisms for optimizing the electricity transmission grid, integrating renewable energy, and reducing GHG emissions.

2.0 Project Description

The applicant proposes to include a component as part of the Rugged solar farm, to be located in southeastern San Diego County. This component consists of energy storage in the form of lithium ion (Li-ion) batteries (energy storage system), which would be located on the Rugged solar farm site in order to store energy produced by CPV trackers and to provide the ability to dispatch this energy upon request depending upon demand and other factors. The battery storage system would provide 160 Megawatt hours (MWh) of Li-ion battery storage

in the form of 160 1 MWh containers each measuring 40 feet x 8.5 feet x 9.5 feet (LxWxH) on approximately 7 acres with appropriate fire access and approximately 20 feet of spacing on all four sides of each container.

2.2 Location

The energy storage system would be located on an approximate 7-acre portion of the Rugged solar farm site immediately south of the on-site substation (see Figures 1a and 1b, Energy Storage System Location) in an area previously proposed to be developed with approximately 47 CPV trackers and associated inverters and step-up transformers . The proposed energy storage system would not change the developed footprint of the Rugged solar farm site.

2.3 Components

The Li-ion battery storage would be housed in standard 40' International Organization for Standardization (ISO) shipping containers. The containers are typically made from 12 to 14 gauge steel. The supplier's logo would be displayed on each container and containers can be painted to order (i.e., containers can be painted with any color stocked by the supplier). The containers would be oriented in two rows of 80 containers each or in four rows of 40 containers each. An approximate 7-acre area would be required to accommodate two rows of 80 containers and an additional 0.5-acre area would be required to accommodate four rows of 40 containers. Approximately 20 feet of spacing would be provided on all four sides of each container; see Figure 2, Energy Storage Container Size and Spacing. It should be noted that inverters and step-up transformers would be located within the container spacing as described below and as depicted in Figure 3.

The Li-ion batteries (cells) would be arranged into modules, which in turn would be stored in battery racks. The racks would be entirely contained within the container. The container would have an access door at each end and overhead lighting on the interior roof. Each container would have an integrated heating, ventilation, and air conditioning (HVAC) unit located on the roof of the container. Each HVAC unit would measure approximately 7.5 feet in height. An inverter with a battery management system and container control system would be installed externally on a concrete pad next to each container. A step-up transformer would be associated with a set of two containers and would be installed alongside the container on a separate concrete pad. Thus, a total of 160 HVAC units, 160 inverters, and 80 step-up transformers would be associated with the energy storage system. Figure 3 provides an example illustration of the containers, step up transformers, and related infrastructure while Figure 4 provides an example of the typical container interior and battery pack configurations. Figure 5 presents the typical Li-ion battery pack components.

The proposed batteries and containers also include the following important monitoring and safety components:

Modular battery racks designed for ease of maintenance. Every rack's battery monitoring system (BMS) continually monitors for unsafe voltage, current, and temperature, and has control of an automated switch (contactor) to disconnect the rack from the system if necessary.

Integrated fire detection and suppression system

Li-ion nanophosphate chemistry which is considered to be the most stable Li-ion technology and substantially reduces the possibility of thermal runaway and provides for reduced reaction from abuse (Sandia National Laboratories 2012) and A123 Systems (no date).

2.3.1 Project Design Features

The project design features (PDFs) listed in Table 1-10, Summary of Project Design Features, of the DPEIR would also apply to this optional new component of the Rugged solar farm, as appropriate. For example, PDF-AE-1 (visual screening of staging and storage areas), PDF-AE-5 (restriction of outdoor lighting), PDF-AQ-1 (implementation of measures to reduce construction and operational air quality emissions) and conditions of approval that would reduce fugitive dust generation, and PDF-HZ-2 and HZ-3 (implementation of construction and operation fire protection plan) would be applicable to the energy storage system. Furthermore, the applicant has incorporated additional PDFs specifically related to this energy storage system component of the Rugged solar farm. The PDFs are included in Table AIS-1, Summary of Project Design Features, and are referenced throughout the discussion in Chapter 3.0, Environmental Issue Areas and various technical memoranda prepared for environmental issue areas. These PDFs would be made conditions of approval for the Rugged solar farm to ensure these features are incorporated into the solar farm design.

2.4 Comparison

As stated in Section 2.1, the energy storage system would not increase the development footprint of the Rugged solar farm site because it would replace 47 CPV trackers, associated inverters and step-up transformers located on an approximate 7-acre portion of the Rugged site. It should also be noted that the energy storage system would eliminate the need for the proposed backup power and storm positioning system, which, as indicated in Section 1.2.1.1 of the DPEIR (p. 1.0-9), would consist of one of the following options: (1) a 1.5 MW diesel-powered emergency generator or equivalent located at the substation, (2) an Uninterrupted Power Supply (UPS) battery storage system at each inverter station, or (3) a 20 kW propane generator at each inverter skid.

The bulk and scale of energy storage system as compared to 47 CPV trackers would result in slightly greater lot coverage and reduced height. The energy storage system containers would be 9.5 feet tall (when accounting for the height of HVAC units (7.5 feet tall) and associated perimeter screen walls (i.e., implementation of PDF-ES-N-1), the containers and associated components would measure approximately 18 feet tall) as compared to a maximum height of 30 feet above grade for the 47 CPV trackers. As for lot coverage, the energy storage system would consist of 160 containers each measuring 40 feet long by 8.5 feet wide. The containers would be oriented east/west in two rows of 80 (or four rows of 40) containers with approximately 20 feet of spacing on all four sides of each container. Each of the 47 CPV tracker modules is approximately 25 feet long by 48 feet wide. Trackers would be installed in parallel rows, oriented north-south with an estimated spacing of 69 feet north-south and 82 feet east-west. Including associated inverters and transformers, the energy storage system would result in approximately 61,120 square feet of covered area as compared to 54,436 square feet of covered area for the 47 CPV trackers. This equates to approximately 20 percent lot coverage on the approximately 7-acre portion for the energy storage system compared to approximately 17.9 percent lot coverage for the 47 CPV trackers. When taking into account the entire 765-acre site, this translates into a negligible 0.0002 percent increase (from 12.49 percent to 12.51 percent). Therefore, the lot coverage would be similar to that associated with the Rugged solar farm analyzed in the DPEIR, and the development footprint would remain the same.

It should also be noted that implementation of PDF-AE-1 and Mitigation Measure M-AE-PP-1 identified in the DPEIR and other project refinements would remove numerous trackers from targeted locations on the Rugged solar farm site. The plot plans for the Rugged solar farm have been revised to reflect the removal of these trackers. A total of 65 CPV trackers have been removed from the topographical saddle occurring in the southeastern corner of the central subarea of the site to reduce visibility of CPV trackers from Interstate 8. In addition, 31 CPV trackers have been removed from the site for landscape screening purposes (the landscape screen would be installed on the Rugged solar farm site west of McCain Valley Road and east of the O&M annex), and 24 CPV trackers have been removed for additional refinements to the plot plan. In total, the applicant has revised the Rugged solar farm plot plans to reflect the removal of 120 CPV trackers (from 3,588 CPV trackers to 3,468 CPV trackers). With the energy storage system, the number of CPV trackers would be further reduced to 3,421. This would result in an 12.5 percent lot coverage with the energy storage system or 11.9 percent lot coverage without.

2.5 Project Construction, Operation and Decommissioning Activities

2.5.1 Construction Activities and Methods

The construction of the Li-ion energy storage system would consist of site preparation and grading, development of fire access roads, container arrangement, and assembly of accessory

components, including transformers and inverters. Because the energy storage system would be located on an area previously proposed to be developed with CPV systems, site preparation and grading would be consistent with what was anticipated in the DPEIR. No additional grading would be required. All existing vegetation would be cleared and grubbed from the area, as originally anticipated in the DPEIR. Fire access roads and pads for each container would be graded consistent with what is required for the entire project. Each container would be directly connected to the onsite substation by an underground buried connection. Each container would be trucked to the site and arranged on a graded pad. Accessory components would be placed either adjacent to or mounted on each container. Following placement of the energy storage systems, fire access roads would be constructed to the required fire code (50,000 lb.) standard. All other disturbed areas would be treated with a permeable nontoxic soil binding agent to reduce fugitive dust and erosion, which is consistent with the DPEIR.

Construction personnel, equipment, and hours of operation would be consistent with that discussed in the DPEIR; refer to Chapter 1.0, Project Description. Compared to the installation of 47 CPV trackers, construction of the optional energy storage system would result in a net increase of approximately 197 one-way delivery trips over an eight month period; refer to Section 3.3, Air Quality, below for details.

2.5.2 Operational Activities and Methods

During operation, containers would be inspected monthly with physical maintenance (equipment testing, continuous remote monitoring, repair, routine procedures to ensure service continuity, and standard preventative maintenance) occurring annually. All inspections would occur during daylight hours and would be performed by the employees operating the Rugged solar farm. No additional employees would be required for the operation of the energy storage system.

2.5.3 Decommissioning Activities and Methods

The energy storage system would be located on the Rugged solar farm site for the duration of the operation of the solar farm. At the end of the useful life of the solar farms, the energy storage system would be dismantled along with the other components of the solar farm. Components that are nontoxic would be recycled along with the CPV tracker module component materials. The actual battery cells contain hazardous components (see Section 3.6 Hazards and Hazardous Materials, below) and would be disposed of at an appropriate facility that accepts hazardous materials. The containers would be re-purposed for other uses. The energy storage system site would be restored to a condition that would allow future use of the site consistent with the current zoning or future applicable zoning, including either preparation of the site with a nontoxic permeable soil binding agent or reseeding with native species.

The energy storage system would be included in the Rugged solar farm's final decommissioning plan and financial assurances for removal of all components would be the same as for the Rugged solar farm.

2.6 Water Usage

The following discussion analyzes the amount of water that would be needed for the energy storage system during construction and site preparation, ongoing operation and maintenance, and decommissioning and dismantling which would come from groundwater from existing wells located on site. No additional water sources beyond those that have already been identified in the DPEIR for the Rugged solar farm would be required to add the optional energy storage system to the Rugged solar farm. See Section 3.1.5 of the DPEIR for further details about the water supply sources for the Rugged solar farm.

2.6.1 Construction and Application of Soil Binding Agents

As anticipated in the DPEIR, during construction water would be used to suppress fugitive dust during general site preparation—including grubbing, clearing, grading, and soil compaction—and to apply a nontoxic soil binding agent to help with soil stabilization at the end of construction. General site preparation includes all project components (i.e., roads, container and/or building pads, fencing, etc.) within the development footprint of the energy storage system site.

Total estimated water demand for the energy storage system is not anticipated to be greater than that previously calculated for the development of trackers on the same site; therefore, water demand would be consistent with that shown on Table 1-6.

2.6.2 Operation and Maintenance Potable Water Usage

No additional water use would be required for operation and maintenance of the energy storage system. Replacement of 47 CPV trackers would reduce the operational water demand by reducing the number of trackers to be washed. As indicated in Table 1-7 of the DPEIR, operational water demands estimated 24 gallons of water per tracker per washing, and up to nine washings per year. This would result in approximately 10,152 less gallons of operational water demand per year.

2.6.3. Decommissioning and Dismantling

It is estimated that the amount of water necessary to decommission and dismantle the Proposed Project would be the same or less than that required for operations and maintenance, as listed in Table 1-7 of the DPEIR, because there would be no need to use water for concrete mixing, construction site preparation, or tracker washing. Over the operational life of the project, the

applicants will allow vegetation to naturally recolonize the site, mowing as needed to maintain vegetation to less than 6 inches in height and to avoid conflicting with facilities or fire protection requirements. Following dismantling and removal of structures, soil binders or a native seed mix will be applied to areas that remain exposed or unvegetated (e.g., access/fire roads and freshly removed concrete pads). Water would primarily be used for the application of soil binders or native seed mix. Decommissioning will not involve installation or use of an irrigation system.

3.0 Environmental Issue Areas

Based on the project description in Section 2.0, the following environmental issue areas are evaluated for impacts relative to the addition of the energy storage system to the Rugged solar farm: aesthetics, biological resources, air quality, noise, greenhouse gas emissions, and hazards and hazardous materials. The following explains the rationale for why these environmental issue areas have been selected and an analysis of potential effects. The analysis is based on the following technical studies prepared for the Rugged solar farm battery storage component:

- Aesthetics Analysis – Energy Storage (Appendix AIS-1);
- Supplemental Air Quality Analysis and Greenhouse Gas Analysis – Energy Storage (Appendix AIS-2);
- Addendum Acoustical Assessment Report, Rugged Solar LLC Project (Appendix AIS-3);
- Addendum Fire Hazards Assessment, Rugged Solar LLC Project (Appendix AIS-4).

3.1 Aesthetics

The energy storage system would introduce additional man-made features to the Rugged solar farm site that could be visible from scenic vistas and public viewpoints. In addition, potentially reflective surfaces associated with the shipping container, HVAC systems and inverters and any outdoor lighting required for nighttime maintenance of energy storage system could affect night and daytime views in the area.

The energy storage system would be located internally within the Rugged solar farm and would consist of 160 9.5-foot tall containers (approximately 18 feet tall when accounting for the height of HVAC units and HVAC unit screen walls) that would be placed in two rows oriented east/west of 80 containers each or four rows of 40 containers each. Because the containers would be surrounded by project components (i.e., CPV trackers) exhibiting a larger vertical scale and form, aesthetic impacts would be minimal; see Appendix AIS-1. With the exception of locations at which superior angle views of the Rugged solar farm are available (i.e., eastbound Interstate 8 at the Tecate Divide and Mt. Tule), visible project components from local area public roads would primarily consist of CPV trackers located along the site

boundary. Further, because the height of the top of CPV trackers would range from 13 feet, 6 inches to 30 feet above grade during normal daily operations, CPV trackers would effectively screen the energy storage system during most hours of the day from view of motorists on local area public roads near the solar farm.

On eastbound Interstate 8 at the Tecate Divide, views to the project site would be brief and due to distance, the form, line and texture of energy storage system containers would not be overly distinguishable from CPV trackers. However, color contrasts between containers and surrounding CPV trackers may be perceptible from superior viewing locations. Therefore, it is recommended that the containers be painted a color that is consistent in hue and intensity with the CPV trackers to minimize visible color contrast.

From Mt. Tule, the energy storage system would be viewed as an interior component of the larger Rugged solar farm. The installation of 160 containers, HVAC units and associated step-up transformers would interrupt the continuity and visual pattern of repetitive CPV tracker rows spread across the solar farm however; when viewed from a superior viewing location, the energy storage system would display an altogether short, horizontal form. As such, containers would not obstruct long, westward-oriented scenic views available from Mt. Tule.

In addition, the application of an exterior color to the containers consistent in hue and intensity with the CPV tracker panels (PDF-ES-AE-1) would minimize visible color contrast with the other solar farm components. Therefore, for the reasons discussed above, the inclusion of the energy storage system to the Rugged solar farm would not result in additional impacts to valued focal and/or panoramic vistas; see also Appendix AIS-1.

The DPEIR determined that the Rugged solar farm would produce strong visual contrast with existing vegetation and terrain and that the operation of numerous rows of tall CPV trackers in the McCain Valley would create visible contrast in form and color with existing vegetation and rural residential development. As such, the Rugged solar farm was determined to have significant and unmitigable impacts to existing visual character and quality. Due to the height of CPV trackers, the energy storage system would be screened at most public viewing locations in the surrounding area. Further, public perception of the Rugged solar farm would typically be fashioned by the visibility of peripheral solar farm components and more specifically, by CPV trackers. Therefore, because the energy storage system would be screened from most public viewpoints by taller CPV tracker systems, the inclusion of the energy storage system to the Rugged solar farm would not create impacts to the existing visual character and quality of the project site and surroundings beyond those previously stated in the DPEIR; see also Appendix AIS-1.

The installation of exterior lighting on individual containers, HVAC systems or step-up transformers is not anticipated to be necessary and therefore, no additional nighttime lighting sources would be added to the Rugged solar farm. As such, no new nighttime lighting impacts would occur due to the addition of the proposed energy storage system. As stated previously, containers would be painted a color to match the hue and intensity of CPV tracker panels to minimize potential color contrast within the solar farm. Implementation of PDF-ES-AE-1 would minimize the potential for glare generated by the energy storage system. As stated in the DPEIR, CPV trackers would create glare that would be received by motorists and residences in the surrounding area. This source of glare was determined to be a significant and unmitigatable impact of the Rugged solar farm. The addition of the energy storage system to the Rugged solar farm would not create a substantial source of additional glare that would increase the severity of anticipated glare impacts of the Proposed Project described in the DPEIR; see also Appendix AIS-1.

3.2 Biological Resources

The energy storage system would not result in any additional ground disturbance and as such, impacts to sensitive habitat and natural communities would be the same as discussed in the DPEIR. However, the energy storage system would include features such as HVAC units, step-up transformers and inverters which could increase noise and result in potential impacts to nesting birds or other indirect wildlife impacts. While indirect impacts associated with noise generated during construction of the Rugged solar farm including the energy storage system could affect the nesting success of tree-nesting raptors near the Rugged solar farm site, mitigation measures (i.e.; preconstruction surveys and setbacks) identified in the DPEIR (see Section 2.3, Biological Resources) would be sufficient and would reduce potential impacts to a less than significant level.

Further, operational noise from the Rugged solar farm, including noise generated by the energy storage system HVAC units and transformers would not exceed County noise ordinance thresholds with implementation of PDFs (see Section 3.4, Noise, below). The PDFs would reduce noise levels received at off-site property boundaries that would in turn minimize the potential for additional indirect wildlife impacts associated with proposed energy storage system HVAC units and transformers. Therefore, with implementation of PDFs intended to minimize noise received offsite, indirect impacts to wildlife would be less than significant.

3.3 Air Quality

Although no additional grading would be required, the energy storage system would require additional truck trips to transport materials to the project site that may impact air quality. Dudek prepared a technical memorandum to address potential air quality and greenhouse gas emission

impacts associated with construction and operation of the proposed energy storage system; see Appendix AIS -2. As stated in the technical memorandum, the energy storage system would be located on an area previously proposed to be developed with CPV systems and as such, site preparation and grading would be consistent with that originally anticipated in the DPEIR.

Each container would be trucked to the site and arranged on a graded pad and accessory components would be placed either adjacent to or mounted on each container. Following installation of the energy storage system, fire access roads would be constructed to support the imposed loads of fire apparatus (not less than 50,000 pounds) as required by the County Fire Code. All other disturbed areas would be treated with a permeable nontoxic soil-binding agent to reduce fugitive dust and erosion, which is consistent with fugitive dust control measures identified in the DPEIR. Therefore, the addition of the energy storage system would generate similar air quality emissions during site preparation and grading as previously analyzed in the DPEIR. Transportation of the 160 1MWh energy storage units, including associated transformers, inverters and HVAC units, to the Rugged solar farm site would require the use of heavy duty trucks. Approximately 160 trucks (320 additional one-way trips) would be required for energy storage unit deliveries and these trips would occur over an approximately eight month period following site preparation activities. The energy storage units would replace approximately 47 CPV tracker components previously proposed in the DPEIR as part of the Rugged solar farm. Approximately 123 one-way trips for material deliveries associated with the 47 CPV components that would be replaced by the energy storage system were originally analyzed in the DPEIR. Therefore, with the addition of the energy storage delivery trips and the removal of 47 CPV components, a net increase of 197 one-way delivery trips over an eight-month period would occur. Daily deliveries and delivery trips during construction would not exceed more than 25 energy storage deliveries (50 one-way trips) on any given day. At this level, criteria air pollutants would remain below the County significance thresholds (see Appendix AIS-2 for revised Rugged solar farm construction emissions). Therefore, because the addition of truck trips associated with the transportation of energy storage units would not contribute to an exceedance of the County of San Diego thresholds for the purposes of analyzing air quality impacts, air quality impacts associated with the Rugged solar farm would remain less than significant as originally concluded in the DPEIR.

During operation, containers would be inspected monthly with physical maintenance (equipment testing, continuous remote monitoring, repair, routine procedures to ensure service continuity, and standard preventative maintenance) occurring annually. All inspections would occur during daylight hours and would be performed by the employees operating the Rugged solar farm. No additional employees would be required for the operation of the energy storage system and therefore, operational emissions would be similar to those previously identified in the DPEIR.

Operational air quality impacts associated with the Rugged solar farm would be less than significant; see also Appendix AIS-2.

3.4 Noise

Dudek prepared an Acoustical Assessment Report Addendum that considers and analyzes the potential noise impacts associated with operation of the proposed energy storage system; see Appendix AIS-3. Each energy storage container would each be equipped with an individual HVAC system which generates a noise level of 68 dBA at a distance of 50 feet during full operation (NACO 2011). In addition, between each pair of containers, a step-up transformer would be provided (a total of 80 transformers would be installed). The anticipated transformer model has a sound rating of 60 dB at a distance of 5 feet based on National Electric Manufactures Association (NEMA) ratings for the size of transformer anticipated to be used with inverters (NEMA 2000). The anticipated power inverter is equivalent to a Xantrex model that has a noise level rating of 77 dB at 6 feet (Schneider Electric 2011). However, it should be noted that the anticipated power inverter would be bi-directional (i.e., able to convert AC to DC and DC to AC) whereas the Xantrex model is not.

Figure 5 of Appendix AIS-3 illustrates the noise modeling locations selected to determine the worst-case cumulative noise levels at the property lines, resulting from the building block inverters and transformers, substation transformer, operations and maintenance yard, CPV tracker motors and dryers/blowers. The anticipated operational noise levels from the Rugged solar farm with addition of the energy storage component were assessed at the same locations as identified in the DPEIR. In addition, the noise levels from all the noted equipment were combined and calculated for the nearest property lines without any shielding from proposed buildings. Noise calculation worksheets are included in Appendix AIS-3. Each calculated noise level also includes contribution from the substation transformer, operations yard, tracker and blower motors, and the energy storage system HVAC units and step-up transformers. The calculated noise levels also take into consideration the applicable mitigation measure from the DPEIR, as follows (see Section 2.6, Noise, of the DPEIR):

M-N-R-1 Enclose Inverters in Noise Attenuating Structures: To ensure noise from inverters would comply with the County Noise Ordinance, the following would be implemented:

- Locate non-enclosed inverters a minimum of 800 feet or greater from the nearest property line, or enclose inverters within 800 feet of property lines in cement blocks or other type of structure capable of achieving a minimum 10 dB attenuation.

- Direct all switch station doorways and exterior ventilation ducts away from adjacent property lines.
- Prior to the approval of building plans, a noise analysis shall be prepared that demonstrates that the inverters comply with the County Noise Ordinance.
- The O&M building at the Rugged solar farm shall be located no closer than 1,250 feet from the property line.

Additionally, as indicated in Table AIS-1, the applicant proposes to implement one of two project design feature options (PDF-ES-N-1) based on two different types of HVAC units. Option 1 would be implemented if the energy storage container units are equipped with the standard HVAC unit (NACO Model 30RB120). Each HVAC unit would be surrounded by a solid perimeter screen wall with elevation one foot higher than the top elevation of the HVAC unit. In addition, each step-up transformer and related pair (2) of power inverters would be enclosed with an 8-foot high solid perimeter wall. As indicated in Table AIS-2, the resulting noise level from combined noise sources would comply with the County's noise ordinance criteria at all property boundaries. Thus, operational noise under Option 1 would not result in a significant noise impact; see also Appendix AIS-3.

Option 2 would be implemented if a quieter HVAC unit (Daikin McQuay 025D, or sound equivalent) is used. With this option, each would be surrounded by a solid perimeter (screen) wall with elevation one foot higher than the top elevation of the chiller unit. No transformer or inverter screen walls are proposed or necessary if the Daikin McQuay 025D, or sound-equivalent HVAC model is used. As illustrated in Table AIS-3, the resulting noise level from combined noise sources would comply with the County's noise ordinance criteria at all property boundaries. Thus, operational noise under Option 2 would also not result in a significant noise impact; see also Appendix AIS-3.

Therefore, with implementation of PDF-ES-N-1 and applicable mitigation from the DPEIR (i.e.; M-N-R-1 as described above), operational noise associated with the energy storage system HVAC units, transformers and inverters do not result in additional significant noise impacts.

Because no additional grading would be required and construction equipment and duration would remain the same as evaluated in the DPEIR, the on-site construction noise would not be appreciably altered with substitution of the energy storage units for approximately 47 CPV components (Appendix AIS-3). Installation of the energy storage system would also result in a short-term increase in traffic on the local area's roadway network; approximately 160 truck trips (320 one-way trips) would be required for energy storage units deliveries. However, approximately 123 one-way trips for material deliveries associated with the 47 CPV components

were originally analyzed in the DPEIR, and therefore the energy storage unit substitution for 47 CPV trackers would result in a net trip increase of 197 one-way trips over an eight-month period.

As indicated in Section 3.3, even if the energy storage unit deliveries were condensed to reach up to 25 truck trips per day (or 50 one-way trips per day), the peak construction truck traffic would be 197 one-way trips per day. This increase would not be sufficient to increase traffic noise levels a substantial amount. Typically, traffic volumes must double to create an increase in perceptible (3 dBA) traffic noise (Caltrans 2009). The addition of 197 one-way construction-related trips to the roadway network would not double existing traffic levels and, therefore, would not increase traffic noise by 3 dBA.

3.5 Greenhouse Gas Emissions

Electricity required to power the HVAC systems associated with each individual unit would be directly generated on site and would not require an additional external source of electricity. Each individual unit would be designed as an integrated energy storage system, and the HVAC system associated with each individual unit would be directly connected to the energy storage system's output and would not require additional electrical input. Therefore, greenhouse gas emissions associated with electrical use would not increase. As stated in the DPEIR, the total construction-related and operational CO_2E emissions associated with the solar farm would be less than the screening criteria of 900 $MTCO_2E$ recommended by the County. In addition, operational emissions of the Rugged solar farm would not exceed the screening threshold of 2,500 $MTCO_2E$ per year as delineated in the *County of San Diego Guidelines for Determining Significance – Climate Change* (County of San Diego 2013). It should also be noted that the Rugged solar farm has been certified as an Environmental Leadership Project under the Jobs and Economic Improvement through Environmental Leadership Act (Assembly Bill 900) (PRC Section 21178 et seq.) and that the applicant has committed to obtain voluntary carbon offsets or GHG credits from a qualified GHG emissions broker to offset total projected construction and operational GHG emissions as stated in the *AB 900 Application for the Soitec Solar Energy Project* (attached as Appendix 3.1.3-3 to the DPEIR). Therefore, as stated in the DPEIR, there would not be a net-increase in GHG emissions following implementation of the Rugged solar farm, and impacts would be less than significant.

3.6 Hazards and Hazardous Materials

Dudek prepared a Fire Hazards Assessment Addendum (Appendix AIS-4) that considers and analyzes the potential fire hazards associated with operation of the proposed energy storage system. As stated Appendix AIS-4, fire hazards associated with the proposed energy storage systems would be less than significant based on a variety of factors including but not limited to the type of Li-ion nanophosphate batteries identified and associated technological monitoring

systems. In addition, the individual energy storage systems would be contained within enclosed shipping containers equipped with cooling, monitoring, and fire suppression systems. These features and others discussed in Appendix AIS-4 would result in minimal potential for battery failure that could lead to thermal runaway or fire.

The Li-ion battery cells that would comprise the energy storage system contain a flammable electrolyte and are kept pressurized. If overheated or overcharged, the battery may combust or catch fire. The battery units contain both hazardous and non-hazardous components. When replaced or no longer needed, hazardous components would be disposed of at a special facility that accepts hazardous materials. Non-hazardous battery unit components/elements including iron, copper, nickel and cobalt are considered safe for incinerators and landfills, or can be recycled, and would be disposed of at an appropriate landfill or recycling facility.

There are applicable results from related tests of Li-ion technology as well as results of chemistry, packaging, and container tests that influence the assessment conducted herein and summarized in Appendix AIS-4. There are extremely large quantities of Li-ion batteries in use for a variety of applications world-wide from cell phones to vehicles to large-scale energy storage. They are also utilized as back-up power for large data storage facilities.

Although statistics were not available at the time of this analysis, research indicates that the number of fire incidents to date, in relation to the number of batteries in use, has been very low (Appendix AIS-4). Li-ion nanophosphate batteries proposed for this Project include more stable chemistry and are less likely to ignite than regular Li-ion batteries, as supported by Sandia National Laboratories (Appendix AIS-4).

Regarding a potential increased wildfire risk associated with operation of the energy storage system, the wildland fire risk in the vicinity of the Proposed Project sites was analyzed in the DPEIR. As stated in the DPEIR, wildfires are likely occurrences in the area but would not be significantly increased in frequency, duration, or size as a result of construction of the Proposed Project (Dudek and Hunt 2013).

Similarly, construction and operation of the energy storage component would not significantly increase wildland fire risk in the area. The energy storage system component would be located in an area set back from wildland fuels and individual energy storage batteries would be located within non-combustible, steel containers equipped with sophisticated monitoring and fire suppression systems. In addition, the Rugged solar site would be largely converted from readily ignited wildland chaparral fuels to ignition resistant facilities and equipment.

Also, the energy storage system would comply with applicable fire codes and include a layered fire protection system designed to current codes including site-specific measures that would

result in a project that is less susceptible to wildfire than surrounding landscapes. While an increased wildland fire risk attributable to the energy storage system component is not anticipated, PDF-HZ-3 from the DPEIR requires implementation of the Rugged solar farm FPP which would now include the FPP Addendum (Appendix AIS-4)l, that describes energy storage system design considerations and training/monitoring protocols that would be implemented and would ensure additional fire hazards would be less than significant.

The addition of the proposed energy storage system would not increase the anticipated fire service calls from the Rugged solar farm and would not result in inadequate emergency access. The number of annual fire service calls to the Rugged solar farm site, including the energy storage component, is anticipated to be the same as stated in the DPEIR. Access consistent with the Consolidated County Fire Code would be provided for the energy storage system and throughout the Rugged solar farm facility.

Lastly, the Rugged solar farm (including the energy storage system) would have sufficient operational water supplies to serve the project from existing entitlements and resources as described in Section 3.1.5 of the DPEIR.

3.7 Transportation and Traffic

As stated in Section 3.3, although no additional grading would be required, the energy storage system would require additional truck trips to transport materials to the Rugged solar farm site. Installation of the energy storage system would result in a short-term increase in traffic on the local area's roadway network; approximately 160 truck trips (320 one-way trips) would be required for energy storage units deliveries. However, approximately 123 one-way trips for material deliveries associated with the 47 CPV components were originally analyzed in the DPEIR, and therefore the energy storage unit substitution for 47 CPV trackers would result in a net trip increase of 197 one-way trips over an eight-month period. Daily deliveries and delivery trips during construction would not exceed more than 25 energy storage deliveries (50 one-way trips) would be permitted to occur on any given day.

According to information presented in Table 3.1.8-4 of the DPEIR, Mobility Element Roads included on the anticipated construction access route to Rugged solar farm site (i.e., I-8, Ribbonwood Road (south of I-8), and Old Highway 80) are operating at LOS A. Therefore, the net trip increase of 197 one-way trips over an eight-month period would not cause roadway operations to fall below LOS D. In addition, non-Mobility Element Roads used by construction are operating at an acceptable LOS and the addition of approximately 197 one-way trips over an eight-month period when construction traffic generation would be greatest would not cause Ribbonwood Road (north of I-8) or McCain Valley Road to exceed their assumed design capacity as it pertains to acceptable traffic volumes on a Rural Residential

Collectors (i.e., less than 4,500 ADT – see Table 3.1.8-5 in the DPEIR). Also, construction traffic on Mobility Element and non-Mobility Element Roads would be reduced with implementation of M-AQ-PP-2 from the DPEIR, which would implement a construction worker ridership program having a goal of decreasing single-occupancy vehicle trips by 30%. In addition, PDF-TR-1(Traffic Control Plan, Construction Notification Plan, and Notification and Provision of Access to Property) from the DPEIR would ensure the safe, timely movement of traffic through the area. As such, construction traffic impacts would remain at a level less than significant. No additional operational traffic trips would result from implementation of the energy storage system.

Table AIS-1
Summary of Energy Storage System Project Design Features

Subject Area	Design Feature or Construction Measure
Aesthetics	**PDF-ES-AE-1** Energy storage system containers shall be painted a color consistent in hue and intensity with CPV tracker. Materials, coatings, or paints having little or no reflectivity shall be used whenever possible.
Noise	**PDF-ES-N-1** To ensure noise from energy storage system HVAC units, transformers, and inverters will comply with the County Noise Ordinance, one of the following measures shall be implemented: a) If the battery storage container units are equipped with the standard HVAC unit (NACO Model 30RB120, or equivalent), each HVAC unit shall be surrounded by a solid perimeter screen wall with elevation one foot higher than the top elevation of the HVAC unit. In addition, each step-up transformer and related pair (2) of power inverters shall be enclosed with an 8-foot high solid perimeter wall. b) If the battery storage container units are equipped with a quieter HVAC unit (Daikin McQuay 025D, or equivalent), each HVAC unit shall be surrounded by a solid perimeter screen wall with elevation one foot higher than the top elevation of the chiller unit. No transformer or inverter screen walls are necessary if the Daikin McQuay 025D, or sound-equivalent HVAC model is used.

Table AIS-2
Summary of Project Noise Levels at Property Lines
Option 1 (PDF-ES-N-1)

Property Line	Project Noise Level (dBA Leq)	Exceed County daytime noise limit (50 dBA Leq)	Exceed County nighttime noise limit (45 dBA Leq)
#1	44	No	No
#2	42	No	No
#3	42	No	No
#4	45	No	No
#5	45	No	No
#6	44	No	No
#7	41	No	No
#8	42	No	No

Table AIS-2
Summary of Project Noise Levels at Property Lines
Option 1 (PDF-ES-N-1)

Property Line	Project Noise Level (dBA Leq)	Exceed County daytime noise limit (50 dBA Leq)	Exceed County nighttime noise limit (45 dBA Leq)
#9	42	No	No
#10	44	No	No
#11	42	No	No
#12	43	No	No
#13	44	No	No
#14	43	No	No
#15	43	No	No
#16	45	No	No

Source: Appendix AIS-3

Table AIS-3
Summary of Project Noise Levels at Property Lines
Option 2 (PDF-ES-N-2)

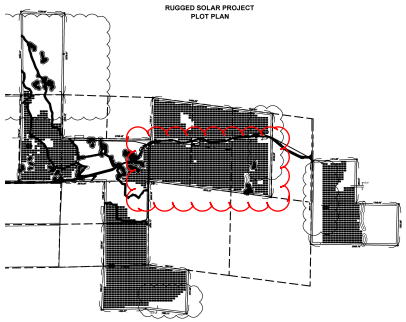
Property Line	Project Noise Level (dBA Leq)	Exceed County daytime noise limit (50 dBA Leq)	Exceed County nighttime noise limit (45 dBA Leq)
#1	44	No	No
#2	41	No	No
#3	42	No	No
#4	44	No	No
#5	44	No	No
#6	44	No	No
#7	41	No	No
#8	42	No	No
#9	42	No	No
#10	44	No	No
#11	42	No	No
#12	43	No	No
#13	44	No	No
#14	43	No	No
#15	43	No	No
#16	44	No	No

Source: Appendix AIS-3

VISUAL AND TECHNICAL SPECIFICATIONS

Figure 1a

Example Location for Battery Storage Containers



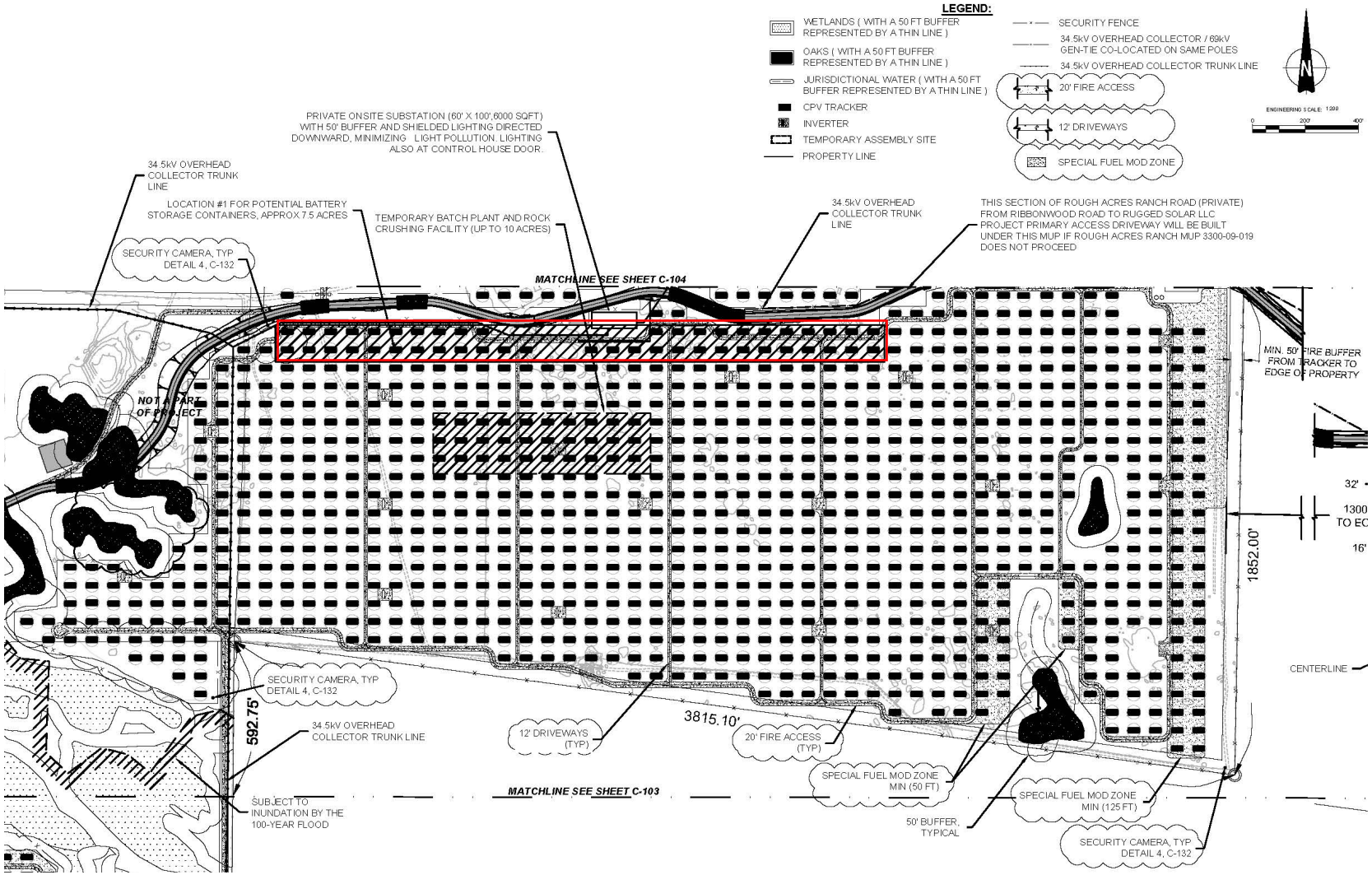
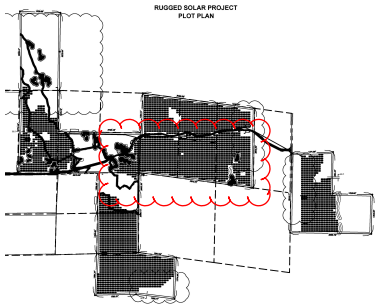


Figure 1b

Example Location for Battery Storage Containers



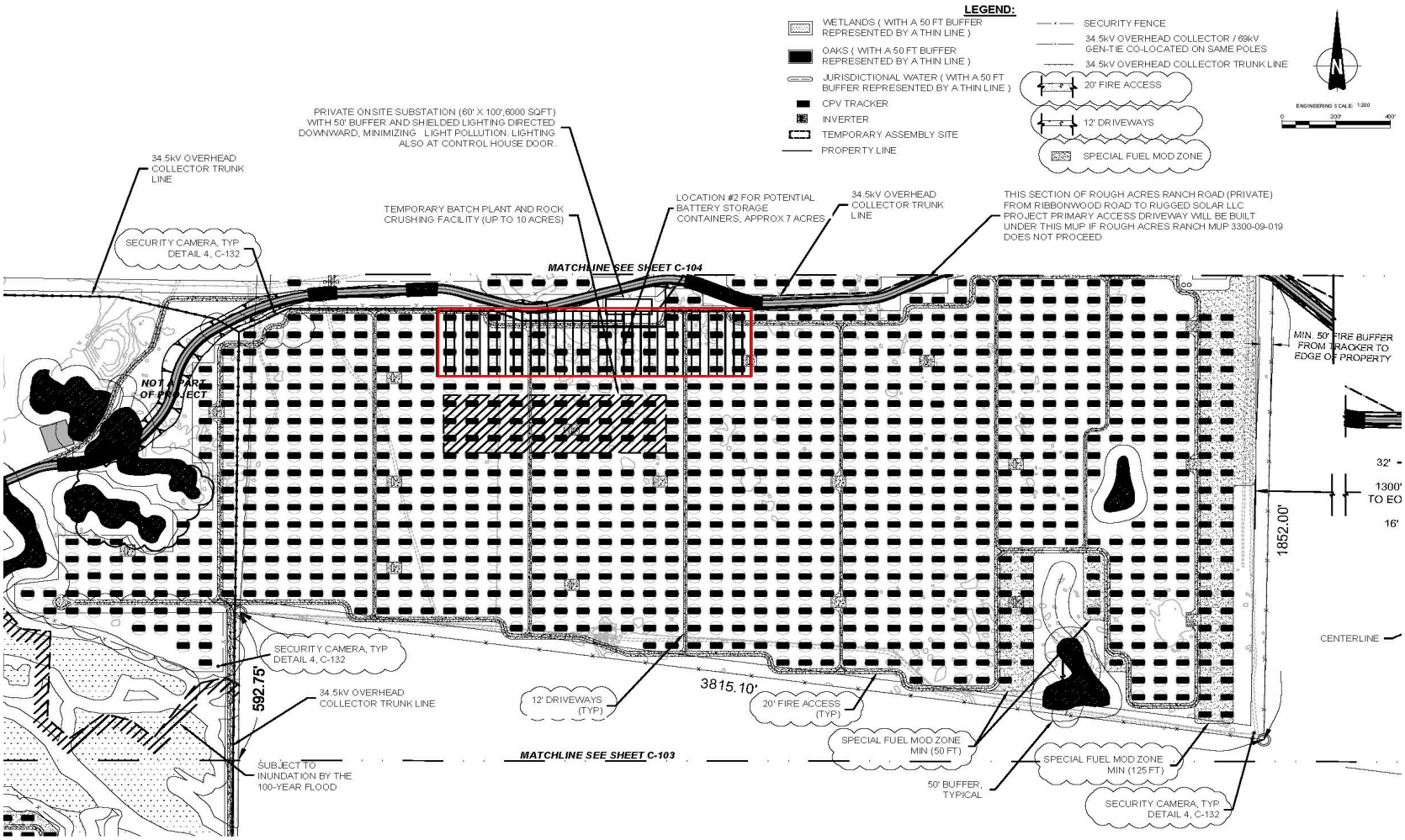


Figure 2
Energy Storage Container Size and Spacing

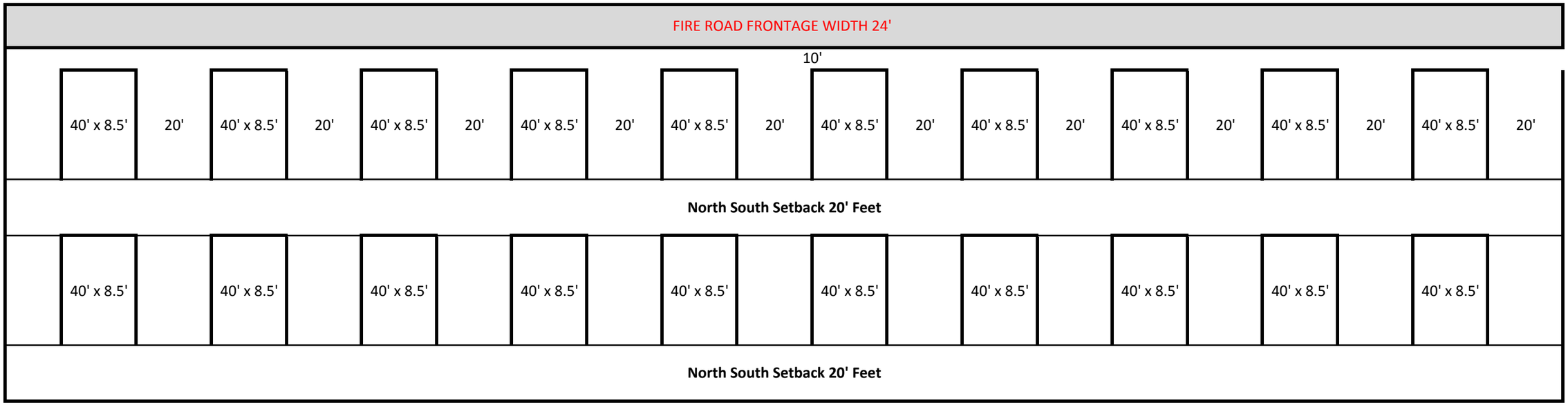


Figure 3

Example Battery Storage Container Layout

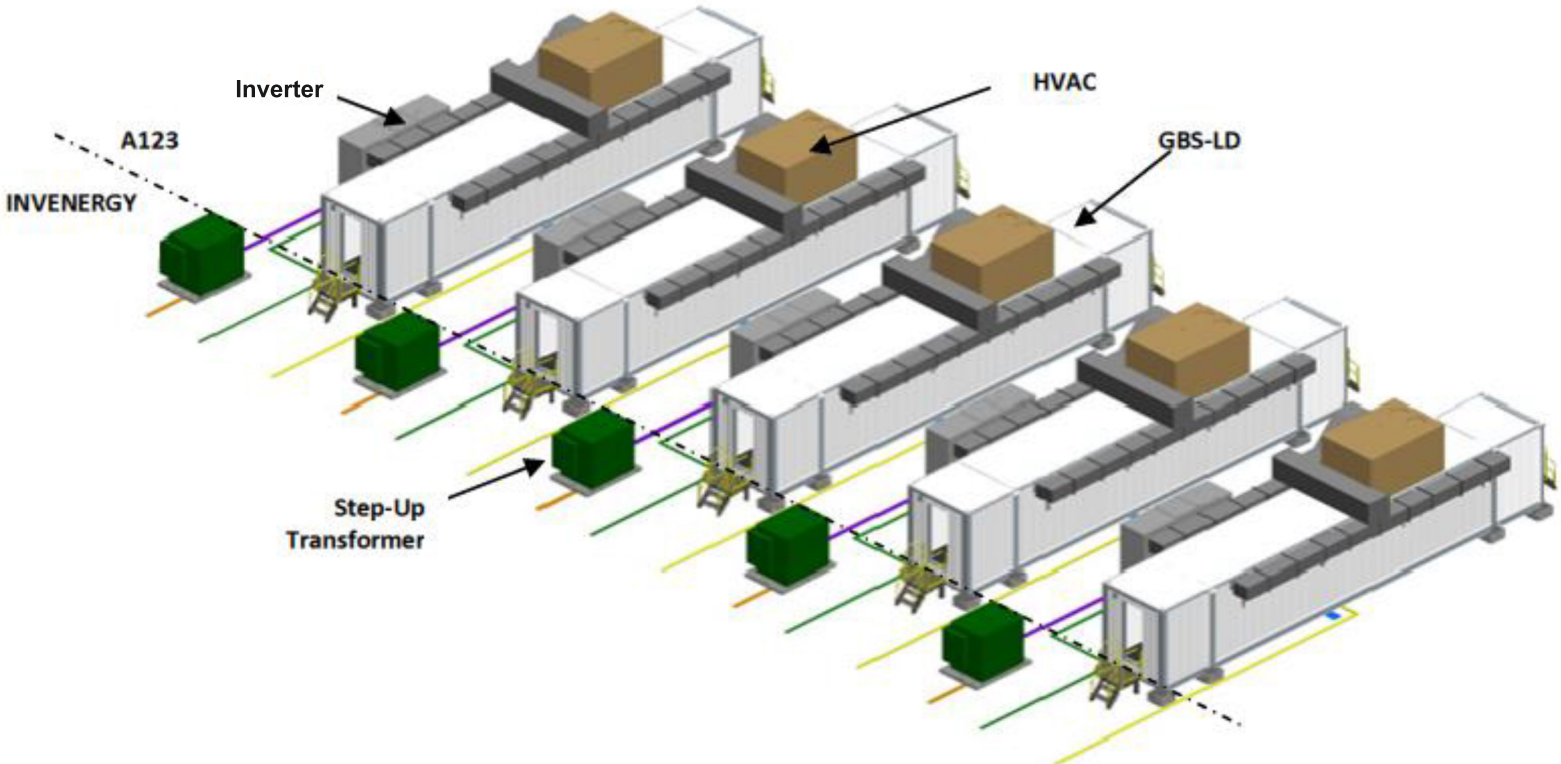


Figure 4

Example Battery Storage Container Illustration

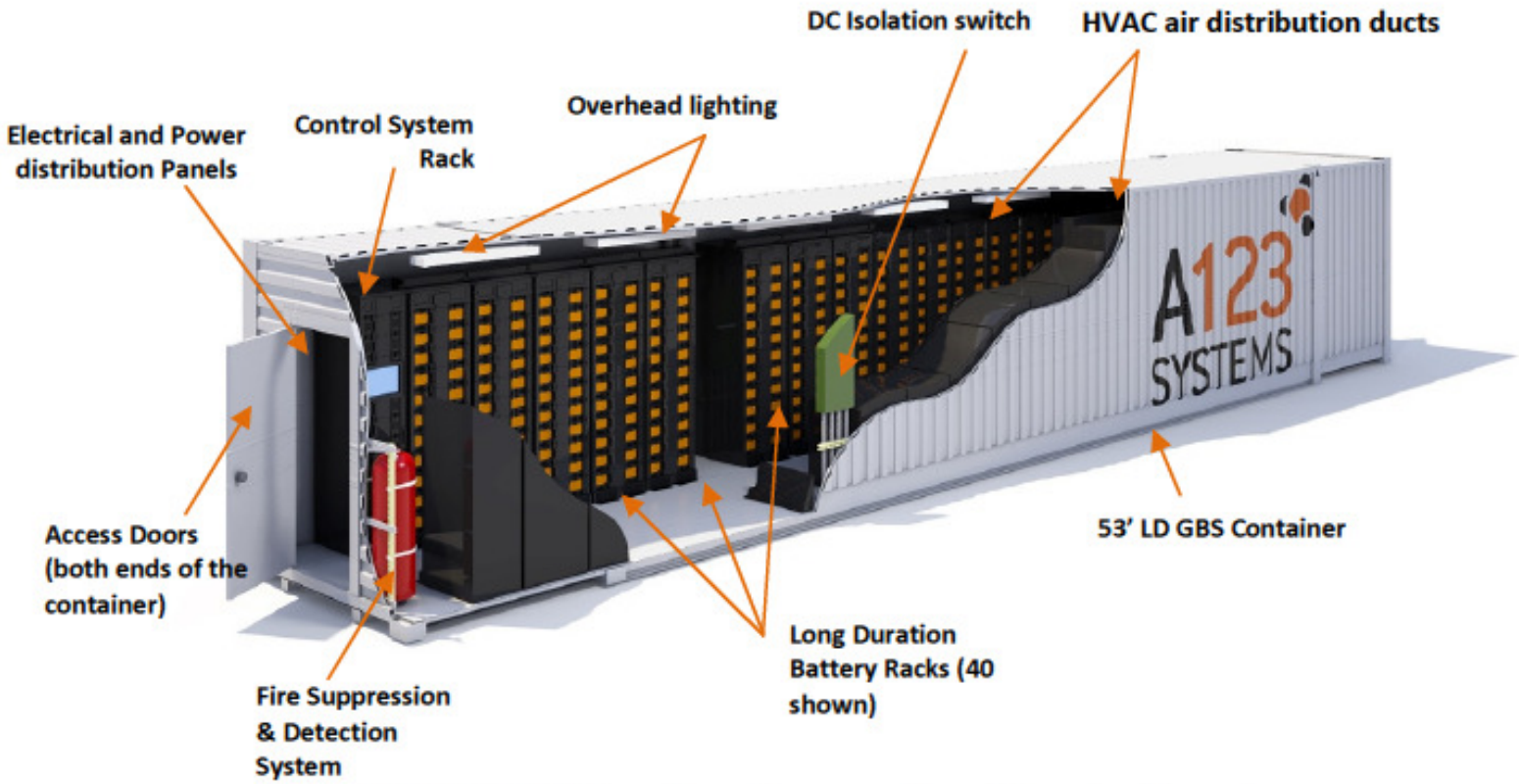
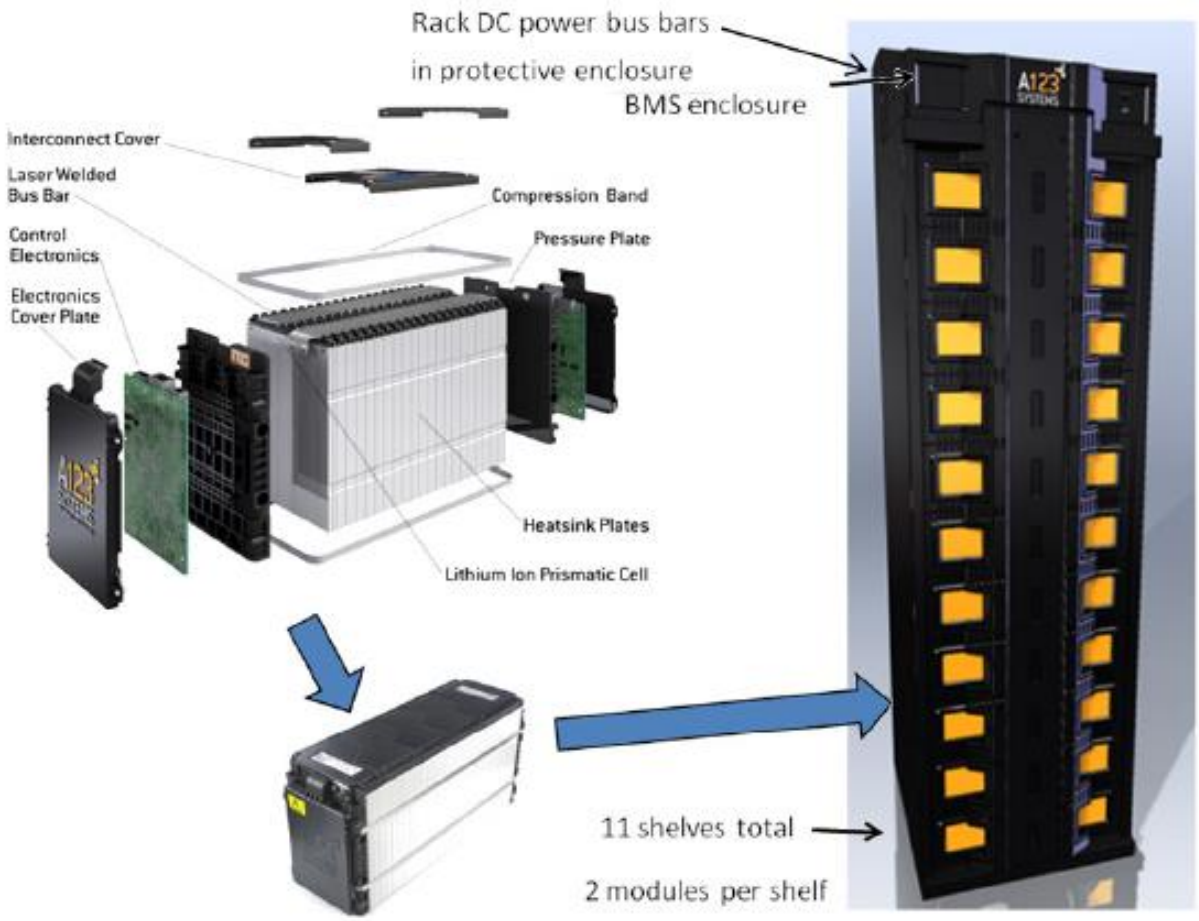


Figure 3 GBS-LD 53' Container Cutaway view (40 racks shown)

Figure 5

Lithium Ion Battery Pack (Typical)



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AIS 1

TECHNICAL MEMORANDUM

To: Rugged Solar LLC
From: Dudek
Subject: Aesthetics Analysis – Energy Storage
Date: September 25, 2014

1.0 INTRODUCTION

This memorandum provides information regarding a new, optional component of the Soitec Solar Development Project (Proposed Project) that was not analyzed in the Draft Program Environmental Impact Report (DPEIR) dated January 2014. Rugged Solar LLC (Rugged) proposes to include an optional energy storage system in the Rugged solar farm as part of the Proposed Project. This memorandum describes the energy storage system, analyzes its potential to have a significant environmental impact related to aesthetics, and concludes that the addition of the energy storage system on the Rugged solar farm would not affect the conclusions of the DPEIR prepared and circulated for the development of the Proposed Project.

2.0 PROJECT DESCRIPTION

The applicant proposes to include a component as part of the Rugged solar farm, to be located in southeastern San Diego County. This component consists of energy storage in the form of lithium ion (Li-ion) batteries (energy storage system), which would be located on the Rugged solar farm site in order to store energy produced by CPV trackers and to provide the ability to dispatch this energy upon request depending upon demand and other factors. The battery storage system would provide 160 Megawatt hours (MWh) of Li-ion battery storage in the form of 160 1 MWh containers each measuring 40 feet x 8.5 feet x 9.5 feet (LxWxH) on approximately 7 acres with appropriate fire access and approximately 20 feet of spacing on all four sides of each container.

2.1 Location

The energy storage system would be located on an approximate 7-acre portion of the Rugged solar farm site immediately south of the on-site substation (see Figures 1a and 1b, Energy

Storage System Location) in an area previously proposed to be developed with approximately 47 CPV trackers and associated inverters and step-up transformers. The proposed energy storage system would not change the developed footprint of the Rugged solar farm site.

2.2 Components

The Li-ion battery storage would be housed in standard 40' International Organization for Standardization (ISO) shipping containers. The containers are typically made from 12 to 14 gauge steel. The supplier's logo would be displayed on each container and containers can be painted to order (i.e., containers can be painted with any color stocked by the supplier). The containers would be oriented east/west in two rows of 80 containers each or in four rows of 60 containers each. An approximate 7-acre area would be required to accommodate two rows of 80 containers and an additional 0.5-acre area would be required to accommodate four rows of 60 containers. Approximately 20 feet of spacing would be provided on all four sides of each container measuring 40 feet x 8.5 feet x 9.5 feet (LxWxH); see Figure 2, Energy Storage Container Size and Spacing. It should be noted that inverters and step-up transformers would be located within the container spacing as described below and as depicted in Figure 3.

The Li-ion batteries (cells) would be arranged into modules, which in turn would be stored in battery racks. The racks would be entirely contained within the container. The container would have an access door at each end and overhead lighting on the interior roof. Each container would have an integrated heating, ventilation, and air conditioning (HVAC) unit located on the roof of the container. Each HVAC unit would measure approximately 7.5 feet in height. An inverter with a battery management system and container control system would be installed externally on a concrete pad next to each container. A step-up transformer would be associated with a set of two containers and would be installed alongside the container on a separate concrete pad. Thus, a total of 160 HVAC units, 160 inverters, and 80 step-up transformers would be associated with the energy storage system. Figure 3 provides an example illustration of the containers, step up transformers, and related infrastructure while Figure 4 provides an example of the typical container interior and battery pack configurations. Figure 5 presents the typical Li-ion battery pack components.

The proposed batteries and containers also include the following important monitoring and safety components:

- Modular battery racks designed for ease of maintenance. Every rack's battery monitoring system (BMS) continually monitors for unsafe voltage, current, and temperature, and has control of an automated switch (contactor) to disconnect the rack from the system if necessary.

- Integrated fire detection and suppression system
- Li-ion nanophosphate chemistry which is considered to be the most stable Li-ion technology and substantially reduces the possibility of thermal runaway and provides for reduced reaction from abuse (Sandia National Laboratories 2012) and A123 Systems (no date).

3.0 ANALYSIS

The energy storage system would introduce additional man-made features to the project site that could be visible from scenic vistas and public viewpoints. In addition, potentially reflective surfaces associated with the shipping container, HVAC systems and inverters and any outdoor lighting required for nighttime maintenance of energy storage system could affect night and daytime views in the area.

3.1 Scenic Vistas

The energy storage system would be located internally within the Rugged solar farm and would consist of 9.5-foot tall containers (approximately 18 feet tall when accounting for the height of HVAC units (7.5 feet tall) and associated perimeter screen walls (i.e., implementation of PDF-ES-N-1) that would be oriented east/west in two rows of 80 containers each or 4 rows of 40 containers each. Because the containers would be surrounded by project components exhibiting a larger vertical scale and form, aesthetic impacts would be minimal. With the exception of locations at which superior angle views of the Rugged solar farm are available (i.e., eastbound Interstate 8 at the Tecate Divide and Mt. Tule), visible project components from local area public roads would primarily consist of CPV trackers located along the site boundary. Further, because the height of the top of CPV trackers would range from 13 feet, 6 inches to 30 feet above grade during normal daily operations, CPV trackers would effectively screen the energy storage system during most hours of the day from view of motorists on most local area public roads near the solar farm.

On eastbound Interstate 8 at the Tecate Divide, views to the project site would be brief and due to distance, the form, line and texture of the energy storage system containers would not be overly distinguishable from CPV trackers. However, color contrasts between containers and surrounding CPV trackers may be perceptible from superior viewing locations. Therefore, containers would be painted a color that is consistent in hue and intensity with the CPV tracker panels to minimize visible color contrast (PDF-ES-AE-1). PDF-ES-AE-1 would also require that materials, coatings, or paints having little or no reflectivity be used whenever possible.

From Mt. Tule, the energy storage system would be viewed as an interior component of the larger Rugged solar farm. The installation of 160 containers, HVAC units and associated step-up transformers would interrupt the continuity and visual pattern of repetitive CPV tracker rows spread across the solar farm. When viewed from a superior viewing location, however, the energy storage system would display an altogether short, horizontal form. As such, containers would not obstruct long, westward-oriented scenic views available from Mt. Tule.

In addition, the application of an exterior color to the containers consistent in hue and intensity with the CPV tracker panels would minimize visible color contrast with the other solar farm components. Therefore, for the reasons discussed above, the inclusion of the energy storage system to the Rugged solar farm would not result in additional impacts to valued focal and/or panoramic vistas.

3.2 Visual Character and Quality of the Site and Surroundings

The DPEIR determined that the Rugged solar farm would produce strong visual contrast with existing vegetation and terrain and that the operation of numerous rows of tall CPV trackers in the McCain Valley would create visible contrast in form and color with existing vegetation and rural residential development. As such, the Rugged solar farm was determined to have significant and unmitigable impacts to existing visual character and quality (**AE-R-1**). Due to the height of CPV trackers, the energy storage system would be screened at most public viewing locations in the surrounding area. Further, public perception of the Rugged solar farm would typically be fashioned by the visibility of peripheral solar farm components and more specifically, by CPV trackers. Although the energy storage system would be screened from most public viewpoints by taller CPV tracker systems, the inclusion of the energy storage system to the Rugged solar farm would contribute to the previously identified significant and unmitigable impact, but is not anticipated to cause in increase in the severity of that impacts beyond that previously stated in the DPEIR.

3.3 Lighting and Glare

The installation of exterior lighting on individual containers, HVAC systems or step-up transformers is not anticipated to be necessary and therefore, no additional nighttime lighting sources would be added to the Rugged solar farm. As such, no new nighttime lighting impacts would occur due to the addition of the proposed energy storage system. As stated previously, containers would be painted a color to match the hue and intensity of CPV tracker panels to minimize potential color contrast within the solar farm. The application of paint to the exterior of containers would minimize the potential for glare generated by the energy storage system. PDF-ES-AE-1 would also require that materials, coatings, or paints having little or no reflectivity be

used whenever possible. As stated in the DPEIR, CPV trackers would create glare that would be received by motorists and residences in the surrounding area (**AE-R-2** and **AE-R-3**). This source of glare was determined to be a significant and unmitigatable impacts of the Rugged solar farm. The addition of the energy storage system to the Rugged solar farm would not create a substantial source of additional glare that would increase the severity of anticipated glare impacts of the project described in the DPEIR.

4.0 DESIGN CONSIDERATIONS

In addition to the project design features (PDFs) listed in Table 1-10, Summary of Project Design Features, of the DPEIR, the applicant has incorporated the following additional PDF as part of this component of the Rugged solar farm. PDFs would be made conditions of approval for the Rugged solar farm to ensure these features are incorporated into the solar farm design. PDF-ES-AE-1 would be implemented at the Rugged solar farm to ensure that color contrast between energy storage containers and CPV trackers is minimized and that new sources of potential glare are reduced wherever possible.

PDF-ES-AE-1 Energy storage system containers shall be painted a color consistent in hue and intensity with CPV tracker. Materials, coatings, or paints having little or no reflectivity shall be used whenever possible.

5.0 CERTIFICATION

This addendum has been prepared by Mr. Josh Saunders and Mr. Michael Sweesy. Mr. Michael Sweesy is a County of San Diego approved CEQA Consultant for Visual Analysis.

Michael L. Sweesy
Registered Landscape Architect #3319
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AIS 2

TECHNICAL MEMORANDUM

To:	Tierra del Sol Solar Farm LLC; Rugged Solar LLC
From:	David Deckman, Director of Air Quality Services
Subject:	Supplemental Air Quality and Greenhouse Gas Analysis – Energy Storage
Date:	October 29, 2014

1.0 INTRODUCTION

This memorandum provides information regarding a new, optional component of the Soitec Solar Development Project (Proposed Project) that was not analyzed in the Draft Program Environmental Impact Report (DPEIR) dated January 2014. Rugged Solar LLC (Rugged) proposes to include an optional energy storage system in the Rugged solar farm as part of the Proposed Project. This memorandum describes the energy storage system, analyzes its potential to have a significant environmental impact related to air quality, and concludes that the addition of the energy storage system on the Rugged solar farm would not affect the conclusions of the DPEIR prepared and circulated for the development of the Proposed Project.

2.0 PROJECT DESCRIPTION

The applicant proposes to include a component as part of the Rugged solar farm, to be located in southeastern San Diego County. This component consists of energy storage in the form of lithium ion (Li-ion) batteries (energy storage system), which would be located on the Rugged solar farm site in order to store energy produced by CPV trackers and to provide the ability to dispatch this energy upon request depending upon demand and other factors. The battery storage system would provide 160 Megawatt hours (MWh) of Li-ion battery storage in the form of 160 1 MWh containers each measuring 40 feet x 8.5 feet x 9.5 feet (LxWxH) on approximately 7 acres with appropriate fire access and approximately 20 feet of spacing on all four sides of each container.

2.1 Location

The energy storage system would be located on an approximate 7-acre portion of the Rugged solar farm site immediately south of the on-site substation (see Figures 1a and 1b, Energy

Storage System Location) in an area previously proposed to be developed with approximately 47 CPV trackers and associated inverters and step-up transformers. The proposed energy storage system would not change the developed footprint of the Rugged solar farm site.

2.2 Components

The Li-ion battery storage would be housed in standard 40' International Organization of Standardization (ISO) shipping containers. The containers are typically made from 12 to 14 gauge steel. The supplier's logo would be displayed on each container and containers can be painted to order (i.e., containers can be painted with any color stocked by the supplier). The containers would be oriented east/west in two rows of 80 containers each or in four rows of 60 containers each. An approximate 7-acre area would be required to accommodate two rows of 80 containers and an additional 0.5-acre area would be required to accommodate four rows of 60 containers. Approximately 20 feet of spacing would be provided on all four sides of each container measuring 40 feet x 8.5 feet x 9.5 feet (LxWxH); see Figure 2, Energy Storage Container Size and Spacing. It should be noted that inverters and step-up transformers would be located within the container spacing as described below and as depicted in Figure 3.

The Li-ion batteries (cells) would be arranged into modules, which in turn would be stored in battery racks. The racks would be entirely contained within the container. The container would have an access door at each end and overhead lighting on the interior roof. Each container would have an integrated heating, ventilation, and air conditioning (HVAC) unit located on the roof of the container. Each HVAC unit would measure approximately 7.5 feet in height. An inverter with a battery management system and container control system would be installed externally on a concrete pad next to each container. A step-up transformer would be associated with a set of two containers and would be installed alongside the container on a separate concrete pad. Thus, a total of 160 HVAC units, 160 inverters, and 80 step-up transformers would be associated with the energy storage system. Figure 3 provides an example illustration of the containers, step up transformers, and related infrastructure while Figure 4 provides an example of the typical container interior and battery pack configurations. Figure 5 presents the typical Li-ion battery pack components.

The proposed batteries and containers also include the following important monitoring and safety components:

- Modular battery racks designed for ease of maintenance. Every rack's battery monitoring system (BMS) continually monitors for unsafe voltage, current, and temperature, and has control of an automated switch (contactor) to disconnect the rack from the system if necessary.

- Integrated fire detection and suppression system.
- Li-ion nanophosphate chemistry which is considered to be the most stable Li-ion technology and substantially reduces the possibility of thermal runaway and provides for reduced reaction from abuse (Sandia National Laboratories 2012) and A123 Systems (no date).

3.0 ANALYSIS

Construction Impacts

Construction of the Li-ion energy storage system would consist of site preparation and grading, development of fire access roads, container arrangement, and assembly of accessory components, including transformers and inverters. Because the energy storage system would be located on an area previously proposed to be developed with CPV systems, site preparation and grading would be included with that originally anticipated in the DPEIR. No additional grading would be required. All existing vegetation would be cleared and grubbed from the area, as originally anticipated in the DPEIR. Fire access roads and pads for each container would be graded consistent with what is required for the entire project. The energy storage system would be connected to the grid by an underground direct buried connection to the project substation. Each container would be trucked to the site and arranged on a graded pad. Accessory components would be placed either adjacent to or mounted on each container. Following placement of the energy storage systems, fire access roads would be constructed to support the imposed loads of fire apparatus (not less than 50,000 pounds) as required by the County Fire Code. All other disturbed areas would be treated with a permeable nontoxic soil binding agent to reduce fugitive dust and erosion, which is consistent with fugitive dust control measures identified in the DPEIR.

Additionally, construction personnel, equipment, and hours of operation would be consistent with that discussed in the DPEIR; refer to Chapter 1.0, Project Description.

The transportation of the energy storage units to the Rugged solar farm site would require the use of heavy-duty trucks. Each of the 160 1-MWh units would be transported individually, resulting in 160 trucks or 320 one-way trips. The energy storage system would replace approximately 47 CPV tracker components previously proposed as part of the Rugged solar farm. Approximately 123 one-way trips for material deliveries associated with the 47 CPV components were analyzed in Appendix 9.0-5 of the Final PEIR. With the addition of the energy storage delivery trips, the net increase in delivery trips would result in 197 additional one-way trips. The delivery of energy storage systems would occur in the final two months of construction during the punch list, cleanup and commissioning phase. Daily deliveries and

delivery trips during construction would not exceed more than 25 energy storage deliveries (50 one-way trips) any given day; see Attachment 1, which includes a list of the assumptions. Although it is anticipated that the amount of deliveries per day would be less, the maximum amount of trips (50 one way trips) were used in the analysis to represent a worse-case scenario. At this level, criteria air pollutants would remain below the County significance thresholds as shown in Table 1 (see AIS 2 Attachment 1 for details).

Table 1 shows the maximum daily Rugged construction emissions estimates as provided in Appendix 9.0-5 of the Final PEIR. The addition of delivery trips associated with energy storage would not occur during the construction period when maximum daily emissions would occur; therefore, the emissions estimates as provided in Appendix 9.0-5 would not change.

Table 1
Revised Estimated Maximum Daily Construction Emissions (pounds/day)
Rugged Solar Farm

	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
2014	17.54	239.82	125.20	0.44	96.76	26.14
2015	14.19	175.61	107.17	0.38	26.03	9.94
Maximum Daily Emissions (Revised)	***17.73***	***244.22***	***126.10***	***0.45***	***96.89***	***26.23***
Emission Threshold	*137*	*250*	*550*	*250*	*100*	*55*
Threshold Exceeded?	**No**	**No**	**No**	**No**	**No**	**No**

Source: See Appendix 9.0-5, Attachment 1 for details.

As previously discussed, additional delivery trips associated with energy storage would occur during the last two months of construction for the Rugged solar farm. Table 2 shows the maximum daily emissions during the last two months of construction as disclosed in Attachment 1 of Appendix 9.0-5 of the Final PEIR. Table 2 also shows the resulting maximum daily emissions with the addition of energy storage delivery trips.

Table 2
Revised Estimated Maximum Daily Construction Emissions (pounds/day)
Rugged Solar Farm – Energy Storage Delivery Period

	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
*Maximum Daily Emissions without Energy Storage Delivery Trips**	2.37	42.06	13.35	0.10	1.95	0.99
Maximum Daily Emissions with Energy Storage Delivery Trips	5.67	113.82	28.80	0.27	4.81	2.54
Emission Threshold	*137*	*250*	*550*	*250*	*100*	*55*
Threshold Exceeded?	**No**	**No**	**No**	**No**	**No**	**No**

Source: See Attachment 1 for complete results. *See Appendix 9.0-5, Attachment 1

It should be noted that Attachment 1 used the updated emissions for the Rugged solar farm that were provided in Appendix 9.0-5 Supplemental Air Quality Analysis – Project Changes. Therefore, because the additional truck trips associated with the transportation of energy storage units would not contribute to an exceedance of the County of San Diego thresholds for the purposes of analyzing air quality impacts, air quality impacts associated with the Rugged solar farm would remain less than significant as originally concluded in the DPEIR.

Table 3 shows the maximum daily emissions that would occur under the Proposed Project scenario during the last two months of the Rugged construction period as disclosed in Attachment 1 of Appendix 9.0-5 of the Final PEIR. Table 3 also shows resulting emissions with the addition of energy storage delivery trips during the energy storage delivery period under the Proposed Project scenario.

Table 3
Revised Estimated Maximum Daily Construction Emissions (pounds/day)
Proposed Project – Energy Storage Delivery Period

	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
TDS – Energy Storage Period	1.51	16.47	28.80	0.26	4.781	2.54
Rugged – Energy Storage Period	5.67	113.82	10.80	0.04	1.08	0.72
Proposed Project Emissions – Energy Storage Period	***7.19***	***130.29***	***39.60***	***0.30***	***5.88***	***3.26***
Emission Threshold	*137*	*250*	*550*	*250*	*100*	*55*
Threshold Exceeded?	**No**	**No**	**No**	**No**	**No**	**No**

Source: See Attachment 1 for complete results.

As shown in Table 3, because the additional truck trips associated with the transportation of energy storage units would not contribute to an exceedance of the County of San Diego

thresholds for the purposes of analyzing air quality impacts, air quality impacts associated with the Proposed Project would remain less than significant as originally concluded in the DPEIR.

Operational Impacts

During operation, containers would be inspected, monthly, quarterly, and annually with physical maintenance (equipment testing, continuous remote monitoring, repair, routine procedures to ensure service continuity, and standard preventative maintenance) occurring annually. All inspections would occur during daylight hours and would be performed by the employees operating the Rugged solar farm. No additional employees would be required for the operation of the energy storage system.

Electricity required to power the HVAC systems associated with each individual unit would be directly generated by the project on site and would not require an additional external source of electricity. Each individual unit would be designed as an integrated energy storage system, and the HVAC system associated with each individual unit would be directly connected to the energy storage system's output and would not require additional electrical input. As such, greenhouse gas emissions associated with electrical use would not increase.

4.0 CONCLUSIONS

Only a minor increase in daily truck trips would be required to accommodate the transportation of the energy storage units to the project site, and no additional electricity would be required to operate the energy storage units. As a result, daily criteria pollutant emissions and annual greenhouse gas emissions would remain below the thresholds and impacts would be less than significant as previously concluded in the DPEIR.

5.0 CERTIFICATION

This addendum has been prepared by Ms. Jennifer Longabaugh and Mr. David Deckman. Mr. David Deckman is a County of San Diego approved CEQA Consultant for Air Quality.

David Deckman
Director of Air Quality Services

ATTACHMENT 1

Revised Air Quality Emission Estimates

Rugged Solar Farm Project
Emissions Summary - Revised 9.29.14

CONSTRUCTION

ROG

	2014 Emissions (lbs/day)						2015 Emissions (lbs/day)					
Activity	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
Offroad Emissions												
Mobilization and Clean-Up	0.35											
Site Clearing/Grubbing/Grinding	1.94	1.94	1.94									
Grading/Road Construction			4.70									
Underground Electric/Communications Cable Installation				2.42	2.42	2.42	2.40					
Tracker Installation		4.64	4.64	4.64	4.64	4.64	4.58	4.58	4.58	4.58		
Substation Construction	0.91	0.91										
O&M Building Construction					0.81	0.81	0.79	0.79				
OFFROAD MONTHLY TOTAL (max daily)	**2.85**	**6.57**	**9.34**	**7.06**	**7.87**	**7.87**	**7.76**	**5.37**	**4.58**	**4.58**		
Onroad Emissions	**4.50**	**6.49**	**6.60**	**5.33**	**5.33**	**5.33**	**4.83**	**4.83**	**4.83**	**5.29**	**3.76**	**0.46**
Concrete Batch Plant	**1.60**	**1.60**	**1.60**	**1.60**	**1.60**	**1.60**	**1.60**	**1.60**	**1.60**	**1.60**		
MAX DAILY EMISSIONS	**8.95**	**14.67**	**17.54**	**13.99**	**14.80**	**14.80**	**14.19**	**11.80**	**11.00**	**11.47**	**3.76**	**0.46**

CO

	2014 Emissions (lbs/day)						2015 Emissions (lbs/day)					
Activity	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
Offroad Emissions												
Mobilization and Clean-Up	3.75											
Site Clearing/Grubbing/Grinding	17.67	17.67	17.67									
Grading/Road Construction			34.06									
Underground Electric/Communications Cable Installation				21.12	21.12	21.12	20.84					
Tracker Installation		40.27	40.27	40.27	40.27	40.27	39.90	39.90	39.90	39.90		
Substation Construction	8.34	8.34										
O&M Building Construction					5.31	5.31	5.18	5.18				
OFFROAD MONTHLY TOTAL (max daily)	**26.01**	**57.94**	**74.33**	**61.40**	**66.71**	**66.71**	**65.92**	**45.08**	**39.90**	**39.90**		
Onroad Emissions	**24.88**	**41.98**	**43.03**	**37.08**	**37.08**	**37.08**	**33.42**	**33.42**	**33.42**	**37.84**	**19.84**	**4.39**
Concrete Batch Plant	**7.84**	**7.84**	**7.84**	**7.84**	**7.84**	**7.84**	**7.84**	**7.84**	**7.84**	**7.84**		
MAX DAILY EMISSIONS	**58.73**	**107.76**	**125.20**	**106.31**	**111.62**	**111.62**	**107.17**	**86.33**	**81.15**	**85.57**	**19.84**	**4.39**

Rugged Solar Farm Project
Emissions Summary - Revised 9.29.14

NOx

	2014 Emissions (lbs/day)						2015 Emissions (lbs/day)					
Activity	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
Offroad Emissions												
Mobilization and Clean-Up	4.22											
Site Clearing/Grubbing/Grinding	28.18	28.18	28.18									
Grading/Road Construction			68.47									
Underground Electric/Communications Cable Installation				34.59	34.59	34.59	33.74					
Tracker Installation		63.60	63.60	63.60	63.60	63.60	61.57	61.57	61.57	61.57		
Substation Construction	12.33	12.33										
O&M Building Construction					10.55	10.55	10.29	10.29				
OFFROAD MONTHLY TOTAL (max daily)	**40.51**	**91.78**	**132.07**	**98.19**	**108.74**	**108.74**	**105.59**	**71.85**	**61.57**	**61.57**		
Onroad Emissions	**85.29**	**96.23**	**96.33**	**67.27**	**67.27**	**67.27**	**58.60**	**58.60**	**58.60**	**59.04**	**72.20**	**0.44**
Concrete Batch Plant	**11.42**	**11.42**	**11.42**	**11.42**	**11.42**	**11.42**	**11.42**	**11.42**	**11.42**	**11.42**		
MAX DAILY EMISSIONS	**137.22**	**199.43**	**239.82**	**176.88**	**187.43**	**187.43**	**175.61**	**141.87**	**131.58**	**132.03**	**72.20**	**0.44**

SOx

	2014 Emissions (lbs/day)						2015 Emissions (lbs/day)					
Activity	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
Offroad Emissions												
Mobilization and Clean-Up	0.01											
Site Clearing/Grubbing/Grinding	0.04	0.04	0.04									
Grading/Road Construction			0.08									
Underground Electric/Communications Cable Installation				0.06	0.06	0.06	0.06					
Tracker Installation		0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12		
Substation Construction	0.02	0.02										
O&M Building Construction					0.02	0.02	0.02	0.02				
OFFROAD MONTHLY TOTAL (max daily)	**0.06**	**0.16**	**0.20**	**0.18**	**0.19**	**0.19**	**0.19**	**0.14**	**0.12**	**0.12**		
Onroad Emissions	**0.18**	**0.22**	**0.23**	**0.17**	**0.17**	**0.17**	**0.17**	**0.17**	**0.17**	**0.18**	**0.17**	**0.01**
Concrete Batch Plant	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**		
MAX DAILY EMISSIONS	**0.26**	**0.40**	**0.44**	**0.36**	**0.38**	**0.38**	**0.38**	**0.32**	**0.30**	**0.31**	**0.17**	**0.01**

Rugged Solar Farm Project
Emissions Summary - Revised 9.29.14

PM10

	2014 Emissions (lbs/day)						2015 Emissions (lbs/day)					
Activity	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
Offroad Emissions												
Mobilization and Clean-Up	0.29											
Site Clearing/Grubbing/Grinding	1.32	1.32	1.32									
Grading/Road Construction			3.24									
Underground Electric/Communications Cable Installation				1.70	1.70	1.70	1.70					
Tracker Installation		3.34	3.34	3.34	3.34	3.34	3.25	3.25	3.25	3.25		
Substation Construction	0.63	0.63										
O&M Building Construction					0.56	0.56	0.55	0.55				
OFFROAD MONTHLY TOTAL (max daily)	**1.95**	**4.66**	**6.58**	**5.04**	**5.61**	**5.61**	**5.50**	**3.80**	**3.25**	**3.25**		
Onroad Emissions	**3.38**	**4.68**	**4.74**	**3.91**	**3.91**	**3.91**	**3.62**	**3.62**	**3.62**	**3.92**	**3.15**	**0.30**
Fugitive Dust	**65.52**	**65.52**	**68.53**									
Concrete Batch Plant	**16.91**	**16.91**	**16.91**	**16.91**	**16.91**	**16.91**	**16.91**	**16.91**	**16.91**	**16.91**		
MAX DAILY EMISSIONS	**87.76**	**91.77**	**96.76**	**25.86**	**26.43**	**26.43**	**26.03**	**24.33**	**23.78**	**24.08**	**3.15**	**0.30**

PM2.5

	2014 Emissions (lbs/day)						2015 Emissions (lbs/day)					
Activity	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
Offroad Emissions												
Mobilization and Clean-Up	0.26											
Site Clearing/Grubbing/Grinding	1.21	1.21	1.21									
Grading/Road Construction			2.98									
Underground Electric/Communications Cable Installation				1.56	1.56	1.56	1.53					
Tracker Installation		3.07	3.07	3.07	3.07	3.07	2.99	2.99	2.99	2.99		
Substation Construction	0.58	0.58										
O&M Building Construction					0.52	0.52	0.51	0.51				
OFFROAD MONTHLY TOTAL (max daily)	**1.79**	**4.29**	**6.05**	**4.64**	**5.16**	**5.16**	**5.02**	**3.50**	**2.99**	**2.99**		
Onroad Emissions	**1.99**	**2.49**	**2.51**	**1.92**	**1.92**	**1.92**	**1.65**	**1.65**	**1.65**	**1.75**	**1.64**	**0.09**
Fugitive Dust	**13.68**	**13.68**	**14.31**									
Concrete Batch Plant	**3.26**	**3.26**	**3.26**	**3.26**	**3.26**	**3.26**	**3.26**	**3.26**	**3.26**	**3.26**		
MAX DAILY EMISSIONS	**20.73**	**23.72**	**26.14**	**9.82**	**10.34**	**10.34**	**9.94**	**8.41**	**7.91**	**8.00**	**1.64**	**0.09**

Rugged Solar Farm Project
Emissions Summary - Revised 9.29.14

CO2

Activity	2014 Emissions (tons/yr)		2015 Emissions (tons/yr)
Offroad Emissions			
Mobilization and Clean Up	2.35		—
Site Clearing/Grubbing/Grinding	112.02		—
Grading/Road Construction	34.41		—
Underground Electric/Communications Cable Installation	200.12		56.44
Tracker Installation	613.99		512.59
Substation Construction	35.70		—
O&M Building Construction	20.79		22.23
OFFROAD ANNUAL TOTAL	**1,019.37**		**591.26**
Onroad Emissions	**1,422.09**		**1,390.33**
Concrete Batch Plant	**69.37**		**104.34**
ANNUAL EMISSIONS	**2,510.83**		**2,085.93**

OPERATION

Vehicle Type	ROG	CO	NOx	SOx	PM10	PM2.5
Solar Farm						
Employee Vehicles	0.66	6.27	0.63	0.01	0.43	0.13
Personnel Transport Vehicles	0.01	0.09	0.01	0.00	0.01	0.00
Washing Vehicles	0.01	0.04	0.17	0.00	0.01	0.00
Satellite Washing Vehicles	0.01	0.09	0.01	0.00	0.01	0.00
Service Trucks	0.00	0.05	0.01	0.00	0.00	0.00
Emergency Generators	1.02	19.30	11.01	0.02	0.63	0.62
Maximum Daily Emissions	**1.71**	**25.84**	**11.83**	**0.03**	**1.08**	**0.76**

Notes:
1. Emissions per month reflect worst-case daily emissions accounting for construction phases occurring concurrently.

Rugged Solar Farm Project
On-Road Motor Vehicle Emissions - Revised

2014 EMISSIONS

Vehicle Type	Trips/Day	No. of Units	Distance (mi)	Duration (days)	Category	2014 Emissions (lb/day)							2014 Emissions (lbs/month)						
						ROG	CO	NOx	SOx	PM10	PM2.5	CO2	ROG	CO	NOx	SOx	PM10	PM2.5	CO2
July																			
Worker Vehicles[1]	43		35	18	On-Road	0.79	7.58	0.76	0.01	0.46	0.14	1,357.64	14.24	136.48	13.65	0.25	8.36	2.57	24,437.44
Delivery Trucks[2]	29		85	18	On-Road	2.12	9.91	48.40	0.09	1.88	1.11	9,915.66	38.21	178.32	871.19	1.70	33.90	19.97	178,481.85
Water Trucks (on-site)[3]		2	120	18	On-Road	0.21	0.96	4.71	0.01	0.14	0.10	965.42	3.72	17.36	84.82	0.17	2.43	1.73	17,377.54
Water Trucks (off-site)[4]	20		54	18	On-Road	0.93	4.34	21.21	0.04	0.61	0.43	4,344.39	16.74	78.13	381.70	0.75	10.95	7.79	78,198.94
Water Trucks (off-site)[4]	28		10	18	On-Road	0.24	1.13	5.50	0.01	0.16	0.11	1,126.32							
Dump Trucks[5]		4	60	18	On-Road	0.21	0.96	4.71	0.01	0.14	0.10	965.42	3.72	17.36	84.82	0.17	2.43	1.73	17,377.54
August																			
Worker Vehicles[1]	130	4	35	26	On-Road	2.37	22.75	2.28	0.04	1.39	0.43	4,072.91	61.71	591.43	59.15	1.07	36.21	11.14	105,895.59
Delivery Trucks[2]	29		85	26	On-Road	2.12	9.91	48.40	0.09	1.88	1.11	9,915.66	55.20	257.58	1258.39	2.46	48.97	28.85	257,807.12
Water Trucks (on-site)[3]		2	120	26	On-Road	0.21	0.96	4.71	0.01	0.14	0.10	965.42	5.37	25.08	122.52	0.24	3.51	2.50	25,100.90
Water Trucks (off-site)[4]	20		54	26	On-Road	0.93	4.34	21.21	0.04	0.61	0.43	4,344.39	24.18	112.85	551.34	1.08	15.82	11.25	112,954.03
Water Trucks (off-site)[4]	28		10	26	On-Road	0.24	1.13	5.50	0.01	0.16	0.11	1,126.32							
Concrete Material Trucks[6]	8		55	26	On-Road	0.38	1.77	8.64	0.02	0.34	0.20	1,769.93	9.85	45.98	224.62	0.44	8.74	5.15	46,018.31
Concrete Trucks[7]	8		5	26	On-Road	0.03	0.16	0.79	0.00	0.03	0.02	160.90	0.90	4.18	20.42	0.04	0.79	0.47	4,183.48
Dump Trucks[5]		4	60	26	On-Road	0.21	0.96	4.71	0.01	0.14	0.10	965.42	5.37	25.08	122.52	0.24	3.51	2.50	25,100.90
September																			
Worker Vehicles[1]	130	4	35	26	On-Road	2.37	22.75	2.28	0.04	1.39	0.43	4,072.91	61.71	591.43	59.15	1.07	36.21	11.14	105,895.59
Delivery Trucks[2]	29		85	26	On-Road	2.12	9.91	48.40	0.09	1.88	1.11	9,915.66	55.20	257.58	1258.39	2.46	48.97	28.85	257,807.12
Commissioning Trips[8]	6		35	26	On-Road	0.11	1.05	0.10	0.00	0.06	0.02	187.69	2.84	27.25	2.73	0.05	1.67	0.51	4,879.98
Water Trucks (on-site)[3]		2	120	26	On-Road	0.21	0.96	4.71	0.01	0.14	0.10	965.42	5.37	25.08	122.52	0.24	3.51	2.50	25,100.90
Water Trucks (off-site)[4]	20		54	26	On-Road	0.93	4.34	21.21	0.04	0.61	0.43	4,344.39	24.18	112.85	551.34	1.08	15.82	11.25	112,954.03
Water Trucks (off-site)[4]	28		10	26	On-Road	0.24	1.13	5.50	0.01	0.16	0.11	1,126.32							
Concrete Material Trucks[6]	8		55	26	On-Road	0.38	1.77	8.64	0.02	0.34	0.20	1,769.93	9.85	45.98	224.62	0.44	8.74	5.15	46,018.31
Concrete Trucks[7]	8		5	26	On-Road	0.03	0.16	0.79	0.00	0.03	0.02	160.90	0.90	4.18	20.42	0.04	0.79	0.47	4,183.48
Dump Trucks[5]		4	60	26	On-Road	0.21	0.96	4.71	0.01	0.14	0.10	965.42	5.37	25.08	122.52	0.24	3.51	2.50	25,100.90
October																			
Worker Vehicles[1]	130	4	35	26	On-Road	2.37	22.75	2.28	0.04	1.39	0.43	4,072.91	61.71	591.43	59.15	1.07	36.21	11.14	105,895.59
Delivery Trucks[2]	29		85	26	On-Road	2.12	9.91	48.40	0.09	1.88	1.11	9,915.66	55.20	257.58	1258.39	2.46	48.97	28.85	257,807.12
Commissioning Trips[8]	6		35	26	On-Road	0.11	1.05	0.10	0.00	0.06	0.02	187.69	2.84	27.25	2.73	0.05	1.67	0.51	4,879.98
Water Trucks (on-site)[3]		2	60	26	On-Road	0.10	0.48	2.36	0.00	0.07	0.05	482.71	2.69	12.54	61.26	0.12	1.76	1.25	12,550.45
Concrete Material Trucks[6]	8		55	26	On-Road	0.38	1.77	8.64	0.02	0.34	0.20	1,769.93	9.85	45.98	224.62	0.44	8.74	5.15	46,018.31
Concrete Trucks[7]	8		5	26	On-Road	0.03	0.16	0.79	0.00	0.03	0.02	160.90	0.90	4.18	20.42	0.04	0.79	0.47	4,183.48
Dump Trucks[5]		4	60	26	On-Road	0.21	0.96	4.71	0.01	0.14	0.10	965.42	5.37	25.08	122.52	0.24	3.51	2.50	25,100.90
November																			
Worker Vehicles[1]	130	4	35	26	On-Road	2.37	22.75	2.28	0.04	1.39	0.43	4,072.91	61.71	591.43	59.15	1.07	36.21	11.14	105,895.59
Delivery Trucks[2]	29		85	26	On-Road	2.12	9.91	48.40	0.09	1.88	1.11	9,915.66	55.20	257.58	1258.39	2.46	48.97	28.85	257,807.12
Commissioning Trips[8]	6		35	26	On-Road	0.11	1.05	0.10	0.00	0.06	0.02	187.69	2.84	27.25	2.73	0.05	1.67	0.51	4,879.98
Water Trucks (on-site)[3]		2	60	26	On-Road	0.10	0.48	2.36	0.00	0.07	0.05	482.71	2.69	12.54	61.26	0.12	1.76	1.25	12,550.45
Concrete Material Trucks[6]	8		55	26	On-Road	0.38	1.77	8.64	0.02	0.34	0.20	1,769.93	9.85	45.98	224.62	0.44	8.74	5.15	46,018.31
Concrete Trucks[7]	8		5	26	On-Road	0.03	0.16	0.79	0.00	0.03	0.02	160.90	0.90	4.18	20.42	0.04	0.79	0.47	4,183.48
Dump Trucks[5]		4	60	26	On-Road	0.21	0.96	4.71	0.01	0.14	0.10	965.42	5.37	25.08	122.52	0.24	3.51	2.50	25,100.90
December																			
Worker Vehicles[1]	130	4	35	26	On-Road	2.37	22.75	2.28	0.04	1.39	0.43	4,072.91	61.71	591.43	59.15	1.07	36.21	11.14	105,895.59
Delivery Trucks[2]	29		85	26	On-Road	2.12	9.91	48.40	0.09	1.88	1.11	9,915.66	55.20	257.58	1258.39	2.46	48.97	28.85	257,807.12
Commissioning Trips[8]	6		35	26	On-Road	0.11	1.05	0.10	0.00	0.06	0.02	187.69	2.84	27.25	2.73	0.05	1.67	0.51	4,879.98
Water Trucks (on-site)[3]		2	60	26	On-Road	0.10	0.48	2.36	0.00	0.07	0.05	482.71	2.69	12.54	61.26	0.12	1.76	1.25	12,550.45
Concrete Material Trucks[6]	8		55	26	On-Road	0.38	1.77	8.64	0.02	0.34	0.20	1,769.93	9.85	45.98	224.62	0.44	8.74	5.15	46,018.31
Concrete Trucks[7]	8		5	26	On-Road	0.03	0.16	0.79	0.00	0.03	0.02	160.90	0.90	4.18	20.42	0.04	0.79	0.47	4,183.48
Dump Trucks[5]		4	60	26	On-Road	0.21	0.96	4.71	0.01	0.14	0.10	965.42	5.37	25.08	122.52	0.24	3.51	2.50	25,100.90
												TOTAL 2014	**820.31**	**5471.38**	**11404.11**	**27.44**	**599.83**	**307.62**	**2,844,181.45**

Rugged Solar Farm Project
On-Road Motor Vehicle Emissions - Revised

2015 EMISSIONS

Vehicle Type	Trips/Day	No. of Units	Distance (mi)	Duration (days)	Category	2015 Emissions (lb/day)							2015 Emissions (lbs/month)						
						ROG	CO	NOx	SOx	PM10	PM2.5	CO2	ROG	CO	NOx	SOx	PM10	PM2.5	CO2
January																			
Worker Vehicles[1]	130		35.0	26	On-Road	2.14	20.37	2.04	0.04	1.39	0.43	4,066.21	55.75	529.65	53.09	1.06	36.10	11.08	105,721.51
Delivery Trucks[2]	29		85.0	26	On-Road	1.91	8.96	41.62	0.09	1.65	0.90	9,907.60	49.72	232.99	1082.13	2.46	43.01	23.36	257,597.63
Commissioning Trips[8]	6		35.0	26	On-Road	0.10	0.94	0.09	0.00	0.06	0.02	187.67	2.57	24.45	2.45	0.05	1.67	0.51	4,879.45
Water Trucks (on-site)[3]		2	60.0	26	On-Road	0.09	0.44	2.03	0.00	0.06	0.04	482.32	2.42	11.34	52.68	0.12	1.47	0.98	12,540.25
Concrete Material Trucks[6]	8		55.0	26	On-Road	0.34	1.60	7.43	0.02	0.30	0.16	1,768.50	8.88	41.59	193.16	0.44	7.68	4.17	45,980.92
Concrete Trucks[7]	8		5.0	26	On-Road	0.03	0.15	0.68	0.00	0.03	0.01	160.77	0.81	3.78	17.56	0.04	0.70	0.38	4,180.08
Dump Trucks[5]		4	60.0	26	On-Road	0.21	0.96	4.71	0.01	0.14	0.10	965.42	4.84	22.68	105.36	0.24	2.93	1.97	25,080.50
February																			
Worker Vehicles[1]	130		35.0	26	On-Road	2.14	20.37	2.04	0.04	1.39	0.43	4,066.21	55.75	529.65	53.09	1.06	36.10	11.08	105,721.51
Delivery Trucks[2]	29		85.0	26	On-Road	1.91	8.96	41.62	0.09	1.65	0.90	9,907.60	49.72	232.99	1082.13	2.46	43.01	23.36	257,597.63
Commissioning Trips[8]	6		35.0	26	On-Road	0.10	0.94	0.09	0.00	0.06	0.02	187.67	2.57	24.45	2.45	0.05	1.67	0.51	4,879.45
Water Trucks (on-site)[3]		2	60.0	26	On-Road	0.09	0.44	2.03	0.00	0.06	0.04	482.32	2.42	11.34	52.68	0.12	1.47	0.98	12,540.25
Concrete Material Trucks[6]	8		55.0	26	On-Road	0.34	1.60	7.43	0.02	0.30	0.16	1,768.50	8.88	41.59	193.16	0.44	7.68	4.17	45,980.92
Concrete Trucks[7]	8		5.0	26	On-Road	0.03	0.15	0.68	0.00	0.03	0.01	160.77	0.81	3.78	17.56	0.04	0.70	0.38	4,180.08
Dump Trucks[5]		4	60.0	26	On-Road	0.21	0.96	4.71	0.01	0.14	0.10	965.42	4.84	22.68	105.36	0.24	2.93	1.97	25,080.50
March																			
Worker Vehicles[1]	130		35.0	26	On-Road	2.14	20.37	2.04	0.04	1.39	0.43	4,066.21	55.75	529.65	53.09	1.06	36.10	11.08	105,721.51
Delivery Trucks[2]	29		85.0	26	On-Road	1.91	8.96	41.62	0.09	1.65	0.90	9,907.60	49.72	232.99	1082.13	2.46	43.01	23.36	257,597.63
Commissioning Trips[8]	6		35.0	26	On-Road	0.10	0.94	0.09	0.00	0.06	0.02	187.67	2.57	24.45	2.45	0.05	1.67	0.51	4,879.45
Water Trucks (on-site)[3]		2	60.0	26	On-Road	0.09	0.44	2.03	0.00	0.06	0.04	482.32	2.42	11.34	52.68	0.12	1.47	0.98	12,540.25
Concrete Material Trucks[6]	8		55.0	26	On-Road	0.34	1.60	7.43	0.02	0.30	0.16	1,768.50	8.88	41.59	193.16	0.44	7.68	4.17	45,980.92
Concrete Trucks[7]	8		5.0	26	On-Road	0.03	0.15	0.68	0.00	0.03	0.01	160.77	0.81	3.78	17.56	0.04	0.70	0.38	4,180.08
Dump Trucks[5]		4	60.0	26	On-Road	0.21	0.96	4.71	0.01	0.14	0.10	965.42	4.84	22.68	105.36	0.24	2.93	1.97	25,080.50
April																			
Worker Vehicles[1]	158		35.0	26	On-Road	2.61	24.79	2.49	0.05	1.69	0.52	4,948.27	67.85	644.54	64.61	1.30	43.93	13.48	128,654.94
Delivery Trucks[2]	29		85.0	26	On-Road	1.91	8.96	41.62	0.09	1.65	0.90	9,907.60	49.72	232.99	1082.13	2.46	43.01	23.36	257,597.63
Commissioning Trips[8]	6		35.0	26	On-Road	0.10	0.94	0.09	0.00	0.06	0.02	187.67	2.57	24.45	2.45	0.05	1.67	0.51	4,879.45
Water Trucks (on-site)[3]		2	60.0	26	On-Road	0.09	0.44	2.03	0.00	0.06	0.04	482.32	2.42	11.34	52.68	0.12	1.47	0.98	12,540.25
Concrete Material Trucks[6]	8		55.0	26	On-Road	0.34	1.60	7.43	0.02	0.30	0.16	1,768.50	8.88	41.59	193.16	0.44	7.68	4.17	45,980.92
Concrete Trucks[7]	8		5.0	26	On-Road	0.03	0.15	0.68	0.00	0.03	0.01	160.77	0.81	3.78	17.56	0.04	0.70	0.38	4,180.08
Dump Trucks[5]		4	60.0	26	On-Road	0.21	0.96	4.71	0.01	0.14	0.10	965.42	4.84	22.68	105.36	0.24	2.93	1.97	25,080.50
May																			
Worker Vehicles[1]	28		35.0	26	On-Road	0.46	4.39	0.44	0.01	0.30	0.09	875.80	12.01	114.08	11.44	0.23	7.78	2.39	22,770.79
Delivery Trucks[9]	50		85.0	26	On-Road	3.30	15.45	71.76	0.16	2.85	1.55	17,082.07	85.73	401.70	1865.74	4.24	74.15	40.28	444,133.85
June																			
Worker Vehicles[1]	28		35.0	26	On-Road	0.46	4.39	0.44	0.01	0.30	0.09	875.80	12.01	114.08	11.44	0.23	7.78	2.39	22,770.79
Delivery Trucks[9]	50		85.0	26	On-Road	3.30	15.45	71.76	0.16	2.85	1.55	17,082.07	85.73	401.70	1865.74	4.24	74.15	40.28	444,133.85
												TOTAL 2015	**707.54**	**4,612.33**	**9,791.58**	**26.80**	**545.89**	**257.55**	**2,780,664.07**

1. Trips per day - assumes 30% decrease in worker trips due to carpooling
   Employee commute distance of 35 miles is assumed based on local workforce from Alpine and Boulevard
2. Materials delivery coming from Rancho Bernardo, San Diego. Includes tracker deliveries and other delivery trips associated with grading, substation construction, and O&M building construction.
3. Assumes on-site water trucks will be operating at 15 mph for 8 hours per day during site preparation (120 mi/day), and 4 hours per day following site preparation activities (60 mi/day)
4. Assumes 65,170 gallons per day of water is imported from Padre Dam Municipal Water District (approx. 54 miles) during October, November and December for site preparation (clear and grub)
   Assumes 92,324 gallons/day of water is imported from Jacumba Community Services District (approx. 10 miles) during October, November, and December for site preparation (clear and grub)
   An original distance of 58 miles was arbitrarily assigned for truck trips travelling to and from Padre Dam. A more accurate 54-mile distance was assigned based on actual miles traveled to and from PDMWD.
5. Assumes dump trucks will be operating at 15 mph for 4 hours per day = 60 mi/day
6. Assumes concrete material (sand, cement, etc) trucks will be travelling 55 miles
7. Assumes concrete trucks will be travelling 5 miles
8. Employee commute/commissioning distance of 35 miles is assumed based on local workforce from Alpine and Boulevard
9. Assumes 50 one way trips per day from Rancho Bernardo, CA for energy storage deliveries

Water for site prep. 12 ac-ft imported from Padre Dam Municipal Water District

Rugged Solar Farm Project
On-Road Motor Vehicle Emissions - Revised

	56,670	gal//day
	54	miles driving distance one-way
	17	ac-ft imported from Jacumba Community Service District
	80,282	gal/day
	10	miles driving distance one-way
Energy Storage	50	one way trips per day from Rancho Bernardo, CA for energy storage deliveries

Source: Dudek Water Estimation Sheet
Construction Traffic Estimates: Dudek "Rugged Traffic Estimates" worksheet

AIS 3

ADDENDUM
ACOUSTICAL ASSESSMENT REPORT
Rugged Solar LLC Project
Environmental Review Project Number 3910-120005
Major Use Permit 3300-12-007
Boulevard, San Diego County, California

Lead Agency:

County of San Diego
Planning & Development Services
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SEPTEMBER 2014

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ADDENDUM
Acoustical Assessment Report
Rugged Solar LLC Project

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EXECUTIVE SUMMARY

Dudek has prepared this addendum noise analysis report for the Rugged Solar Farm, evaluating operational noise impacts associated with outdoor mechanical equipment, to include the proposed optional addition of an energy storage system component. Operational noise impacts associated with the energy storage systems include heating, ventilation and air conditioning units (HVAC), power inverters, and step up transformers. The applicant proposes to implement one of two project design feature options, both of which are analyzed in this report. The options are based on two different types of HVAC units. Option 1 would be implemented if the energy storage container units are equipped with the standard HVAC unit (NACO Model 30RB120 or sound equivalent). Each HVAC unit would be surrounded by a solid perimeter (screen) wall with elevation one foot higher than the top elevation of the HVAC unit. In addition, each step-up transformer and related pair (2) of power inverters would be enclosed with an 8-foot high solid perimeter wall.

Option 2 would be implemented if a quieter HVAC unit (Daikin McQuay 025D, or sound equivalent) is used. With this option, each would be surrounded by a solid perimeter (screen) wall with elevation one foot higher than the top elevation of the chiller unit. No energy storage transformer or power inverter screen walls are proposed or necessary if the Daikin McQuay 025D, or sound-equivalent HVAC model is used.

This addendum analyzes both project design feature options, and incorporates the following applicable mitigation measure for the Rugged solar farm from the original report and Draft Program Environmental Impact Report (DPEIR) Section 2.6, Noise:

M-N-R-1 Enclose Inverters in Noise Attenuating Structures: To ensure noise from inverters would comply with the County Noise Ordinance, the following would be implemented:

- Locate non-enclosed inverters a minimum of 800 feet or greater from the nearest property line, or enclose inverters within 800 feet of property lines in cement blocks or other type of structure capable of achieving a minimum 10 dB attenuation.
- Direct all switch station doorways and exterior ventilation ducts away from adjacent property lines.
- Prior to the approval of building plans, a noise analysis shall be prepared that demonstrates that the inverters comply with the County Noise Ordinance.
- The O&M building at the Rugged solar farm shall be located no closer than 1,250 feet from the property line.

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ADDENDUM
Acoustical Assessment Report
Rugged Solar LLC Project

1.0 INTRODUCTION

This addendum to the Dudek Acoustical Assessment Report for the Rugged Solar LLC Project (October 2013) provides information regarding a new, optional component of the Soitec Solar Development Project (Proposed Project) that was not analyzed in the Draft Program Environmental Impact Report (DPEIR) dated January 2014. Rugged Solar LLC (Rugged) proposes to include an optional energy storage system in the Rugged solar farm as part of the Proposed Project. This addendum describes the energy storage system, analyzes its potential to have a significant environmental impact related to noise, and concludes that the addition of the energy storage system on the Rugged solar farm would not affect the conclusions of the DPEIR prepared and circulated for the development of the Proposed Project.

2.0 PROJECT DESCRIPTION

The applicant proposes to include a component as part of the Rugged solar farm, to be located in southeastern San Diego County. This component consists of energy storage in the form of lithium ion (Li-ion) batteries (energy storage system), which would be located on the Rugged solar farm site in order to store energy produced by CPV trackers and to provide the ability to dispatch this energy upon request depending upon demand and other factors. The battery storage system would provide 160 Megawatt hours (MWh) of Li-ion battery storage in the form of 160 1 MWh containers each measuring 40 feet x 8.5 feet x 9.5 feet (LxWxH) on approximately 7 acres with appropriate fire access and approximately 20 feet of spacing on all four sides of each container.

2.1 Location

The energy storage system would be located on an approximate 7-acre portion of the Rugged solar farm site immediately south of the on-site substation (see Figures 1a and 1b, Energy Storage System Location) in an area previously proposed to be developed with approximately 47 CPV trackers and associated inverters and step-up transformers. The proposed energy storage system would not change the developed footprint of the Rugged solar farm site.

2.2 Components

The Li-ion battery storage would be housed in standard 40’ International Organization of Standardization (ISO) shipping containers. The containers are typically made from 12 to 14 gauge steel. The supplier’s logo would be displayed on each container and containers can be painted to order (i.e., containers can be painted with any color stocked by the supplier). The containers would be oriented east/west in two rows of 80 containers each or in four rows of 40

containers each. An approximate 7-acre area would be required to accommodate two rows of 80 containers and an additional 0.5-acre area would be required to accommodate four rows of 60 containers.. Approximately 20 feet of spacing would be provided on all four sides of each container measuring 40 feet x 8.5 feet x 9.5 feet (LxWxH); see Figure 2, Energy Storage Container Size and Spacing. It should be noted that inverters and step-up transformers would be located within the container spacing as described below and as depicted in Figure 3.

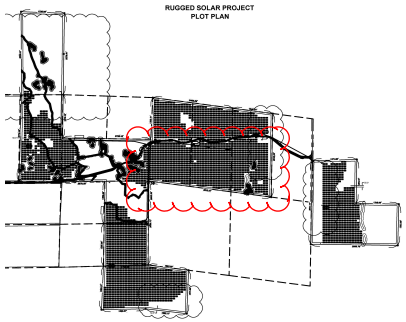
The Li-ion batteries (cells) would be arranged into modules, which in turn would be stored in battery racks. The racks would be entirely contained within the container. The container would have an access door at each end and overhead lighting on the interior roof. Each container would have an integrated heating, ventilation, and air conditioning (HVAC) unit located on the roof of the container. Each HVAC unit would measure approximately 7.5 feet in height. An inverter with a battery management system and container control system would be installed externally on a concrete pad next to each container. A step-up transformer would be associated with a set of two containers and would be installed alongside the container on a separate concrete pad. Thus, a total of 160 HVAC units, 160 inverters, and 80 step-up transformers would be associated with the energy storage system. Figure 3 provides an example illustration of the containers, step up transformers, and related infrastructure while Figure 4 provides an example of the typical container interior and battery pack configurations. Figure 5 presents the typical Li-ion battery pack components.

The proposed batteries and containers also include the following important monitoring and safety components:

- Modular battery racks designed for ease of maintenance. Every rack's battery monitoring system (BMS) continually monitors for unsafe voltage, current, and temperature, and has control of an automated switch (contactor) to disconnect the rack from the system if necessary.
- Integrated fire detection and suppression system
- Li-ion nanophosphate chemistry which is considered to be the most stable Li-ion technology and substantially reduces the possibility of thermal runaway and provides for reduced reaction from abuse (Sandia National Laboratories 2012) and A123 Systems (no date).

Figure 1a

Example Location for Battery Storage Containers



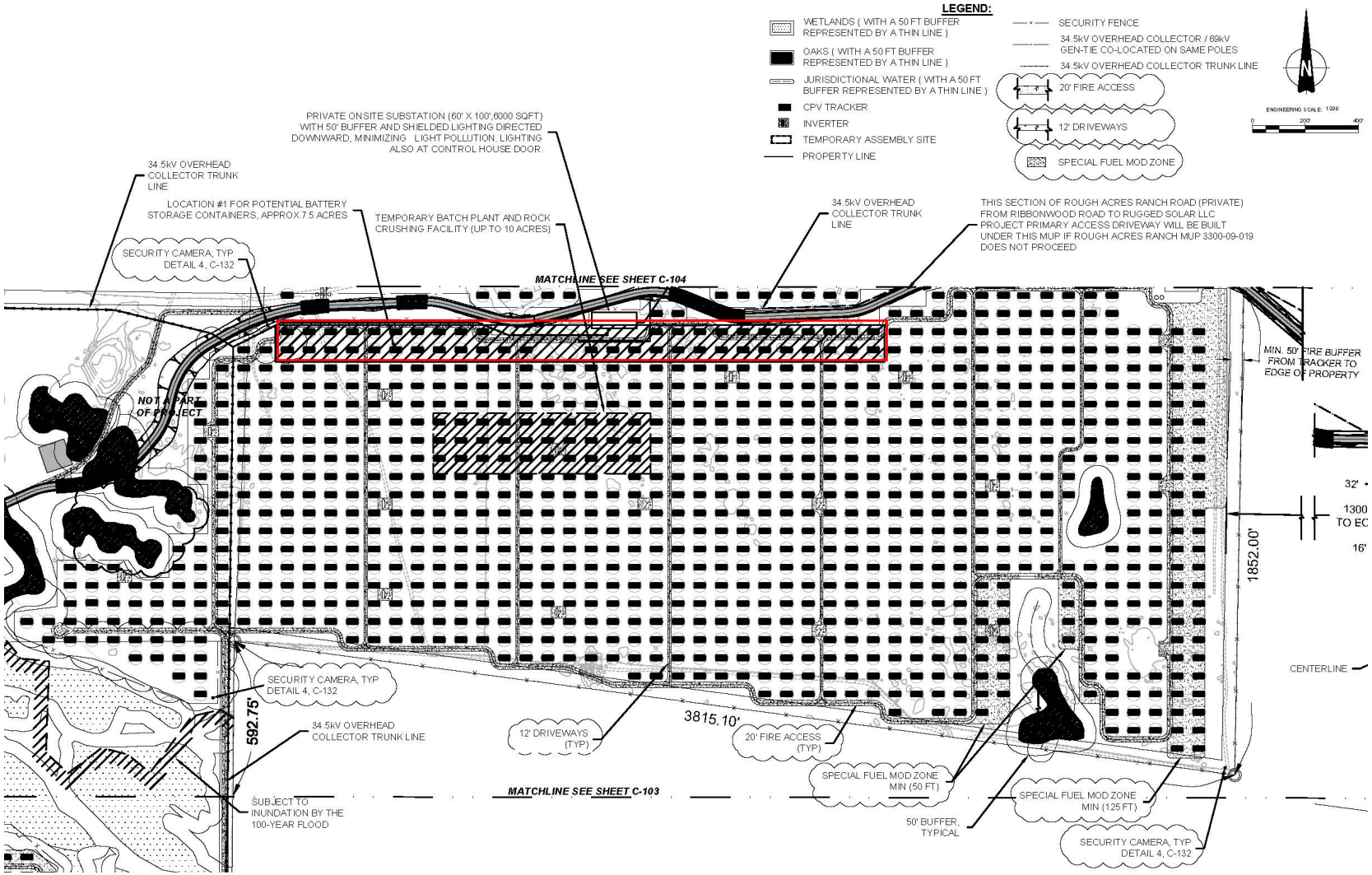


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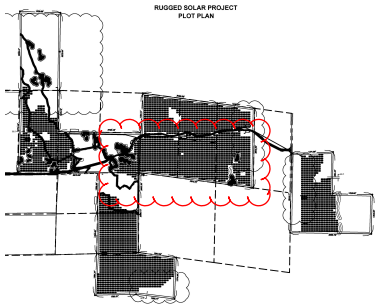
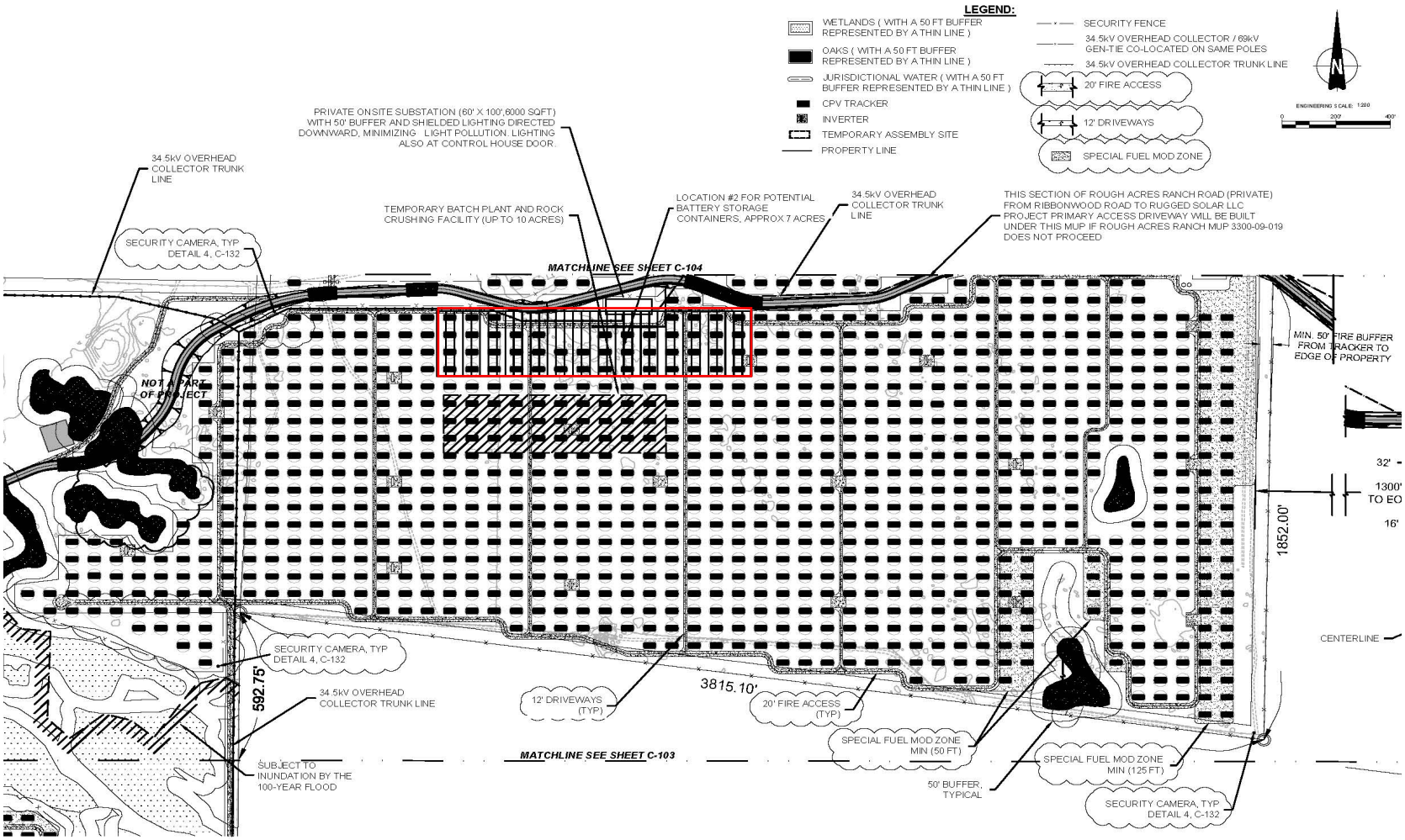
Figure 1b

Example Location for Battery Storage Containers





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3.0 ANALYSIS

3.1 Solar Farm Operation Noise Sources

On-site stationary noise sources associated with the Rugged solar farm and evaluated in the Dudek Acoustical Assessment Report for Rugged Solar LLC (October 2013) would include pad-mounted inverters and transformers, substation transformers, tracker array motors and dryers/blowers. The noise from operation of the energy storage system container HVAC systems and step-up transformers must be added to the previously assessed stationary noise sources in order to determine composite noise levels from all project components. We briefly summarize each of the operational components previously evaluated, in addition to the new energy storage component, before presenting the results of the assessment of operations noise.

3.1.1 Building Block Inverters and Transformers

The Rugged solar farm includes a total installation of 3,588 CPV Trackers. The CPV Trackers would be arranged into a building block that consists of Soitec Concentrix CX-S530 dual-axis trackers that would feed into an inverter station. The proposed Xantrex Inverter, or equivalent, has a noise level rating of 77 dB at 6 feet (Schneider Electric 2011). The proposed transformer has a sound rating of 60 dB at 5 feet based on National Electric Manufactures Association (NEMA) ratings for the size of transformer anticipated to be used with inverters (NEMA 2000).

The inverter/transformer equipment represents the most substantial noise source in the panel array areas, compared to tracker and blower noise. The distance spacing between inverters/transformers is such that a given point on the project perimeter may be exposed to noise from more than a single inverter station. For this reason, property line noise exposure was evaluated from the combined noise from the three closest inverter stations.

3.1.2 Substation Transformer

The Rugged solar farm requires the use of a private on-site collector substation 60feet by 100 feet that would be located on a 2.0-acre site within the central portion of the site (refer to *Figure 1*). The purpose of the substation is to collect the energy received from the overhead and underground collector system and increase the voltage from 34.5–138 kV. Once the voltage is stepped up to 138kV, the power would be conveyed through a 35-foot high deadened structure that terminates the gen-tie within the on-site collector substation. The power would then be conveyed through the gen-tie line to the Boulevard Substation.

The transformer at the on-site substation would be either a 50 MVA or 70 MVA step up transformer. A transformer with 50 MVA or 70 MVA capacity has a noise level rating of 72 dB

at 5 feet (Delta Star 2012). See *Figure 1* for the proposed location of the substation, which Dudek used for evaluation of noise levels at the project property boundaries.

3.1.3 Operations and Maintenance

An operations and maintenance (O&M) area is also proposed in the central subarea of the site, east of Ribbonwood Road and west of McCain Valley Road on APN 611-100-07-00 and would contain parking, a 7,500-sf building, and other maintenance material and equipment. The O&M operations yard would potentially generate noise levels during daytime hours on the order of 70 dBA Leq at 50 feet (AECOM 2012).

3.1.4 Tracker Motors and Dryers/Blowers

Individual tracker dimensions are approximately 48 feet across by 25 feet tall. Each CPV Tracker unit would be mounted on a steel pole. Noise associated with the trackers would be from the motors and dryers/blowers. Field noise measurements of the tracker indicates the tracker motor generates a noise level of 37 dB at 50 feet and the dryers/blowers generate a noise level of 43 dB at 50 feet (AECOM 2012).

3.1.5 Energy Storage Container HVAC / Inverters / Step-Up Transformers

With respect to potential long-term operational noise associated with the energy storage component, the HVAC unit for each storage container would be a primary source of noise generation. Standard literature for one mass energy storage vendor indicates a typical installation of one step up transformer for each pair of containers. Thus, a total of 160 HVAC units, 160 power inverters, and 80 transformers would be associated with the storage containers.

Information from the vendor indicates the HVAC unit which is supplied as standard equipment for the storage containers produces 68 dBA at a distance of 50 feet during full operation (NACO Model 30RB120). An alternate HVAC unit with the same capacity is available from another vendor, which has a much lower sound rating of 60 dBA at a distance of 30 feet during full operation (Daikin McQuay 025D). The anticipated step-up transformer has a sound rating of 60 dB at 5 feet based on National Electric Manufactures Association (NEMA) ratings for the size of transformer anticipated to be used with storage battery systems (NEMA 2000). The anticipated power inverter is a Xantrex model, or equivalent, which has a noise level rating of 77 dB at 6 feet (Schneider Electric 2011). However, it should be noted that the anticipated power inverter would be bi-drectional whereas the Xantrex model is not. A total of 160 energy storage containers would be provided to house the energy storage systems, in two rows of 80 containers apiece (or in four rows of 40 containers apiece), oriented east/west. Each container would be equipped with an individual HVAC system and between each pair of containers, a step-up transformer and inverter would be provided (80 total). Noise contribution from the

energy storage complex was modelled using the acoustic center of the dedicated energy storage system yard.

3.2 Equipment Noise Levels at Property Lines

Figure 5 of the Dudek Acoustical Assessment Report for Rugged Solar LLC (DPEIR Appendix 2.6-2, October 2013) illustrates the noise modeling locations selected to determine the worst-case cumulative noise levels at the property lines, resulting from the building block inverters and transformers, substation transformer, operations and maintenance yard, tracker motors and dryers/blowers. *Figure 6* depicts the property lines accounted for in the cumulative noise level analysis. A cumulative noise level analysis from the Rugged solar farm with addition of the energy storage component was completed, which included assessment at the same locations as previously identified in the Dudek Acoustical Assessment Report. Since the applicant proposes one of two project design feature options based on the type of HVAC equipment that will be used, the following analyzes both options.

3.2.1 Option 1

If the energy storage container units are equipped with the standard HVAC unit (NACO Model 30RB120, or sound equivalent), each HVAC unit would be surrounded by a solid perimeter screen wall with elevation one foot higher than the top elevation of the HVAC unit. In addition, each step-up transformer and related pair (2) of power inverters would be enclosed with an 8-foot high solid perimeter wall.

The results of the cumulative noise levels for Option 1 are included in *Table 1* (refer to *Attachment 1* for calculation worksheets). Each cumulative noise level includes contribution from the substation transformer, operations yard, tracker and blower motors, solar panel inverters and the energy storage system HVAC units, inverters, and step-up transformers. As indicated above, the analysis assumes adherence to Mitigation M-N-R-1 from the DPEIR (i.e., inverters setback 800 feet or more to adjacent residential property lines and operations and maintenance yard located not closer than 1,250 feet from adjacent residential property lines). As illustrated in *Table 1*, the resulting noise level from combined project noise sources would comply with the County's noise ordinance criteria at all project property boundaries; thus, operational noise under Option 1 would not result in a significant noise impact.

Table 1
Summary of Project Noise Levels at Property Lines
OPTION 1

Property Line	Project Noise Level (dBA Leq)	Exceed County daytime noise limit (50 dBA Leq)	Exceed County nighttime noise limit (45 dBA Leq)
#1	44	No	No
#2	42	No	No
#3	42	No	No
#4	45	No	No
#5	45	No	No
#6	44	No	No
#7	41	No	No
#8	42	No	No
#9	42	No	No
#10	44	No	No
#11	42	No	No
#12	43	No	No
#13	44	No	No
#14	43	No	No
#15	43	No	No
#16	45	No	No

3.2.2 Option 2

Option 2 is use of a quieter HVAC unit (Daikin McQuay 025D, or equivalent) with each HVAC unit surrounded by a solid perimeter (screen) wall with elevation one foot higher than the top elevation of the chiller unit. No transformer or inverter screen walls are proposed or necessary if the Daikin McQuay 025D, or sound-equivalent HVAC model is used.

The results of the cumulative noise levels for Option 2 are included in *Table 2* (refer to *Attachment 1* for calculation worksheets). Each cumulative noise level includes contribution from the substation transformer, operations yard, tracker and blower motors, solar panel inverters and the energy storage system HVAC units, inverters, and step-up transformers. Again, the analysis assumes adherence to Mitigation M-N-R-1 from the DPEIR. As illustrated in *Table 2*, the resulting noise level from combined project noise sources would comply with the County's noise ordinance criteria at all project property boundaries; thus, operational noise under Option 2 would also not result in a significant noise impact.

Table 2
Summary of Mitigated Project Noise Levels at Property Lines
OPTION 2

Property Line	Project Noise Level (dBA Leq)	Exceed County daytime noise limit (50 dBA Leq)	Exceed County nighttime noise limit (45 dBA Leq)
#1	44	No	No
#2	41	No	No
#3	42	No	No
#4	44	No	No
#5	44	No	No
#6	44	No	No
#7	41	No	No
#8	42	No	No
#9	42	No	No
#10	44	No	No
#11	42	No	No
#12	43	No	No
#13	44	No	No
#14	43	No	No
#15	43	No	No
#16	44	No	No

3.3 Short Term Construction Noise

Because no additional grading would be required and construction equipment and duration would remain the same as evaluated in the DPEIR, the on-site construction noise would not be appreciably altered with substitution of the energy storage units for approximately 47 CPV components. Installation of the energy storage systems would also result in a short-term increase in traffic on the local area's roadway network; approximately 160 truck trips (320 one-way trips) would be required for energy storage unit deliveries. However, approximately 123 one-way trips for material deliveries associated with the 47 CPV components were originally analyzed in the DPEIR, and therefore the storage unit substitution for 47 CPV components would result in a net trip increase of 197 overall trips over an eight-month period.

Energy storage container deliveries could reach up to 25 truck trips per day (or 50 one-way trips per day). At this level, the peak construction truck traffic for the Rugged solar farm would increase to 197 one-way trips per day. This increase would not be sufficient to increase traffic noise levels a substantial amount. Typically, traffic volumes must double to create an increase in perceptible (3 dBA) traffic noise (Caltrans 2009). The addition of 197 construction-related trips

to the roadway network would not double existing traffic levels and, therefore, would not increase traffic noise by 3 dBA.

4.0 DESIGN CONSIDERATIONS

Implementation of applicant proposed design feature PDF-ES-N-1 (i.e., Option 1 or Option 2 as discussed above in Section 3.2.1 and 3.2.2) would maintain project noise impacts at a level below significance, including compliance with the County's daytime and nighttime hourly Leq standards. No further design considerations would be necessary in order to address potentially significant noise impacts.

PDF-ES-N-1 To ensure noise from energy storage system HVAC units, transformers and inverters will comply with the County Noise Ordinance, one of the following measures shall be implemented:

1) If the battery storage container units are equipped with the standard HVAC unit (NACO Model 30RB120, or sound equivalent), each HVAC unit shall be surrounded by a solid perimeter screen wall with elevation one foot higher than the top elevation of the HVAC unit. In addition, each step-up transformer and related pair (2) of power inverters shall be enclosed with an 8-foot high solid perimeter wall.
2) If the battery storage container units are equipped with a quieter HVAC unit (Daikin McQuay 025D, or sound equivalent), each HVAC unit shall be surrounded by a solid perimeter screen wall with elevation one foot higher than the top elevation of the chiller unit. No transformer or inverter screen walls are necessary if the Daikin McQuay 025D, or sound-equivalent HVAC model is used.

5.0 CERTIFICATION

This addendum has been prepared by Mr. Jonathan V. Leech and Mr. Mike Greene. Mike Greene is a County of San Diego approved CEQA Consultant for Acoustics.

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ATTACHMENT 1

Operating Noise Levels at Adjacent Property Boundaries

Scenario: NACO Model 30RB120 Chiller with 8.5 foot screen; 8 ft transformer screen — Property Line 1

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	240	32.0	39.7
Transformer (pad mounted)	60	5	1	240	33.6	26.4
Inverter	67	6	3	425	37.0	34.8
Transformer (pad mounted)	60	5	1	425	38.6	21.4
Inverter	67	6	3	805	42.6	29.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Substation Transformer	72	5	1	7250	63.2	8.8
O&M Yard	70	50	1	5500	40.8	29.2
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
Storage Transformers	15	50	80	7250	43.2	1.0
Storage HVAC	50	50	160	7250	43.2	28.8
Storage Inverters	30	50	160	7250	43.2	8.8
					Cumulative	44.0

Scenario: NACO Model 30RB120 Chiller with 8.5 foot screen; 8 ft transformer screen — Property Line 2

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	380	36.0	35.7
Transformer (pad mounted)	60	5	1	380	37.6	22.4
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Inverter	67	6	3	950	44.0	27.8
Transformer (pad mounted)	60	5	1	950	45.6	14.4
Substation Transformer	72	5	1	6810	62.7	9.3
O&M Yard	70	50	1	4375	38.8	31.2
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
Storage Transformers	15	50	80	7010	42.9	1.0
Storage HVAC	50	50	160	7010	42.9	29.1
Storage Inverters	30	50	160	7010	42.9	9.1
					Cumulative	41.5

Scenario: NACO Model 30RB120 Chiller with 8.5 foot screen; 8 ft transformer screen — Property Line 3

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	285	33.5	38.2
Transformer (pad mounted)	60	5	1	285	35.1	24.9
Inverter	67	6	3	805	42.6	29.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Inverter	67	6	3	1470	47.8	24.0
Transformer (pad mounted)	60	5	1	1470	49.4	10.6
Substation Transformer	72	5	1	5625	61.0	11.0
O&M Yard	70	50	1	4250	38.6	31.4
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
Storage Transformers	15	50	80	5825	41.3	1.0
Storage HVAC	50	50	160	5825	41.3	30.7
Storage Inverters	30	50	160	5825	41.3	10.7
					Cumulative	42.3

Scenario: NACO Model 30RB120 Chiller with 8.5 foot screen; 8 ft transformer screen — Property Line 4

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	380	36.0	35.7
Transformer (pad mounted)	60	5	1	380	37.6	22.4
Inverter	67	6	3	330	34.8	37.0
Transformer (pad mounted)	60	5	1	330	36.4	23.6
Inverter	67	6	3	855	43.1	28.7
Transformer (pad mounted)	60	5	1	855	44.7	15.3
Substation Transformer	72	5	1	3065	55.7	16.3
O&M Yard	70	50	1	1625	30.2	39.8
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
Storage Transformers	15	50	80	3365	36.6	1.0
Storage HVAC	50	50	160	3365	36.6	35.5
Storage Inverters	30	50	160	3365	36.6	15.5
					Cumulative	44.7

Scenario: NACO Model 30RB120 Chiller with 8.5 foot screen; 8 ft transformer screen — Property Line 5

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	285	33.5	38.2
Transformer (pad mounted)	60	5	1	285	35.1	24.9
Inverter	67	6	3	570	39.6	32.2
Transformer (pad mounted)	60	5	1	570	41.1	18.9
Inverter	67	6	3	1140	45.6	26.2
Transformer (pad mounted)	60	5	1	1140	47.2	12.8
Substation Transformer	72	5	1	1750	50.9	21.1
O&M Yard	70	50	1	2250	33.1	36.9
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
Storage Transformers	15	50	80	1900	31.6	1.0
Storage HVAC	50	50	160	1900	31.6	40.4
Storage Inverters	30	50	160	1900	31.6	20.4
					Cumulative	45.0

Scenario: NACO Model 30RB120 Chiller with 8.5 foot screen; 8 ft transformer screen — Property Line 6

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	400	36.5	35.3
Transformer (pad mounted)	60	5	1	400	38.1	21.9
Inverter	67	6	3	520	38.8	33.0
Transformer (pad mounted)	60	5	1	520	40.3	19.7
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Substation Transformer	72	5	1	2000	52.0	20.0
O&M Yard	70	50	1	4625	39.3	30.7
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
Storage Transformers	15	50	80	1800	31.1	1.0
Storage HVAC	50	30	160	1800	35.6	36.5
Storage Inverters	30	50	160	1800	31.1	20.9
					Cumulative	43.5

Scenario: NACO Model 30RB120 Chiller with 8.5 foot screen; 8 ft transformer screen — Property Line 7

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	475	38.0	33.8
Transformer (pad mounted)	60	5	1	475	39.6	20.4
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Inverter	67	6	3	805	42.6	29.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Substation Transformer	72	5	1	5125	60.2	11.8
O&M Yard	70	50	1	8000	44.1	25.9
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
Storage Transformers	15	50	80	4925	39.9	1.0
Storage HVAC	50	50	160	4925	39.9	32.2
Storage Inverters	30	50	160	4925	39.9	12.2
					Cumulative	41.1

Scenario: NACO Model 30RB120 Chiller with 8.5 foot screen; 8 ft transformer screen — Property Line 8

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	285	33.5	38.2
Transformer (pad mounted)	60	5	1	285	35.1	24.9
Inverter	67	6	3	615	40.2	31.6
Transformer (pad mounted)	60	5	1	615	41.8	18.2
Inverter	67	6	3	710	41.5	30.3
Transformer (pad mounted)	60	5	1	710	43.0	17.0
Substation Transformer	72	5	1	5625	61.0	11.0
O&M Yard	70	50	1	8375	44.5	25.5
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
Storage Transformers	15	50	80	5525	40.9	1.0
Storage HVAC	50	50	160	5525	40.9	31.2
Storage Inverters	30	50	160	5525	40.9	11.2
					Cumulative	42.4

Scenario: NACO Model 30RB120 Chiller with 8.5 foot screen; 8 ft transformer screen — Property Line 9

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	380	36.0	35.7
Transformer (pad mounted)	60	5	1	380	37.6	22.4
Inverter	67	6	3	805	42.6	29.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Inverter	67	6	3	950	44.0	27.8
Transformer (pad mounted)	60	5	1	950	45.6	14.4
Substation Transformer	72	5	1	7250	63.2	8.8
O&M Yard	70	50	1	10000	46.0	24.0
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
Storage Transformers	15	50	80	6250	41.9	1.0
Storage HVAC	50	50	160	6250	41.9	30.1
Storage Inverters	30	50	160	6250	41.9	10.1
					Cumulative	42.2

Scenario: NACO Model 30RB120 Chiller with 8.5 foot screen; 8 ft transformer screen — Property Line 10

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	240	32.0	39.7
Transformer (pad mounted)	60	5	1	240	33.6	26.4
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Inverter	67	6	3	950	44.0	27.8
Transformer (pad mounted)	60	5	1	950	45.6	14.4
Substation Transformer	72	5	1	6250	61.9	10.1
O&M Yard	70	50	1	9315	45.4	24.6
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
Storage Transformers	15	50	80	6050	41.7	1.0
Storage HVAC	50	50	160	6050	41.7	30.4
Storage Inverters	30	50	160	6050	41.7	10.4
					Cumulative	43.6

Scenario: NACO Model 30RB120 Chiller with 8.5 foot screen; 8 ft transformer screen — Property Line 11

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	330	34.8	37.0
Transformer (pad mounted)	60	5	1	330	36.4	23.6
Inverter	67	6	3	570	39.6	32.2
Transformer (pad mounted)	60	5	1	570	41.1	18.9
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Substation Transformer	72	5	1	5500	60.8	11.2
O&M Yard	70	50	1	7750	43.8	26.2
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
Storage Transformers	15	50	80	5350	40.6	1.0
Storage HVAC	50	50	160	5350	40.6	31.5
Storage Inverters	30	50	160	5350	40.6	11.5
					Cumulative	42.1

Scenario: NACO Model 30RB120 Chiller with 8.5 foot screen; 8 ft transformer screen — Property Line 12

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	330	34.8	37.0
Transformer (pad mounted)	60	5	1	330	36.4	23.6
Inverter	67	6	3	710	41.5	30.3
Transformer (pad mounted)	60	5	1	710	43.0	17.0
Inverter	67	6	3	805	42.6	29.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Substation Transformer	72	5	1	7625	63.7	8.3
O&M Yard	70	50	1	9125	45.2	24.8
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
Storage Transformers	15	50	80	7475	43.5	1.0
Storage HVAC	50	50	160	7475	43.5	28.5
Storage Inverters	30	50	160	7475	43.5	8.5
					Cumulative	42.5

Scenario: NACO Model 30RB120 Chiller with 8.5 foot screen; 8 ft transformer screen — Property Line 13

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	190	30.0	41.8
Transformer (pad mounted)	60	5	1	190	31.6	28.4
Inverter	67	6	3	760	42.1	29.7
Transformer (pad mounted)	60	5	1	760	43.6	16.4
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Substation Transformer	72	5	1	6310	62.0	10.0
O&M Yard	70	50	1	7060	43.0	27.0
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
Storage Transformers	15	50	80	6210	41.9	1.0
Storage HVAC	50	50	160	6210	41.9	30.2
Storage Inverters	30	50	160	6210	41.9	10.2
					Cumulative	44.1

Scenario: NACO Model 30RB120 Chiller with 8.5 foot screen; 8 ft transformer screen — Property Line 14

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	425	37.0	34.8
Transformer (pad mounted)	60	5	1	425	38.6	21.4
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Inverter	67	6	3	520	38.8	33.0
Transformer (pad mounted)	60	5	1	520	40.3	19.7
Substation Transformer	72	5	1	5375	60.6	11.4
O&M Yard	70	50	1	6750	42.6	27.4
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
Storage Transformers	15	50	80	5175	40.3	1.0
Storage HVAC	50	50	160	5175	40.3	31.7
Storage Inverters	30	50	160	5175	40.3	11.7
					Cumulative	42.6

Scenario: NACO Model 30RB120 Chiller with 8.5 foot screen; 8 ft transformer screen — Property Line 15

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	240	32.0	39.7
Transformer (pad mounted)	60	5	1	240	33.6	26.4
Inverter	67	6	3	570	39.6	32.2
Transformer (pad mounted)	60	5	1	570	41.1	18.9
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Substation Transformer	72	5	1	4375	58.8	13.2
O&M Yard	70	50	1	6250	41.9	28.1
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
Storage Transformers	15	50	80	4275	38.6	1.0
Storage HVAC	50	50	160	4275	38.6	33.4
Storage Inverters	30	50	160	4275	38.6	13.4
					Cumulative	43.4

Scenario: NACO Model 30RB120 Chiller with 8.5 foot screen; 8 ft transformer screen — Property Line 16

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	285	33.5	38.2
Transformer (pad mounted)	60	5	1	285	35.1	24.9
Inverter	67	6	3	640	40.6	31.2
Transformer (pad mounted)	60	5	1	640	42.1	17.9
Inverter	67	6	3	760	42.1	29.7
Transformer (pad mounted)	60	5	1	760	43.6	16.4
Substation Transformer	72	5	1	1940	51.8	20.2
O&M Yard	70	50	1	3375	36.6	33.4
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
Storage Transformers	15	50	80	1840	31.3	1.0
Storage HVAC	50	50	160	1840	31.3	40.7
Storage Inverters	30	50	160	1840	31.3	20.7
					Cumulative	45.2

Scenario: Daikin McQuay Chiller & 8.5 foot screen/parapet — Property Line 1

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	240	32.0	39.7
Transformer (pad mounted)	60	5	1	240	33.6	26.4
Inverter	67	6	3	425	37.0	34.8
Transformer (pad mounted)	60	5	1	425	38.6	21.4
Inverter	67	6	3	805	42.6	29.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Substation Transformer	72	5	1	7250	63.2	8.8
O&M Yard	70	50	1	6250	41.9	28.1
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
Storage Transformers	60	5	80	7250	63.2	15.8
Storage HVAC	35	50	160	7250	43.2	13.8
Storage Inverters	67	5	160	7250	63.2	25.8
					Cumulative	43.9

Scenario: Daikin McQuay Chiller & 8.5 foot screen/parapet — Property Line 2

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	380	36.0	35.7
Transformer (pad mounted)	60	5	1	380	37.6	22.4
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Inverter	67	6	3	950	44.0	27.8
Transformer (pad mounted)	60	5	1	950	45.6	14.4
Substation Transformer	72	5	1	6810	62.7	9.3
O&M Yard	70	50	1	5500	40.8	29.2
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
Storage Transformers	60	5	80	7010	62.9	16.1
Storage HVAC	35	50	160	7010	42.9	14.1
Storage Inverters	67	5	160	7010	62.9	26.1
					Cumulative	41.3

Scenario: Daikin McQuay Chiller & 8.5 foot screen/parapet — Property Line 3

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	285	33.5	38.2
Transformer (pad mounted)	60	5	1	285	35.1	24.9
Inverter	67	6	3	805	42.6	29.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Inverter	67	6	3	1470	47.8	24.0
Transformer (pad mounted)	60	5	1	1470	49.4	10.6
Substation Transformer	72	5	1	5625	61.0	11.0
O&M Yard	70	50	1	4250	38.6	31.4
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
Storage Transformers	60	5	80	5825	61.3	17.7
Storage HVAC	35	50	160	5825	41.3	15.7
Storage Inverters	67	5	160	5825	61.3	27.7
					Cumulative	42.2

Scenario: Daikin McQuay Chiller & 8.5 foot screen/parapet — Property Line 4

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	380	36.0	35.7
Transformer (pad mounted)	60	5	1	380	37.6	22.4
Inverter	67	6	3	330	34.8	37.0
Transformer (pad mounted)	60	5	1	330	36.4	23.6
Inverter	67	6	3	855	43.1	28.7
Transformer (pad mounted)	60	5	1	855	44.7	15.3
Substation Transformer	72	5	1	3065	55.7	16.3
O&M Yard	70	50	1	1625	30.2	39.8
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
Storage Transformers	60	5	80	3365	56.6	22.5
Storage HVAC	35	30	160	3365	41.0	16.0
Storage Inverters	67	5	160	3365	56.6	32.5
					Cumulative	44.4

Scenario: Daikin McQuay Chiller & 8.5 foot screen/parapet — Property Line 5

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	285	33.5	38.2
Transformer (pad mounted)	60	5	1	285	35.1	24.9
Inverter	67	6	3	570	39.6	32.2
Transformer (pad mounted)	60	5	1	570	41.1	18.9
Inverter	67	6	3	1140	45.6	26.2
Transformer (pad mounted)	60	5	1	1140	47.2	12.8
Substation Transformer	72	5	1	1750	50.9	21.1
O&M Yard	70	50	1	2250	33.1	36.9
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
Storage Transformers	60	5	80	1900	51.6	27.4
Storage HVAC	35	30	160	1900	36.0	21.0
Storage Inverters	67	5	160	1900	51.6	37.4
					Cumulative	44.3

Scenario: Daikin McQuay Chiller & 8.5 foot screen/parapet — Property Line 6

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	400	36.5	35.3
Transformer (pad mounted)	60	5	1	400	38.1	21.9
Inverter	67	6	3	520	38.8	33.0
Transformer (pad mounted)	60	5	1	520	40.3	19.7
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Substation Transformer	72	5	1	2000	52.0	20.0
O&M Yard	70	50	1	4625	39.3	30.7
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
Storage Transformers	60	5	80	1800	51.1	27.9
Storage HVAC	35	30	160	1800	35.6	21.5
Storage Inverters	67	5	160	1800	51.1	37.9
					Cumulative	44.0

Scenario: Daikin McQuay Chiller & 8.5 foot screen/parapet — Property Line 7

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	475	38.0	33.8
Transformer (pad mounted)	60	5	1	475	39.6	20.4
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Inverter	67	6	3	805	42.6	29.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Substation Transformer	72	5	1	5125	60.2	11.8
O&M Yard	70	50	1	8000	44.1	25.9
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
Storage Transformers	60	5	80	4925	59.9	19.2
Storage HVAC	35	50	160	4925	39.9	17.2
Storage Inverters	67	5	160	4925	59.9	29.2
					Cumulative	40.9

Scenario: Daikin McQuay Chiller & 8.5 foot screen/parapet — Property Line 8

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	285	33.5	38.2
Transformer (pad mounted)	60	5	1	285	35.1	24.9
Inverter	67	6	3	615	40.2	31.6
Transformer (pad mounted)	60	5	1	615	41.8	18.2
Inverter	67	6	3	710	41.5	30.3
Transformer (pad mounted)	60	5	1	710	43.0	17.0
Substation Transformer	72	5	1	5625	61.0	11.0
O&M Yard	70	50	1	8375	44.5	25.5
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
Storage Transformers	60	5	80	5525	60.9	18.2
Storage HVAC	35	50	160	5525	40.9	16.2
Storage Inverters	67	5	160	5525	60.9	28.2
					Cumulative	42.3

Scenario: Daikin McQuay Chiller & 8.5 foot screen/parapet — Property Line 9

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	380	36.0	35.7
Transformer (pad mounted)	60	5	1	380	37.6	22.4
Inverter	67	6	3	805	42.6	29.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Inverter	67	6	3	950	44.0	27.8
Transformer (pad mounted)	60	5	1	950	45.6	14.4
Substation Transformer	72	5	1	7250	63.2	8.8
O&M Yard	70	50	1	10000	46.0	24.0
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
Storage Transformers	60	5	80	6250	61.9	17.1
Storage HVAC	35	50	160	6250	41.9	15.1
Storage Inverters	67	5	160	6250	61.9	27.1
					Cumulative	42.0

Scenario: Daikin McQuay Chiller & 8.5 foot screen/parapet — Property Line 10

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	240	32.0	39.7
Transformer (pad mounted)	60	5	1	240	33.6	26.4
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Inverter	67	6	3	950	44.0	27.8
Transformer (pad mounted)	60	5	1	950	45.6	14.4
Substation Transformer	72	5	1	6250	61.9	10.1
O&M Yard	70	50	1	9315	45.4	24.6
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
Storage Transformers	60	5	80	6050	61.7	17.4
Storage HVAC	35	50	160	6050	41.7	15.4
Storage Inverters	67	5	160	6050	61.7	27.4
					Cumulative	43.5

Scenario: Daikin McQuay Chiller & 8.5 foot screen/parapet — Property Line 11

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	330	34.8	37.0
Transformer (pad mounted)	60	5	1	330	36.4	23.6
Inverter	67	6	3	570	39.6	32.2
Transformer (pad mounted)	60	5	1	570	41.1	18.9
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Substation Transformer	72	5	1	5500	60.8	11.2
O&M Yard	70	50	1	7750	43.8	26.2
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
Storage Transformers	60	5	80	5350	60.6	18.4
Storage HVAC	35	50	160	5350	40.6	16.5
Storage Inverters	67	5	160	5350	60.6	28.5
					Cumulative	42.0

Scenario: Daikin McQuay Chiller & 8.5 foot screen/parapet — Property Line 12

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	330	34.8	37.0
Transformer (pad mounted)	60	5	1	330	36.4	23.6
Inverter	67	6	3	710	41.5	30.3
Transformer (pad mounted)	60	5	1	710	43.0	17.0
Inverter	67	6	3	805	42.6	29.2
Transformer (pad mounted)	60	5	1	805	44.1	15.9
Substation Transformer	72	5	1	7625	63.7	8.3
O&M Yard	70	50	1	9125	45.2	24.8
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
Storage Transformers	60	5	80	7475	63.5	15.5
Storage HVAC	35	50	160	7475	43.5	13.5
Storage Inverters	67	5	160	7475	63.5	25.5
					Cumulative	42.5

Scenario: Daikin McQuay Chiller & 8.5 foot screen/parapet — Property Line 13

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	190	30.0	41.8
Transformer (pad mounted)	60	5	1	190	31.6	28.4
Inverter	67	6	3	760	42.1	29.7
Transformer (pad mounted)	60	5	1	760	43.6	16.4
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Substation Transformer	72	5	1	6310	62.0	10.0
O&M Yard	70	50	1	7060	43.0	27.0
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
Storage Transformers	60	5	80	6210	61.9	17.1
Storage HVAC	35	50	160	6210	41.9	15.2
Storage Inverters	67	5	160	6210	61.9	27.2
					Cumulative	44.0

Scenario: Daikin McQuay Chiller & 8.5 foot screen/parapet — Property Line 14

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	425	37.0	34.8
Transformer (pad mounted)	60	5	1	425	38.6	21.4
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Inverter	67	6	3	520	38.8	33.0
Transformer (pad mounted)	60	5	1	520	40.3	19.7
Substation Transformer	72	5	1	5375	60.6	11.4
O&M Yard	70	50	1	6750	42.6	27.4
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
Storage Transformers	60	5	80	5175	60.3	18.7
Storage HVAC	35	50	160	5175	40.3	16.7
Storage Inverters	67	5	160	5175	60.3	28.7
					Cumulative	42.5

Scenario: Daikin McQuay Chiller & 8.5 foot screen/parapet — Property Line 15

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	240	32.0	39.7
Transformer (pad mounted)	60	5	1	240	33.6	26.4
Inverter	67	6	3	570	39.6	32.2
Transformer (pad mounted)	60	5	1	570	41.1	18.9
Inverter	67	6	3	665	40.9	30.9
Transformer (pad mounted)	60	5	1	665	42.5	17.5
Substation Transformer	72	5	1	4375	58.8	13.2
O&M Yard	70	50	1	6250	41.9	28.1
Tracker Motor	37	50	1	100	6.0	31.0
Tracker dryer/blower	43	50	1	100	6.0	37.0
Storage Transformers	60	5	80	4275	58.6	20.4
Storage HVAC	35	50	160	4275	38.6	18.4
Storage Inverters	67	5	160	4275	58.6	30.4
					Cumulative	43.2

Scenario: Daikin McQuay Chiller & 8.5 foot screen/parapet — Property Line 16

Source	Source Noise Level	Source Reference Distance	Number of Representative Units	Distance to Nearest Property Line	Distance Attenuation	Noise Level at Property Line
Inverter	67	6	3	285	33.5	38.2
Transformer (pad mounted)	60	5	1	285	35.1	24.9
Inverter	67	6	3	640	40.6	31.2
Transformer (pad mounted)	60	5	1	640	42.1	17.9
Inverter	67	6	3	760	42.1	29.7
Transformer (pad mounted)	60	5	1	760	43.6	16.4
Substation Transformer	72	5	1	1940	51.8	20.2
O&M Yard	70	50	1	3375	36.6	33.4
Tracker Motor	37	50	1	80	4.1	32.9
Tracker dryer/blower	43	50	1	80	4.1	38.9
Storage Transformers	60	5	80	1840	51.3	27.7
Storage HVAC	35	30	160	1840	35.8	21.3
Storage Inverters	67	5	160	1840	51.3	37.7
					Cumulative	44.5

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ADDENDUM TO
FIRE PROTECTION PLAN
Rugged Solar LLC Project
Environmental Review Project Number 3910-120005
Major Use Permit 3300-12-007
Boulevard, San Diego County, California

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EXECUTIVE SUMMARY

Dudek has prepared this Addendum to the Rugged Solar Fire Protection Plan (December 2013) to evaluate potential fire impacts associated with adding an energy storage system component to the Rugged solar farm.

The Draft Programmatic Environmental Impact Report (DPEIR) released for public review in January 2014 concluded that fire impacts associated with the Rugged solar farm in particular, and the Proposed Project as a whole, would be less than significant. Adding an energy storage system to the Rugged solar farm would not change the conclusion that fire impacts associated with the Rugged solar farm in particular, and the Proposed Project as a whole, would be less than significant.

This conclusion is based on (1) the minimal potential for battery failure that could lead to thermal runaway or fire due to the type of lithium ion (Li-ion) phosphate batteries that would be employed, advanced monitoring systems for the battery system, and climate control within the containers the batteries would be rack-mounted within; and (2) the minimal potential for a fire in an energy storage container to escape that container and cause a fire based on the fire resistant materials that would be used for the energy storage system (including a 2 to 4 hour rated steel container), automated fire suppression systems within each energy storage container, fuel modification within the Rugged solar farm, fire buffer areas around the Rugged solar farm, and the accessibility of the energy storage containers to fire fighter response.

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1.0 INTRODUCTION

This Addendum to the Rugged Solar Fire Protection Plan (December 2013) provides information regarding a new, optional component of the Soitec Solar Development Project (Proposed Project) that was not analyzed in the Draft Program Environmental Impact Report (DPEIR) dated January 2014. Rugged Solar LLC (Rugged) proposes to include an optional energy storage system in the Rugged solar farm as part of the Proposed Project. This addendum describes the energy storage system, analyzes its potential to have a significant environmental impact related to fire hazards, and concludes that the addition of the energy storage system on the Rugged solar farm would not affect the conclusions of the DPEIR prepared and circulated for the development of the Proposed Project.

1.1 Applicable Regulations

This analysis focused on existing codes or guidelines that may be applicable to the proposed energy storage system.

1.1.1 California Fire Code (CFC) (2013)

The Fire Code Section 608 addresses “Stationary Storage Battery Systems” and sets forth general fire protection for stationary storage battery systems, including Li-ion batteries. For Li-ion battery systems, the CFC requires a Smoke detection system, signage indicating the presence of an energized battery system, and seismic bracing.

1.1.2 California Public Utilities Commission

Electric Rule 21. Interconnection Standard for Non-Utility Owned Generation. Electric Rule 21 is a tariff that describes the interconnection, operating and metering requirements for generation facilities to be connected to a utility’s distribution system, including storage of energy, over which the California Public Utilities Commission (CPUC) has jurisdiction. Rule 21 addresses safety issues of such facilities including fire safety by minimizing risk of component failure.

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2.0 PROJECT DESCRIPTION

The applicant proposes to include a component as part of the Rugged solar farm, to be located in southeastern San Diego County. This component consists of energy storage in the form of lithium ion (Li-ion) batteries (energy storage system), which would be located on the Rugged solar farm site in order to store energy produced by CPV trackers and to provide the ability to dispatch this energy upon request depending upon demand and other factors. The battery storage system would provide 160 Megawatt hours (MWh) of Li-ion battery storage in the form of 160 1 MWh containers each measuring 40 feet x 8.5 feet x 9.5 feet (LxWxH) on approximately 7 acres with appropriate fire access and approximately 20 feet of spacing on all four sides of each container.

2.1 Location

The energy storage system would be located on an approximate 7-acre portion of the Rugged solar farm site immediately south of the on-site substation (see Figures 1a and 1b, Energy Storage System Location) in an area previously proposed to be developed with approximately 47 CPV trackers and associated inverters and step-up transformers. The proposed energy storage system would not change the developed footprint of the Rugged solar farm site.

2.2 Components

The Li-ion battery storage would be housed in standard 40' International Organization of Standardization (ISO) shipping containers. The containers are typically made from 12 to 14 gauge steel. The supplier's logo would be displayed on each container and containers can be painted to order (i.e., containers can be painted with any color stocked by the supplier). The containers would be oriented east/west in two rows of 80 containers each or in four rows of 60 containers each. An approximate 7-acre area would be required to accommodate two rows of 80 containers and an additional 0.5-acre area would be required to accommodate four rows of 60 containers. Approximately 20 feet of spacing would be provided on all four sides of each container measuring 40 feet x 8.5 feet x 9.5 feet (LxWxH); see Figure 2, Energy Storage Container Size and Spacing. It should be noted that inverters and step-up transformers would be located within the container spacing as described below and as depicted in Figure 3.

The Li-ion batteries (cells) would be arranged into modules, which in turn would be stored in battery racks. The racks would be entirely contained within the container. The container would have an access door at each end and overhead lighting on the interior roof. Each container would have an integrated heating, ventilation, and air conditioning (HVAC) unit located on the roof of the container. Each HVAC unit would measure approximately 7.5 feet in height. An inverter

with a battery management system and container control system would be installed externally on a concrete pad next to each container. A step-up transformer would be associated with a set of two containers and would be installed alongside the container on a separate concrete pad. Thus, a total of 160 HVAC units, 160 inverters, and 80 step-up transformers would be associated with the energy storage system. Figure 3 provides an example illustration of the containers, step up transformers, and related infrastructure while Figure 4 provides an example of the typical container interior and battery pack configurations. Figure 5 presents the typical Li-ion battery pack components.

The proposed batteries and containers also include the following important monitoring and safety components:

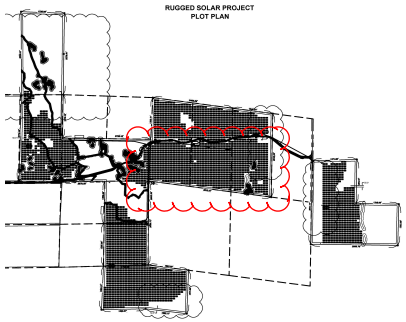
- Modular battery racks designed for ease of maintenance. Every rack's battery monitoring system (BMS) continually monitors for unsafe voltage, current, and temperature, and has control of an automated switch (contactor) to disconnect the rack from the system if necessary.
- Integrated fire detection and suppression system
- Li-ion nanophosphate chemistry which is considered to be the most stable Li-ion technology and substantially reduces the possibility of thermal runaway and provides for reduced reaction from abuse (Sandia National Laboratories 2012) and A123 Systems (no date).

The energy storage system would be composed of 160 containers that each could store up to 1 megawatt of electrical energy. The containers would be situated internally to the project site, with access from a primary fire apparatus roadway in a linear configuration. Figure 1 provides an example of how the containers can be situated for ease of ongoing maintenance and fire department access with adequate set back from off-site areas as a buffer against potential wildfire ignitions. Figure 2 illustrates a proposed container size, location next to fire access roads, and spacing between adjacent containers. The containers are typically made from 12 to 14 gauge steel, measure 40'x8.5'x9.5' (LxWxH), and would be separated from neighboring containers by 20'.

Each container includes a step-up transformer and inverter externally connected and in close proximity to the container. Figure 3 provides an example illustration of the containers, step up transformers, and related infrastructure while Figure 4 provides an example of the typical container interior and battery pack configurations. The Li-ion battery packs are typically stacked on racks within the containers. Figure 5 presents the typical Li-ion battery pack components.

Figure 1a

Example Location for Battery Storage Containers



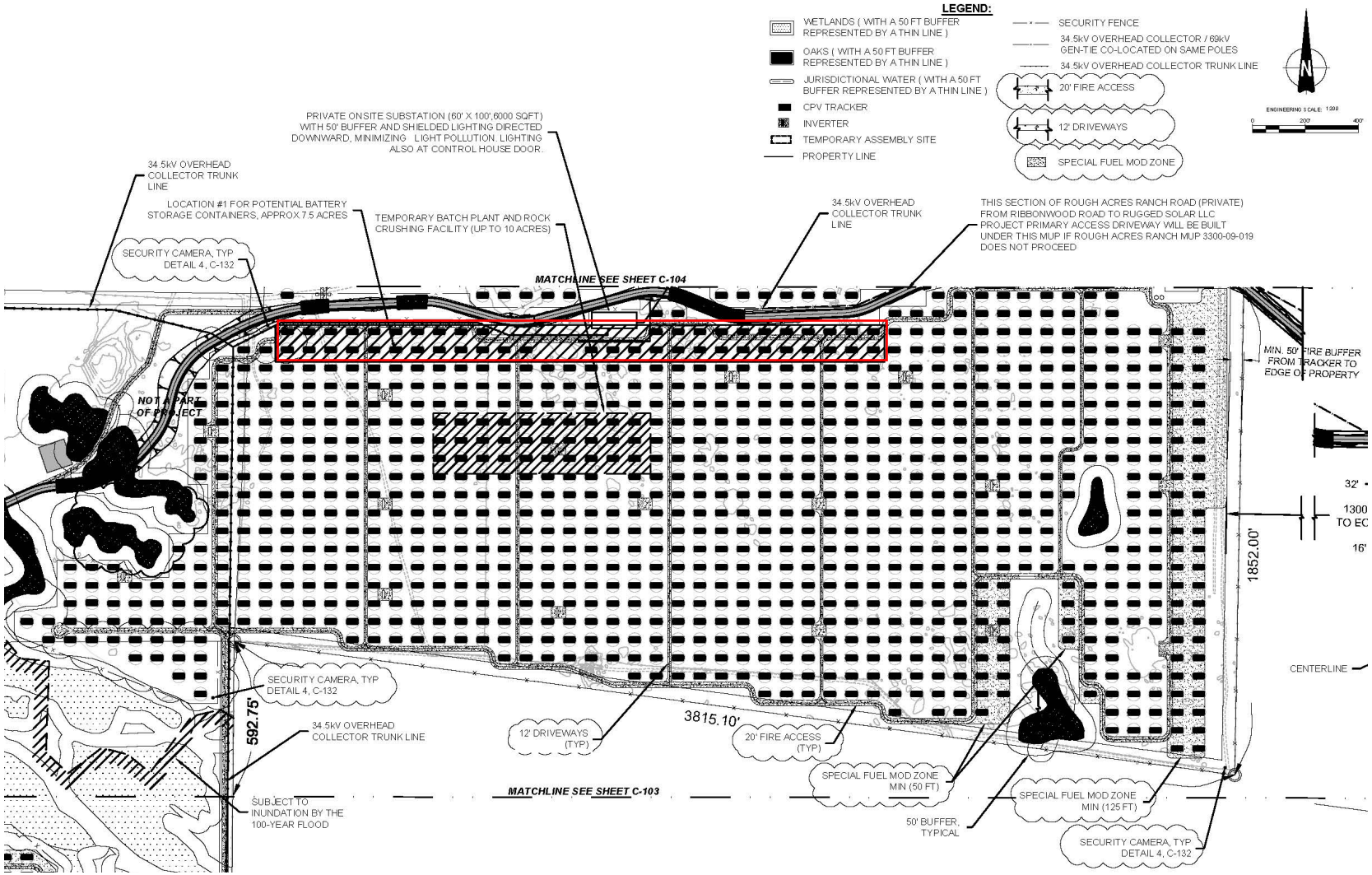


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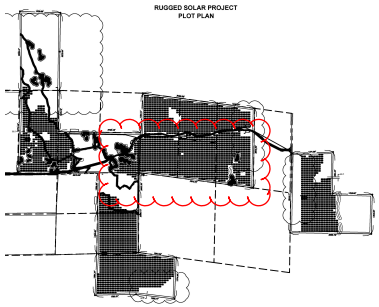
Figure 1b

Example Location for Battery Storage Containers



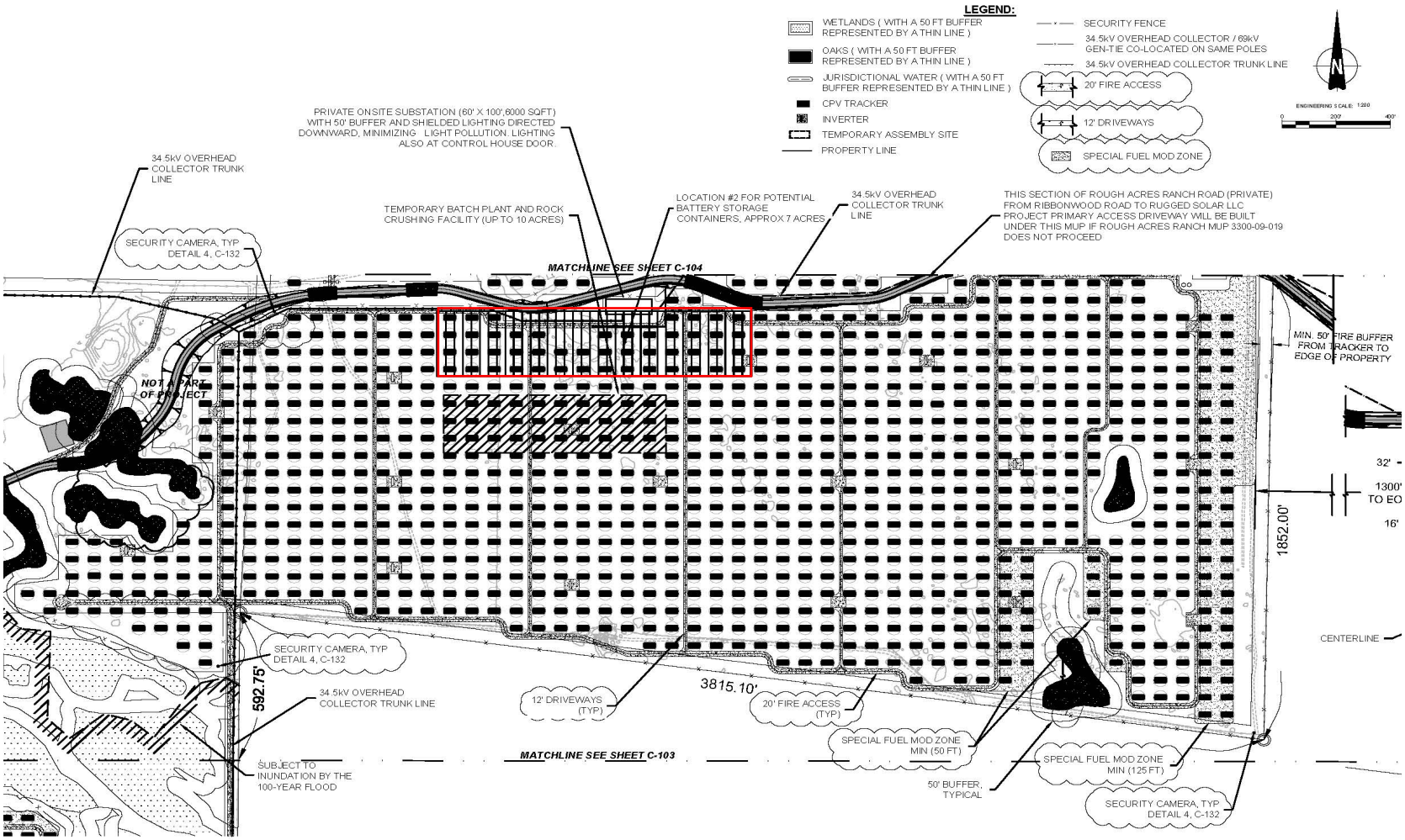


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Figure 2
Energy Storage Container Size and Spacing

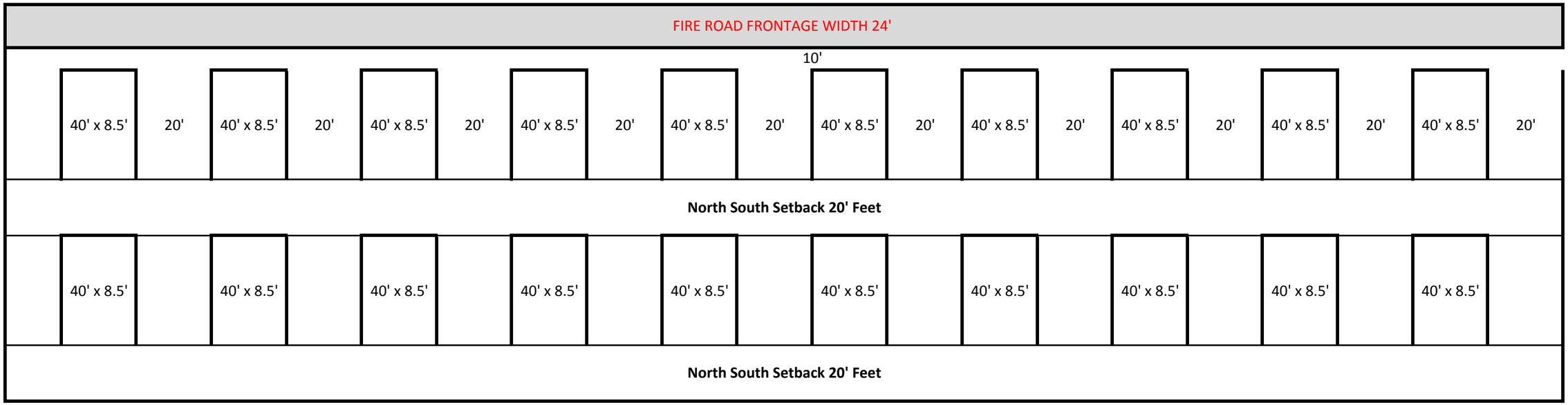

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Figure 3

Example Battery Storage Container Layout

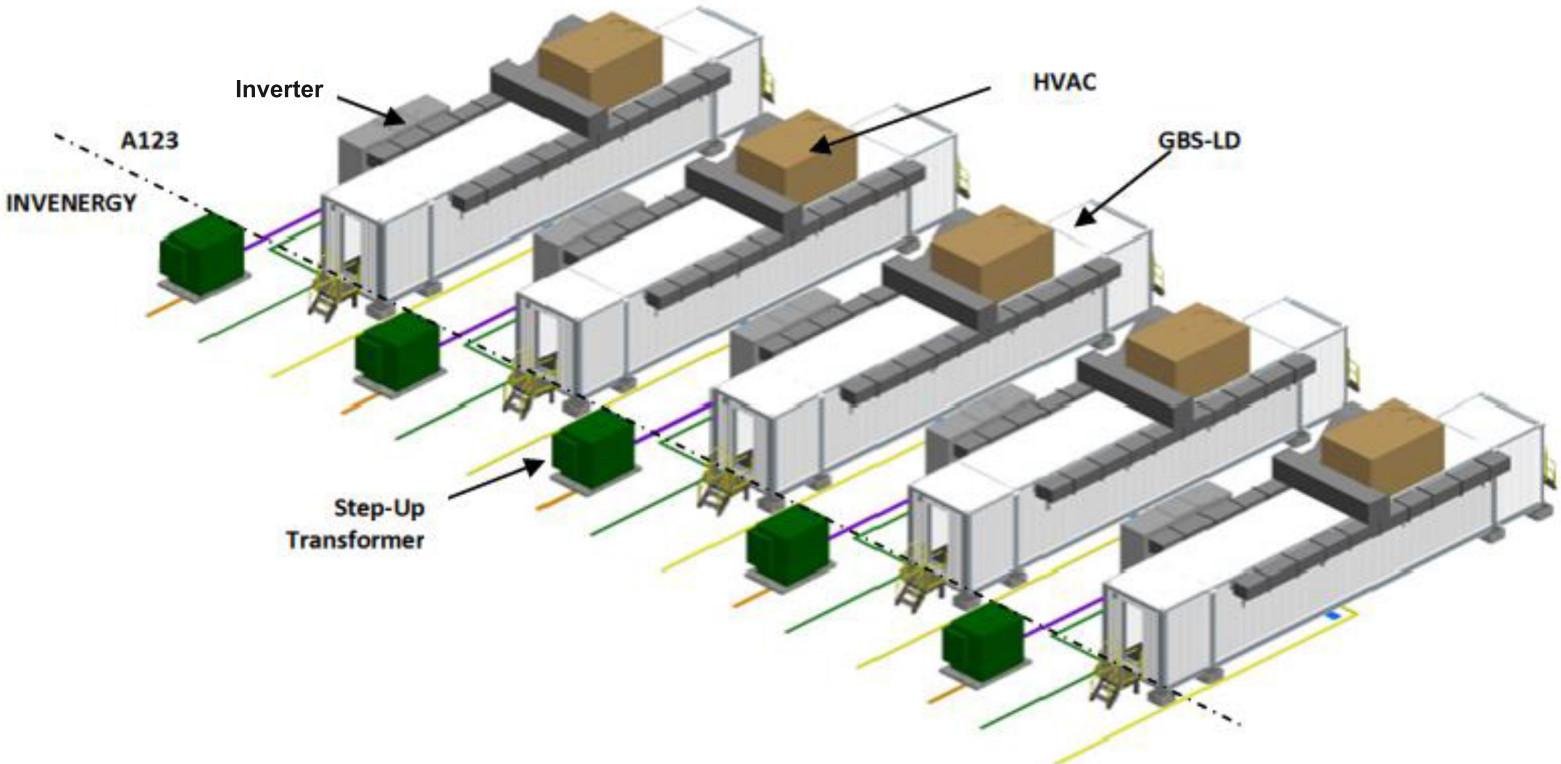

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Figure 4

Example Battery Storage Container Illustration

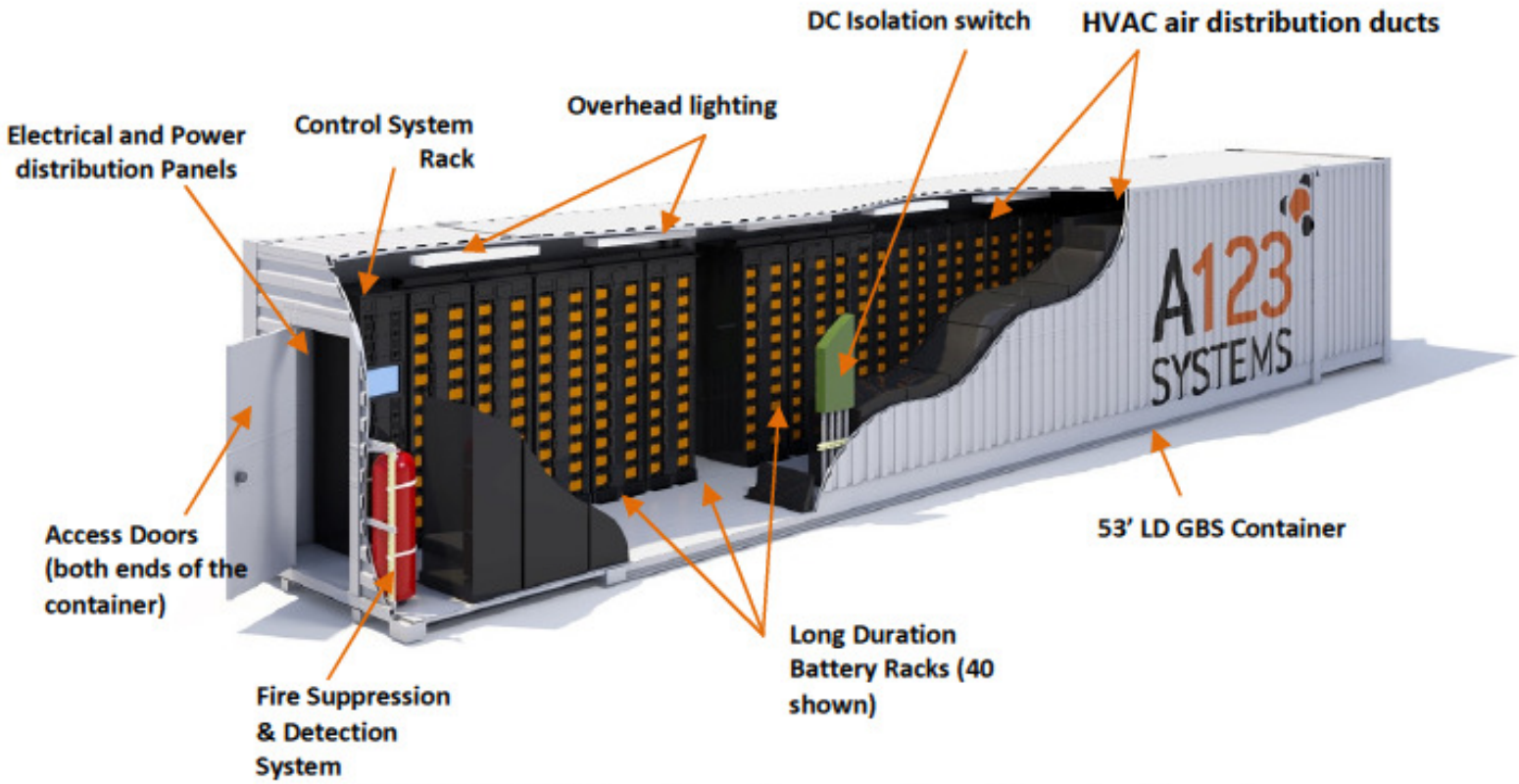

Figure 3 GBS-LD 53' Container Cutaway view (40 racks shown)

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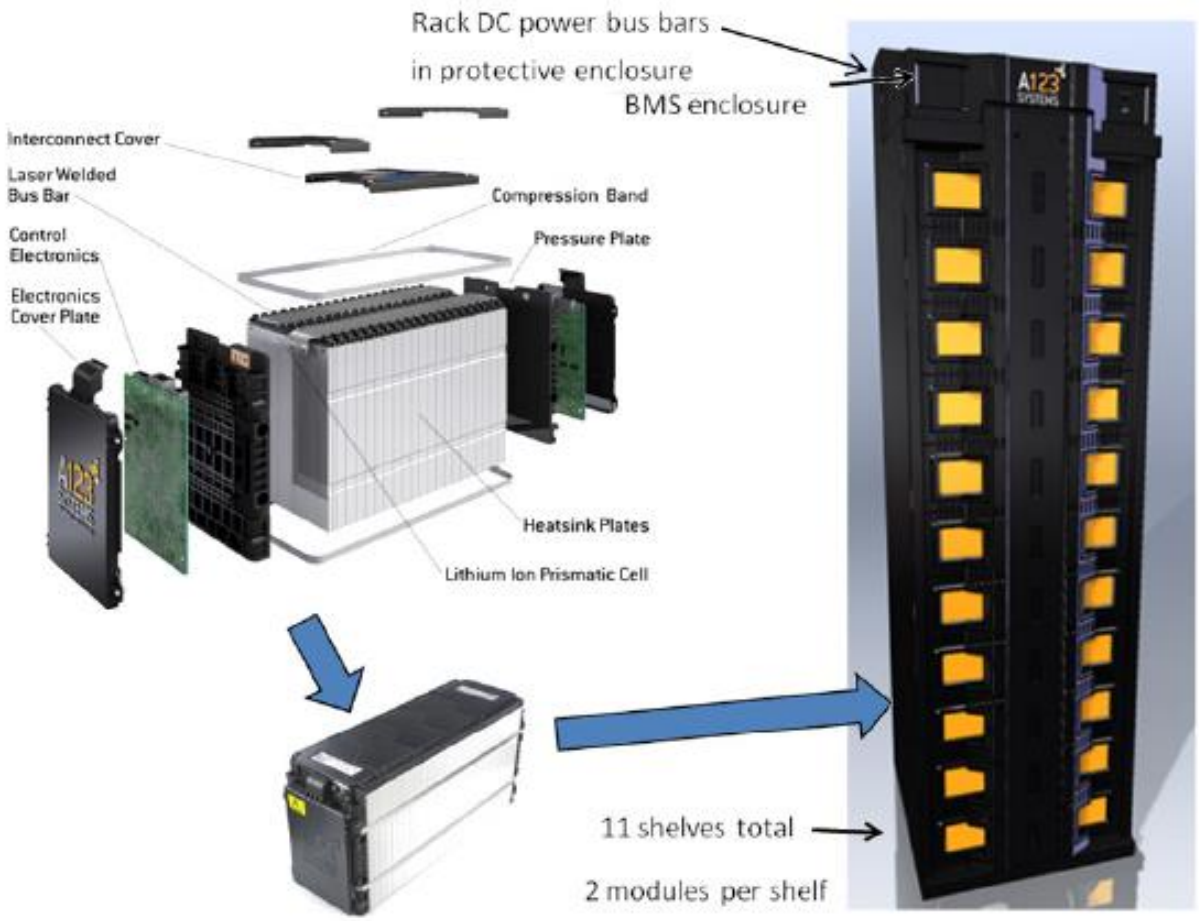
Figure 5

Lithium Ion Battery Pack (Typical)



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The proposed batteries and containers also include the following important monitoring and safety components:

- Modular battery racks designed for ease of maintenance
- Integrated fire detection and suppression system
- Integrated air conditioning system

There are various types of Li-ion batteries available for use in this application. The specific battery type proposed for the Rugged solar farm energy storage system is a Li-ion nanophosphate cell. Available data indicates that this particular type of Li-ion battery has proven to be less vulnerable to fire occurrences than typical Li-ion batteries, which as a category, include a very low occurrence of fires, but have experienced some especially high profile fires in recent years. Li-ion nanophosphate batteries include a stable cathode chemistry that substantially reduces the possibility of thermal runaway and provides for reduced reaction from abuse (Sandia National Laboratories 2012) and A123 Systems (no date).

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3.0 LITHIUM ION BATTERY TECHNOLOGY

3.1 Lithium Ion Batteries

The term Li-ion battery refers to a battery where the negative electrode (anode) and positive electrode (cathode) materials serve as a host for the Li-ion (Li+) (Mikolacjzak et al. 2011). Li-ions move from the anode to the cathode during discharge and are inserted into voids in the crystallographic structure of the cathode. The ions reverse direction during charging. An important fact about Li-ion batteries is that based on their materials content and how they operate, there is no free lithium metal within a Li-ion cell. Therefore, if a cell ignition occurs, metal fire suppression techniques are not appropriate for controlling the fire.

The four primary functional components of a practical Li-ion cell are:

- Anode
- Cathode
- Separator
- Electrolyte

Additional components of Li-ion cells, such as the current collectors, case or pouch, internal insulators, headers, and vent ports also affect cell reliability, safety, and behavior in a fire. The chemistry and design of these components varies across multiple parameters, so it is difficult to make blanket statements about fire behavior, prevention and suppression strategies, and other fire safety measures. For example, cell components, chemistry, electrode materials, particle sizes, particle size distributions, coatings on individual particles, binder materials, cell construction styles, amongst others, generally will be selected by a cell designer to optimize a family of cell properties and performance criteria. However, there are fundamental commonalities with regard to fire that are applicable to most of the Li-ion battery types. In addition, since Li-ion cell chemistry is an area of active research, it is anticipated that cell manufacturers will continue to advance cell designs including more fire safety driven updates.

Mikolacjzak, et. al. (2011) indicate that:

> "An individual Li-ion cell has a safe voltage range over which it can be cycled that will be determined by the specific cell chemistry. A safe voltage range will be a range in which the cell electrodes will not rapidly degrade due to lithium plating, copper dissolution, or other undesirable reactions. For most cells, charging significantly above 100% state of charge (SOC) can lead to rapid, exothermic degradation of the electrodes. Charging above the manufacturer's high

> voltage specification is referred to as overcharge. Since overcharging can lead to violent thermal runaway reactions, a number of overcharge protection devices are either designed into the cells or included in the electronics protection packages for Li-ion battery packs".

There are two methods to measure Li-ion battery life: (1) calendar life and (2) cycle life. Calendar life indicates how many years a battery is expected to last. The calendar life does not depend on amount times the battery has been charge or discharged, but rather how much charge is stored and its operating temperature (Saft 2014). Cycle life is based upon the number of charge and discharge cycles as well as to what level the battery is discharged to, or, its "depth of discharge" (Saft 2014). Li-ion batteries do not suddenly stop functioning in the same way a lead-acid battery would, rather a Li-ion battery exhibits a gradual decrease in performance (Saft 2014).

3.2 Fire Hazards

The primary hazard associated with Li-ion batteries is fire. Li-ion batteries may burn according to two primary factors. The first is being exposed to an adjacent fire or heat source that is hot enough to raise the internal temperature to combustion levels or provides actual flame impingement on the battery and leads to combustion or uncontrolled increased internal temperature. This leads to the second ignition factor, which is known as thermal runaway, where the battery's internal temperature rises and can lead to increased internal pressure, combustion of chemicals, venting or rupture and release of hydrogen or other flammable gasses. Thermal runaway may be caused by a number of issues, but manufacturing defects or physical damage during transport or set up may lead to malfunctions. In most cases, mechanical damage would probably rank as the highest risk factor for initiating a thermal runaway (fire/explosion) event (Butler 2013). Improper handling can result in crush or puncture damage, possibly leading to the release of flammable electrolyte material through venting or leakage, or short-circuiting. These actions could result in thermal runaway and a resulting fire and/or explosion.

When a Li-ion battery has a thermal runaway, the battery physically expands and electrical shorts within the battery can start, or continue if that was the initial cause of the thermal runaway. The stored energy is released and may include an explosion. This process can cause adjacent battery cells to increase internal temperature, catch fire or thermally runaway (VAN 2014), leading to a chain reaction where successive batteries fail. In other words, once one battery cell goes into thermal runaway, it produces enough heat to potentially cause adjacent battery cells to also go into thermal runaway. This produces a fire that repeatedly flares up as each battery cell in turn ruptures and releases its contents. Li-ion batteries do not contain lithium metal, but do contain lithium ions in electrolyte (Butler 2013). Fires occurring in Li-ion batteries are not like a typical fire and therefore, they require a holistic pre-planning approach to reduce

the potential for battery failure including battery design, shipping techniques, storage rack design and configuration, monitoring protocols, pre-planning, suppression systems, firefighter training, and extinguishing approaches.

Research (Butler 2013, Ditch & De Vries 2013, Mikolajczak et al. 2011, and others) indicates that the severity of a cell thermal runaway event will depend upon a number of factors, with the level of charge (how much electrical energy is stored in the form of chemical potential energy), the ambient environmental temperature, the electrochemical design of the cell (cell chemistry), and the mechanical design of the cell (cell size, electrolyte volume, etc.) having the greatest influence. For any given cell, the most severe thermal runaway reaction will be achieved when that cell is at 100% (or greater, if overcharged) of its charge capability, because the cell will contain maximum electrical energy. If a typical fully charged (or overcharged) Li-ion cell undergoes a thermal runaway reaction, a number of things occur, including:

- Cell internal temperature increases;
- Cell internal pressure increases;
- Cell undergoes venting;
- Cell vent gases may ignite;
- Cell contents may be ejected; and
- Cell thermal runaway may propagate to adjacent cells.

There is a lack of available data regarding large storage format Li-ion nanophosphate batteries. Testing by one Li-ion nanophosphate battery manufacturer indicates that the thermal runaway potential is reduced due to the reduced oxygen release during a failure (A123 System 2012)) However, it is anticipated that all Li-ion batteries may follow a somewhat predictable path when thermal ruaway occurs, and that some variation is likely for nanophosphate batteries. Butler (2013) predicts that when a single Li-ion battery goes into thermal runaway, the propagation creates identifiable markers, i.e., the battery behaves in a certain way. He concludes that the fire may be a progressive burn-off or one that is explosive in nature.

Li-ion batteries are non-aqueous and therefore lack the capability of dissipating overcharge energy. As such, positive metal-oxide cells will continue to absorb and store overcharge energy to the point where the material becomes unstable causing release of substantial heat and ignition. While overcharge can lead to the most serious of Li-ion failures, it is considered the least probable for stationary batteries due to well controlled charging systems, alarms, and battery isolation switches (McDowall 2014).

3.3 Fire Behavior

Research conducted by Mikolajczak et al. (2011) indicates that the severity of a Li-ion cell failure is strongly affected by the total energy stored in that cell. Stored energy is a combination of chemical energy and electrical energy. Thus, the severity of a potential thermal runaway event can be mitigated by reducing stored chemical energy (i.e., by reducing the volume of electrolyte within a cell), or by changing the electrolyte to a noncombustible material (i.e., the cell chemistry). These are active research areas within the Li-ion field, but there are not currently commercial-ready products available. It is possible that future versions of Li-ion batteries will include lower potential for fire due to the ongoing research in this direction.

It is commonly thought that the most flammable component of a Li-ion cell is the hydrocarbon-based electrolyte. The hydrocarbon-based electrolyte in Li-ion cells results in a drastically different fire behavior than the typical household lead acid, NiMH or NiCad cell batteries, which contain water-based electrolytes.

The importance of understanding the fire behavior of typical Li-Ion cells is that if they are punctured or otherwise damaged to the point that leakage or venting occurs, it will release flammable vapors. Newer cell technology and lithium ion nanophosphate cells have been tested and shown to include reduced venting and less flammable vapors, resulting in reduced intensity of thermal events (A123 2012). Similarly, fire impingement on Li-ion cells will cause release of flammable electrolyte, increasing the total heat release of the fire, assuming there are well-ventilated conditions. Other combustible components in a Li-ion cell include a polymeric separator, various binders used in the electrodes, and the graphite of the anode (Mikolajczak et al. 2011).

When a cell vents, the released gases mix with the surrounding atmosphere. Depending upon a number of factors, including fuel concentration, oxygen concentration, and temperature, the resulting mixture may or may not be flammable (Ditch & De Vries 2013). Ventilation and cooling capabilities of the storage container will have a strong influence on the ability of these gases to reach flammable levels. The combination of the Li-ion nanophosphate batteries and the well-ventilated, cooled, customized storage containers should result in a lower likelihood that flammable gas levels would be experienced.

On fire scenes where large quantities of Li-ion cells would be in close proximity, decisions regarding overhaul procedures must be made with an understanding that as cells are uncovered, moved, or damaged, they may undergo thermal runaway reactions and vent, they may ignite, and they may generate (or may themselves become) hot projectiles. Similarly, the potential for

rekindles will be high at such fire scenes, and these scenes will require extended monitoring by trained firefighters.

3.4 Fire Suppression

The observations from various testing previously described in this analysis would appear to have meaningful implications on fire protection/prevention as well as firefighting procedures. As indicated in these tests, battery heating and thermal runaway controls are important to preventing fires. Specifically, if a fire occurs within a energy storage container, the battery cells and battery packs must be protected from overheating, or they may begin to vent and ignite, spreading the fire more rapidly than would be expected for normal combustibles. Therefore, the design of the energy storage racks, spacing, internal container fire walls/separators, HVAC system, venting, fire suppression system and fire fighter capabilities must all be pre-planned for best prevention, protection, and suppression success.

Butler (2013) indicates that at minimum, an effective strategy for storing lithium batteries is to develop fire containment and suppression systems that would deal with the battery fire event. Systems like this would contain the fire event and encourage Suppression through Cooling, Isolation, and Containment (SCIC). Research indicates that suppressing a Li-ion battery fire is best accomplished by extinguishing the flame with a gas-based suppression system and cooling the burning material with water. However, since the risk of fire spread beyond a container is minimal, and water and plumbing systems are cost-prohibitive and logistically challenging, it is anticipated that cooling of the batteries and container, if necessary, can be provided from firefighters. Therefore, a fire sprinkler system for these containers is not supported.

In most instances, Li-ion battery fires would not be treated like common structure fires by responding firefighters. The burn characteristics and potentially toxic by-product release components do not align with a structure fire where wood and household flammables are burning. Among the precautions that would be considered by responding firefighters are:

- The energy storage containers include electric hazard
- The energy storage containers are adjacent to energized solar panels
- There is extra energy that may be released from polymeric materials burning (binder, separator, etc.)
- Burning batteries would present smoke toxicity and environmental issues
- There is no known way to eliminate “ignition sources”; e.g.: fire initiated from an internal short, subsequent to a manufacturing defect

- There may be re-ignitions and post-fire monitoring will be required

Training regarding fire hazards, behavior, and suppression can be provided to all contractors installing the energy storage facilities, operating and maintaining them, and local firefighters who may respond to an emergency in order to preserve both life and property. Training materials should address issues including battery awareness and care, cautions, warning signs, battery fire behavior, emergency response procedures, and fire extinguisher use (Li-ion battery focus).

Firefighter Response

- Every fire emergency is unique and requires a customized approach, but a typical battery incident may include the following response:
- A firefighter would arrive on scene and size up the situation.
- Calls for additional units would be made as necessary.
- Assuming that the fire in the container was not chain reacting (the type of cell being proposed is not likely to chain react), they would confirm that the suppression gas system is performing as intended.
- If so, the fire would likely be out by the time firefighters arrived. If the system malfunctioned, then there could be a situation where fire is burning flammable materials within the container.
- The container would need to be cooled so firefighters would begin blanketing the container and nearby containers with water streams and as possible and if necessary, streaming a water fog into the container.
- The fire would continue to burn inside until the flammables were consumed. There would be no need to enter the building unless someone was maintaining the batteries and was incapacitated inside. In that case, a rescue operation would be attempted if conditions allowed.

With the energy storage technology that is being proposed, the possibility of explosion is considered extremely rare. However, unforeseen malfunctions can occur that could result in an explosion. It is not anticipated that a battery explosion would contain enough energy to breach the steel containers. However, should that occur, the containers are separated by 20 feet from the adjacent containers and are situated in an areas free of “targets” and set back from native fuels to provide a buffer for minimizing the likelihood of materials beyond the site boundaries. Furthermore, as stated in Section 5.0, Design Considerations, selection of the optional energy storage system would include regularly scheduled, on-site training with local firefighters that

would be provided a Battery Storage Fire Fighting Manual shall also be prepared and distributed to local fire agencies for review and integration in their operation pre-planning efforts.

3.5 Fire Safety

McDowall 2014 states that Li-ion battery safety requires four (4) elements: (1) materials and process control, (2) choice of chemistry, (3) cell design, and (4) system design. In general, materials and process control is the responsibility of the cell manufacturer as opposed to the battery system operator. The first decision to be made by the battery operator to ensure system safety is appropriate cell chemistry for the intended use (e.g. solar power storage and delivery). Cells are designed to vent as a form of safety; therefore a safe Li-ion battery system must accommodate for large quantities of released gas including hydrogen gas vented during regular operations and inert gases vented after gas-based fire suppression systems are utilized.

As discussed above, thermal runaway has potential to cause a chain reaction of heat causing extreme failure in adjacent cells. Measures, such as electronic monitoring systems, alarms, circuit breakers and other layered safety features, should be incorporated to lower the possibility of a thermal runaway chain reaction. These electronic safety systems would monitor the individual cell voltages during charge and discharge, internal batter temperature, and cell balance; these systems would also provide communication with a form of management unit or dashboard (Saft 2014). For example, Saft's manufactured battery systems contain a Battery Management Module with two components: (1) battery management unit (manages battery functions) and (2) electrical disconnect unit (enables a safe disconnect of a portion of the system). (Saft 2014). This Battery Management Module is responsible for many of the previously listed system safety functions including: operations supervision, charge and discharge management, thermal management, warnings and alarms, State of Charge, State of Health, first level safety, watchdog, blackbox, and maintenance and diagnostics (Saft 2014). Each of these Battery Management Modules can be connected to a Master Battery Management Module for an additional layer of redundancy and safety (Saft 2014).

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4.0 POTENTIAL FIRE IMPACTS

Applicable results from related tests of Li-ion technology as well as results of chemistry, packaging, and container tests that influence the assessment conducted herein. There are extremely large quantities of Li-ion batteries in use for a variety of applications world-wide from cell phones to vehicles to large-scale energy storage. They are also utilized as back-up power for large data storage facilities. Although statistics were not available at the time of this analysis, the number of fire incidents to date, in relation to the number of batteries in use, has been very low. Li-ion nanophosphate batteries include a stable cathode chemistry that substantially reduces the possibility of thermal runaway and provides for reduced reaction from abuse (Sandia National Laboratories 2012) and A123 Systems (no date).

The potential fire impacts and how the project addresses them are summarized below.

4.1 Wildfire Hazards

Guidelines for the Determination of Significance

For purposes of this assessment, both Appendix G of the CEQA Guidelines and the County's *Guidelines for Determining Significance: Wildland Fire and Fire Protection* were utilized to determine whether the inclusion of the energy storage system to the Proposed Project identified in the DPEIR would result in a significant environmental impact related to wildfire hazards. As such, the relevant wildfire hazard guidelines are identified below.

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

2. An affirmative response to, or confirmation of any one of the following guidelines from the County's *Guidelines for Determining Significance: Wildland Fire and Fire Protection*, will generally be considered a significant impact related to Wildland Fire and Fire Protection as a result of the project, in the absence of evidence to the contrary:

   - The project cannot demonstrate compliance with all applicable fire codes.
   - A comprehensive Fire Protection Plan has been accepted, and the project is inconsistent with its recommendations.

Analysis

The wildland fire risk in the vicinity of the Proposed Project has been analyzed in the DPEIR and it has been determined that wildfires are likely occurrences, but would not be significantly increased in frequency, duration, or size with the construction of the Proposed Project (Dudek and Hunt 2013). Adding the energy storage system would not change the DPEIR's conclusion that neither the Rugged solar farm individually, nor the Proposed Project as a whole, would cause a significant impact by exposing people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

The energy storage component would be located on the Rugged solar farm in an area set back from wildland fuels and the battery storage is within non-combustible, steel containers with sophisticated monitoring and fire suppression systems. It is anticipated that any thermal event involving the energy storage system's Li-ion nanophosphate batteries, as well as their negative by-products (burning electrolytes, and other matter), can be effectively managed and contained within the appropriate storage and transport environments. The temperatures and burning duration of the batteries when triggering an appropriate suppression system within a customized steel container are not anticipated to exceed the integrity of the steel containers proposed for the energy storage system. The site would be largely converted from readily ignited wildland chaparral fuels to ignition resistant facilities and equipment. The Rugged solar farm would not include full-time inhabitants, but would include increased human activity during construction and for ongoing Project operation and maintenance.

The Rugged solar farm, including the energy storage system, would comply with applicable fire codes and would include a layered fire protection system designed to current codes and inclusive of site-specific measures that will result in a Project that is less susceptible to wildfire than surrounding landscapes. The Rugged solar farm energy storage system proposes one of the most stable types of Li-ion battery technologies available (Li-ion nanophosphate) from a reputable manufacturer that includes several manufacturing processes that minimize defects, careful packaging and shipping methods, a steel container that will include a minimum 2 hour and up to 4 hour fire rating, a variety of fuses that help protect down to the cell level, an automated system that continually monitors the batteries for out of range calibrations, a heat and fire detecting system, automatic inert gas fire suppression system, and a site that is designed to allow firefighter access and facilitate suppression activities. All of these features will suppress fire risk.

Further, the facility would provide specific measures to reduce the likelihood of fire igniting on the site from necessary maintenance operations as well as measures to aid responding

firefighters to the facility through direct site safety designs, apparatus and training methods. A site-specific Fire Protection Plan (FPP) for Rugged solar farm (Appendix 3.1.4-6) has been prepared, will be approved, and will be implemented. The FPP clarifies requirements of the San Diego County Consolidated Fire Code and includes multiple design considerations that would be incorporated into the design and operation of the Rugged solar farm (see Section 5.0 of Appendix 3.1.4-6). In addition, the inclusion of funding to the SDCFA (see DPEIR PDF-PS-1) and other measures in the Project's Fire Services Agreement would enhance emergency services response capabilities in the local area. Lastly, there will be no permanent, habitable structures where people would remain overnight and with incorporation of a layered fire protection system at the Rugged solar farm, on-site personnel would be able to temporarily remain on site during a wildfire. Therefore, adding the energy storage system to the Rugged solar farm would not expose people or structures to a significant risk of loss, injury or death involving wildland fires.

4.2 Hazards Associated with Interference of Emergency Responses

Guidelines for the Determination of Significance

For purposes of this assessment, both Appendix G of the CEQA Guidelines and the County's *Guidelines for Determining Significance: Wildland Fire and Fire Protection* are utilized to determine whether the inclusion of the energy storage system to the Proposed Project identified in the DPEIR would result in a significant environmental impact related to emergency response and access. As such, the relevant emergency response/access guidelines are identified below.

1. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance service ratios, response times or other performance objectives for fire protection?
2. The project does not meet the emergency response objectives identified in the Safety Element of the County General Plan or offer feasible alternatives that achieve comparable emergency response objectives.
3. Would the project result in inadequate emergency access?

Analysis

The Rugged solar farm is projected to add an estimated fewer than 1.6 calls per year to the Boulevard and CAL FIRE White Star Fire Stations. (DPEIR, Appendix 3.1.4-6, p. 23.) Because the Rugged solar farm, including the energy storage system, would comply with applicable fire codes, would include a layered fire protection system designed to current codes, and would include specific design measures to reduce the potential for fire evens during operations, the addition of an energy storage system is not anticipated to result in an increased number of emergency calls from the project. The addition of 1.6 calls/year to a rural fire station that currently responds to approximately 7–10 calls per week is considered insignificant and will not require the construction of additional Fire Station facilities based on that increase alone. However, the project will be part of a cumulative impact from several renewable energy projects in the area that combined could cause service level decline. As such, the Rugged solar farm will enter into a Fire Services Agreement and will contribute funding to the SDCFA to improve emergency response capabilities in the area (see DPEIR PDF-PS-1). The Fire Services Agreement and PDF-PS-1 will provide fair-share funding to be used to augment existing fire emergency response capabilities of the local Fire Response Resources and off-set cumulative impacts of the Rugged solar farm and other renewable energy projects that are expected to be built in the area. The funding will provide for apparatus and equipment as well as staffing enhancements, as selected by the area's fire authorities and as recommended by the area's Fire Resource Capability Report (Dudek & Hunt 2013). The result is maintained or enhanced fire service ratios and response times to the existing condition.

Regarding emergency access, the Rugged solar farm includes fire access throughout the facility and is consistent with the Consolidated County Fire Code. The addition of an energy storage system would not affect emergency access. Fire apparatus access to the energy storage containers will include a combination of 20 feet wide and 12 feet wide road ways. Fire access on the Rugged solar farm site will be improved from its current condition which provides only limited access on dirt/gravel roads. The on-site roadways are designed as looped access throughout the project and conformance with road surface, width, turning radius, and vertical clearance Code requirements for emergency access. On-site roadways also include 20-foot-wide perimeter access roads. Therefore, emergency access is considered adequate for this type of facility.

5.0 DESIGN CONSIDERATIONS

As presented in the project's FPP, the proposed Project provides customized measures that address the identified potential fire hazards on the site. The measures are independently established, but will work together to result in reduced fire threat and heightened fire protection. These include Fuel Modification, Special Fuel Management Areas, improved access throughout the site, participation in a fire service agreement, fuel modification inspections, illuminated signage, stow mode for CPV trackers, training for firefighters, construction fire prevention plan, fire extinguishers, water tanks, and others.

This analysis assumes the implementation of the following additional design features and training/operational protocols below, which would ensure the fire impact associated with the energy storage units remain at a level below significance, including compliance with the County's Determination of Significance standards.

The energy storage system shall include the following components, or their equivalent:

- Available Battery Management Modules (BMMs) continuously monitor the state of charge, battery health, temperature, and other important information. Also available are Mastery Battery Management Modules (MBMMs) to ensure charge uniformity throughout each string of Li-ion batteries.
- Custom grate or fiberglass t-bar flooring available to cover corrosion resistant secondary containment.
- EPA Compliant Spill Containment and Access
- IEEE 1547 compliance (to preclude unplanned power backfeed or islanding)
- Electrical fault protection compatible with downstream protection coordination
- Fault current/voltage limited inverters with full electrical protection and isolation switches
- AEROS energy control system monitors and ensures operation within safe limits and can disconnect power if needed
- Ground fault detection, integrated onboard fire suppression system with smoke and heat detection
- Every rack's battery management system continually monitors for unsafe voltage, current, and temperature and has control of an automated switch to disconnect the rack from the system if necessary
- High voltage fusing for the entire rack supplements the battery management control system

- Module electronics will monitor every cell voltage and select cell temperatures, and has its own dedicated overvoltage monitoring chip
- Two additional levels of fuse safety – individual cell fuses and integral module-level fuse
- Integrated pressure vent on all cylindrical cells
- Cells certified to stringent UL1642 Lithium cell safety standards
- Effective battery standard operating procedures (SOP's) shall be developed and shall include processes that guide every aspect of battery safety, from shipping and receiving, handling, daily use, storage, and other functions involving the batteries.
- An interior inert gas fire suppression system such as the FM-200 or similar shall be installed. The suppression system shall comply with NFPA 72 safety provisions regarding fire detection, signaling and emergency communications and NFPA 2001 standards regarding inspection and testing requirements.
- Firefighters shall have access to the containers to provide water for cooling any battery fire, as possible with a back-up plan to avoid entering a container to cool the exterior of the container through water application (multiple water streams encompassing the involved container) which would positively impact interior temperatures as the batteries burned within.
- Regularly scheduled, on-site training and familiarity with local firefighters shall be conducted and battery system and container specifics provided to the fire agencies for integration in their operation pre-planning efforts. A Battery Storage Fire Fighting Manual shall also be prepared and distributed to local fire agencies.
- The HVAC and venting system shall be engineered to remove the expected toxic, thick smoke from burning plastics and the toxic fumes from electrolyte should a fire occur. The HVAC system shall be designed so that burning embers and smoke from nearby fires, such as a wildland fire, do not penetrate into the containers and ignite combustibles inside. The HVAC system shall also be on emergency standby power and monitored.
- Seismic engineering and restraint shall be incorporated in the containers and the battery racks. The proposed system comes with a seismic rating.
- Containers shall be separated an acceptable distance from one another to prevent fire/heat spread which will help control the rare occurrence of thermal runaway domino effect.
- Spill control and secondary containment shall be provided for transformers containing any appreciable amount of oil.

- An emergency shutdown device shall be provided to stop electrical flow for battery isolation and Firefighter safety.
- The required Heat/Smoke Detection system, per Fire Code, shall comply with NFPA 72 and shall be remotely supervised. The proposed energy storage component for the Soitec Rugged solar farm includes a heat and fire detection system linked to an automatic fire suppression system.
- Safety signs and warning signs shall be installed on all building for firefighter and worker safety.
- Suitable portable fire extinguishers shall be provided.
- Approved Fire Truck access shall be provided to ensure access within 150 feet of all containers.

5.1 Residual Impact Level

Fire hazard associated with the mechanical equipment of the Rugged solar farm, including addition of an energy storage system, would remain at a level less than significant with implementation of the design features listed in Section 5.0 of this addendum, which would be implemented under PDF-HZ-3 from the DPEIR, as well as with incorporation of project design feature PDF-PS-1 from the DPEIR.

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7.0 CERTIFICATION

This addendum has been prepared by Mr. Michael Huff. Mr. Huff is a County of San Diego approved CEQA Consultant for Fire Protection Planning.

Michael Huff
Principal Fire Protection Planner

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