

Rancho Viejo Solar Project – Battery Storage

Provided below are responses and details to questions and clarifications provided by Santa Fe County on August 8 and 14, 2023, to AES Clean Energy.

Santa Fe County (Questions/Clarifications)	AES Clean Energy (Responses and Details)
Type of battery storage with specs and fail rate.	Samsung Battery System E5S (NCA) No public data sheet is available for E5S. See attached container details, which is shareable under NDA.
Where is it located?	The proposed battery energy storage system (BESS) is located in the northeastern area of the project site, west of the proposed AES substation. See the attached vicinity map.
Is it within a structure?	Battery modules are located within containers; these steel containers do not allow for or require personnel entry. See attached container details.
Provide the design of the cabinet and or storage area.	Current container design is attached.
Address the fire protection within a storage cabinet and or stargaze structure for the entire battery storage.	The containers include self-contained fire suppression that can address both non-battery electrical fires (via conventional suppressant) and battery fires via direct injection of clean agent fire suppressant into the cell on fire. This solution has been tested by UL and found to fully suppress a fire internal to the battery enclosure. Fires external to the enclosure are mitigated by first reducing combustible load, then through conventional firefighting measures.
How many batteries per storage cabinet or area.	Containers in final design may vary. Maximum batteries per container are designed to include 21 strings, with 12 battery modules, for a total of 252 modules. There will 60 battery cells per string for a maximum total of 15,120 battery cells per 40-foot container.
Defensible space around the storage area including ground cover.	The ground cover is composed of clean finish rock that encompasses and extends five feet outside the BESS yard fence. The distance from container equipment pads to the edge of the rock is approximately 25 feet.
Fire alarm system / automatic shut down.	The BESS includes a fire alarm system interconnected to our plant control system, which is monitored 24 hours per day, 7 days per week, by the AES Remote Operations and Control Center (ROCC). The industry-standard fire

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	panels selected for the enclosures are commonly used in building applications and provide “trouble” and “alarm” signals to alert operators of any off-normal conditions, including loss of power.
Fire Department access to structures.	<p>Consistent with 2021 IFC Chapter 5 Fire Service Features, access will include:</p> <p>Roadways</p> <ul style="list-style-type: none"> • Fire apparatus access roads shall have an approved, all weather driving surface, capable of supporting the imposed load 75,000 lbs. of fire apparatus to all enclosed structures/facilities. • Minimum grate and driveway width shall be 20’, with an unobstructed vertical clearance of 13’6” and a minimum inside turning radius of 28’. • Emergency Vehicle Turnaround is required and shall meet Santa Fe County Fire Code and remain vacant at all times. • Emergency Vehicle Turnaround shall be maintained per Santa Fe County Fire Code. • Road infrastructure shall be installed prior to any vertical construction. <p>Key Boxes</p> <ul style="list-style-type: none"> • Where access to or within a structure or an area is restricted because of secured openings or where immediate access is necessary for life-saving or firefighting purposes, the <i>fire code official</i> is authorized to require a key box to be installed in an <i>approved</i> location. The key box shall be of an <i>approved type listed</i> in accordance with UL 1037, and shall contain keys to gain necessary access as required by the <i>fire code official</i>. <p>Premises Identification</p> <ul style="list-style-type: none"> • New and existing buildings shall be provided with approved address identification. The address identification shall be legible and placed in a position that is visible from the street or road fronting the property.
Identify it on the site plan and provide full scale drawing of just the battery area.	Current BESS layout area is attached.
Complete list of fire mitigation standards being proposed.	<ul style="list-style-type: none"> • NFPA 855 (inclusive of UL1741, UL9540, NFPA 68/69) <p><u>Compliance with the Santa Fe County Fire Code</u></p> <ul style="list-style-type: none"> • Santa Fe County Ordinance 2018-8 as adopted by the Board of County Commissioners

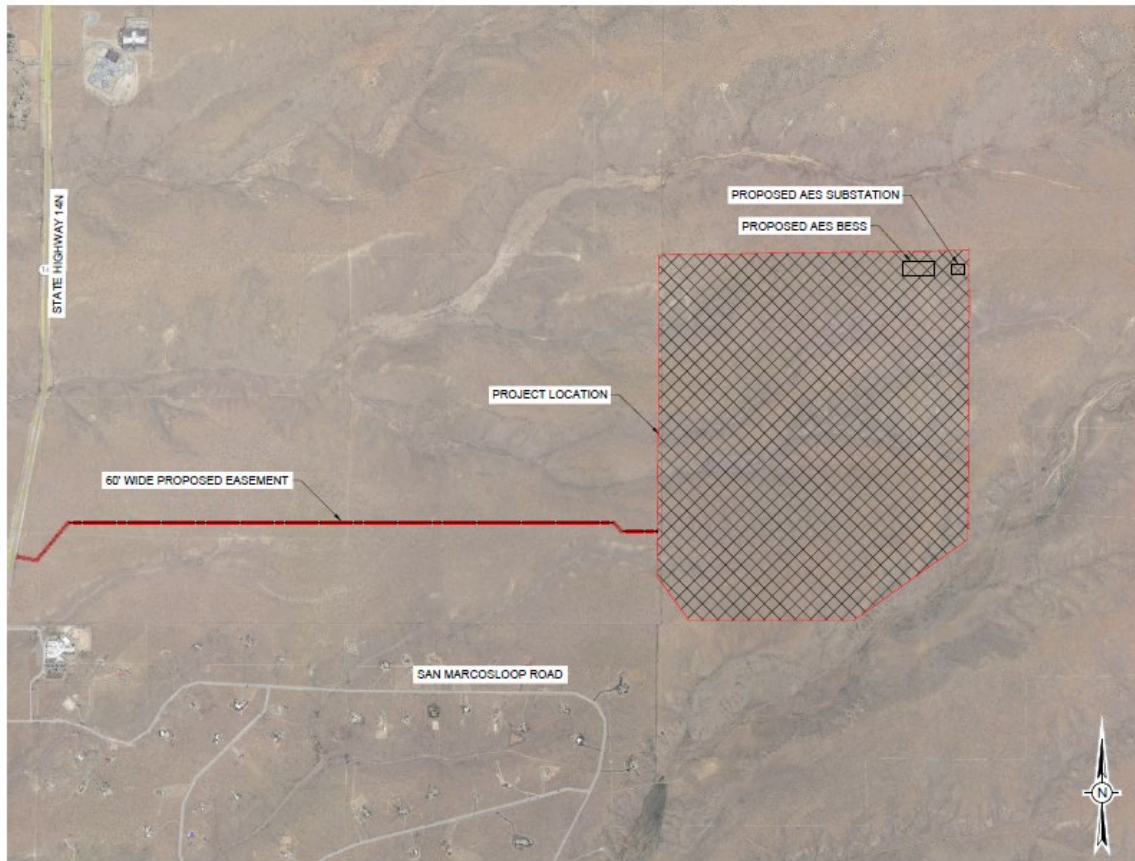
Santa Fe County (Questions/Clarifications)	AES Clean Energy (Responses and Details)
	<ul style="list-style-type: none"> • 2021 International Fire Code, specifically chapters 1 through 10 and Appendix Chapters B and D • 2015 International Wildland Urban Interface Code and Appendix Chapters A, B, and C • Any requirements imposed by the Authority Having Jurisdiction, their Designee, and Building Code Official pertaining to Fire and Life Safety. <p><u>Compliance with Conditions of Approval</u></p> <ul style="list-style-type: none"> • Shall comply with Santa Fe County Ordinance 2018-8 and 2021 International Fire Code (as adopted by New Mexico NMAC 10.25.5.8), including: <ul style="list-style-type: none"> • 2021 IFC Chapter 12 Energy Systems <ul style="list-style-type: none"> Fire protection system/s required by the IFC 2021 and its referenced standards. <ul style="list-style-type: none"> ○ All fire protection system/s required shall be submitted to the Santa Fe County Fire Department. Please contact your plan reviewer for details. • 2021 IFC Chapter 33 Fire safety during construction and demolition. • 2021 IFC Chapter 5 Fire Service Features <ul style="list-style-type: none"> Includes requirements for Roadways, Key Boxes, and Premises Identification, identified above. • Vegetation Management Plan per Ordinance 2018-8 Exhibit B • NFPA 855 Standard for the Installation of Stationary Energy Storage Systems, including: <ul style="list-style-type: none"> • 4.1.3 Emergency Planning and Training. <ul style="list-style-type: none"> ○ 4.1.3.1 * General. Emergency planning and training shall be provided by the owner of the ESS or their authorized representative so that ESS facility operations and maintenance personnel and emergency responders can effectively address foreseeable hazards associated with the on-site systems.
Any other item relevant for us to be able to analyze the impact of the batteries and mitigation measures.	A Hazard Mitigation Analysis (HMA) will be performed as part of the detailed engineering process. This HMA will include site and product specific fire risk assessment and a first responder plan. Local first responders will have access to these reports. AES will provide on-site and in-person training to the local responders prior to commercial operation of the system. There are no special materials required to respond to a fire event for the containerized BESS units. Only standard water application to the adjacent BESS containers is required and this is only in the case where all internal fire suppression systems may fail. All information required by the first responders will be included in the first responder plan part of the HMA.

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	<p>AES have UL9540A test results for the cell, module, and unit level tests. These are all that's required due to the successful fire mitigation at the unit level. AES is determining if detailed test reports can be provided publicly, as they are not owned by AES but by the manufacturer.</p>
<p>List of extremely hazardous substances that will be in use or stored in the facility. Facilities that maintain EPCRA Extremely Hazardous Substances (EHS) on-site in quantities greater than corresponding threshold planning quantities (TPQs) must cooperate in emergency plan preparation. The list of EHSs and their TPQs are in 40 CFR 355 Appendices A & B.</p>	<p>The system is designed to contain no leak-able fluids other than Novec 1230, water-glycol coolant, and refrigerant for HVAC. No other substances were identified in the "Consolidated List of Lists" provided by the EPA as relevant to this system.</p>
<p>Emergency plan and response to include: Emergency Notification, Community Right-to-Know Requirements, and Toxic Release Inventory.</p>	<p>Development of the project Emergency Plan will include Emergency Notification, fulfillment of Community Right-to-Know requirements, and a Toxic Release Inventory (as applicable), and will be completed in accordance with federal, state, and local regulations.</p> <p>AES Global Insurance Company has experience developing Emergency Response and Pre-Incident Planning initiatives, that include:</p> <ul style="list-style-type: none"> • Developing a NFPA 1660 Pre-Incident Plan (assists in timely, effective, firefighting techniques and safe response for first responders); • Developing a First Responder Mitigation Guidelines (provides awareness of hazards and mitigation protocols); • Providing Site Familiarization (provides firsthand onsite recognition and understanding of safety features); <p>and,</p>

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	<ul style="list-style-type: none"> • Providing initial training for responding fire departments and first responders. <p>Our goal is to safeguard life, reduce chance of injuries and minimize onsite property loss and spread of fire.</p>
Flooding mitigation plan.	Project design has been optimized to avoid 100-year flood depths greater than 1 foot, including a 50-foot setback, based on hydrological study. Stormwater management detention has been considered and is located to the west of the BESS area. See attached layout plan.
Lithium-Ion battery fire behavior.	Please refer to the HMA. In the event of a lithium-ion battery fire, smoke detectors throughout the enclosure signal to the fire panel and release a clean agent into a set of pipes routed over each module. Perforations in the pipes are covered with a resin, that melts under the heat of the fire, opening an orifice through which all of the clean agent can be directed into the failed cell. Numerous tests, including UL9540A demonstrated the effectiveness of this “direct injection” of fire suppressant in stopping cell-to-cell propagation of thermal runaway.
Lithium-Ion fire response and mitigation plan for the long duration of the incident.	The incident is over in a matter of minutes. In the event of an extreme failure (simultaneous failure of the suppression system during a grid outage while a UPS has failed, estimated to occur only once in the lifetime of over 5000 energy storage plants), a fire may propagate throughout an enclosure. AES conducted full-scale burn testing of energy storage enclosures identical in size to the one proposed at this plant and found that the battery fire burned for approximately 4 hours. Fire rated insulation in these enclosures should prevent any enclosure to enclosure spread, though provisions are in the AES Emergency Response Plan for fire mitigation with first responders operating at a safe distance from the burning enclosure.
Battery cells manufacturing quality control.	All battery cells are inspected during manufacturing. The plant's layered risk mitigation mechanisms are designed for the planned failure of any one battery cell. The systems in place maintain system stability and integrity in the event of a cell failure. It is an unfortunate reality of lithium-ion batteries and in order to make use of their benefits, we have taken great care to understand, quantify, and address their risks. We accept the possibility, then design and test safety measures to mitigate probability and severity of the result.
Thermal runaway causes and mitigation plan.	<p>The causes of thermal runaway in the AES energy storage enclosures are the same as other energy storage enclosures. The HMA documents the full list of potential hazards and how AES mitigates them.</p> <p>The plant's layered risk mitigation mechanisms are designed for the planned failure of any one battery cell. The systems in place maintain system stability and integrity in the event of a cell failure. The containerized design, including self-contained fire suppression that can address both non-battery electrical fires (via conventional suppressant) and battery fires via direct injection of clean agent fire suppressant into the cell on fire, would serve</p>

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	<p>to mitigate potential for thermal runaway. This solution has been tested by UL and found to fully suppress a fire internal to the battery enclosure.</p> <p>AES HMAs are based on the following template: https://www.epri.com/research/products/000000003002017136</p>
<p>Safety and reliability of energy storage systems.</p>	<p>Utility-scale battery energy storage systems are not new or untested technology. According to the U.S. Energy Information Administration, operating utility-scale battery storage will triple between now and the end of 2025 to about 30 gigawatts. There have been steady and significant advancements in materials, operations, safety and monitoring systems, and emergency response training compared to early systems built a decade ago.</p>

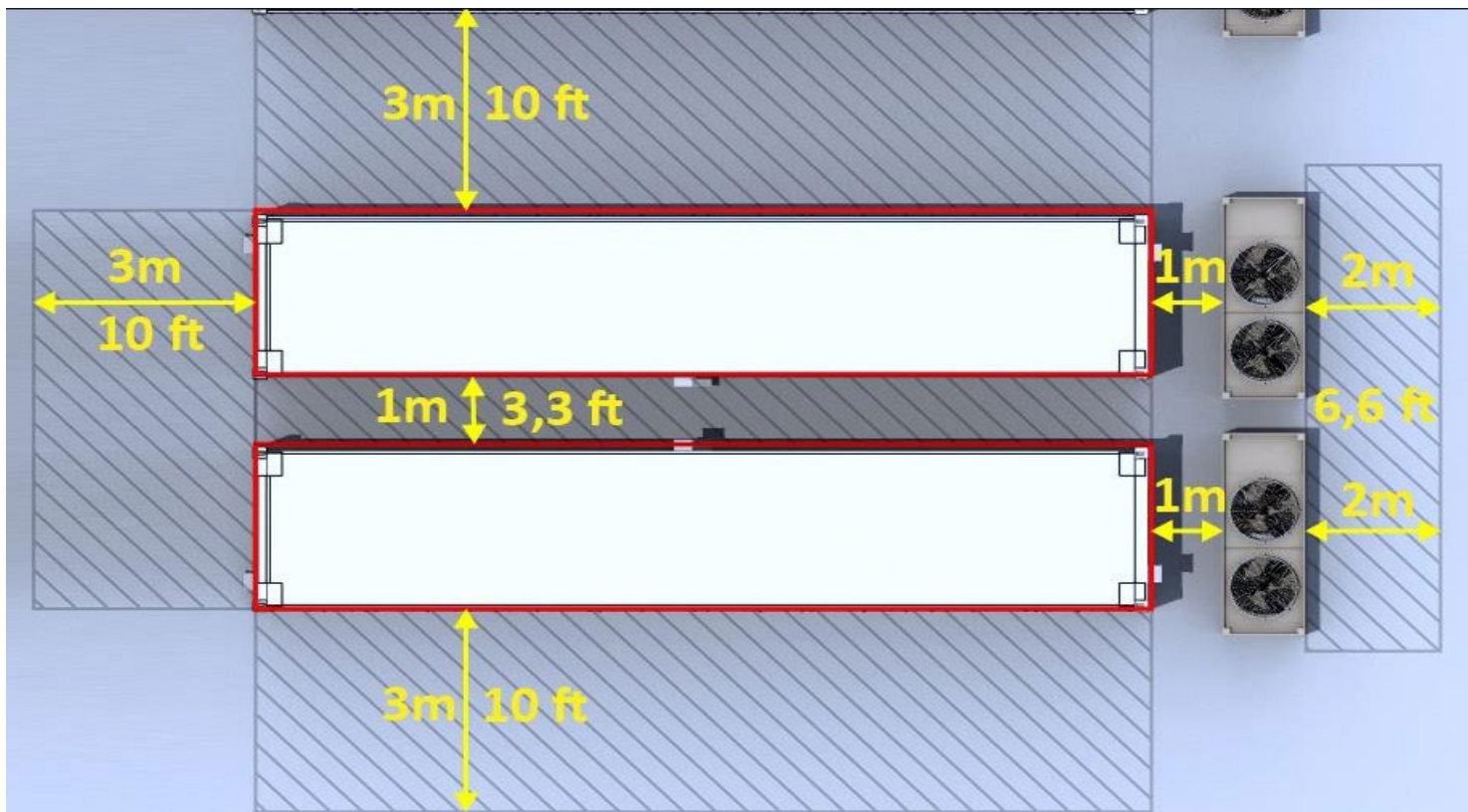
Rancho Viejo Solar Project

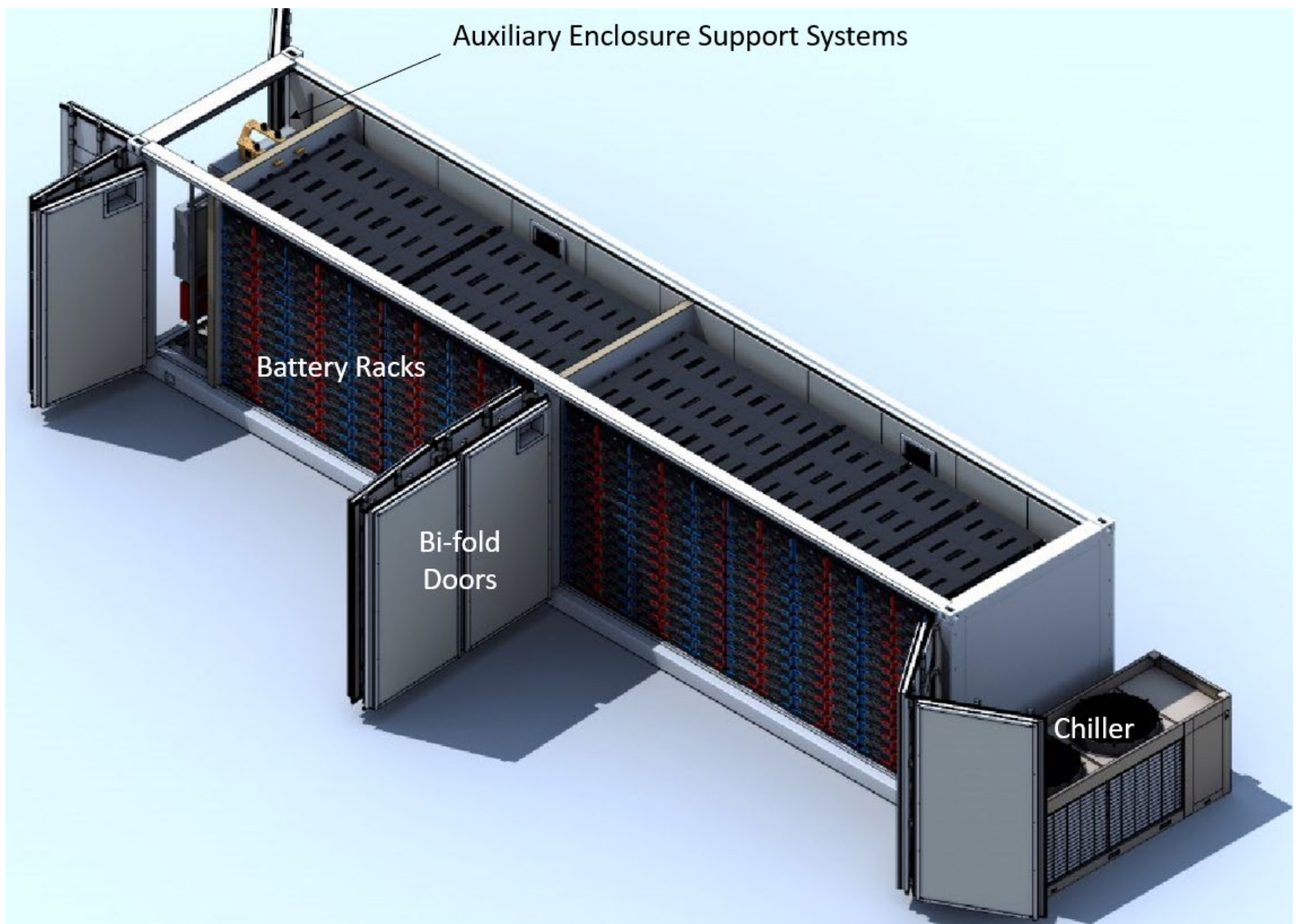


VICINITY MAP

N.T.S

	All Values Subject to Change	Units
Dimensions of BESS enclosure	40 x 8 x 9.5	ft
Chiller Dimensions (JC)	2.3 x 1.2 x 2.44	m (LxWxH)
Enclosure footprint	320	sqft
Spacing between enclosures	see below	
Door Clearance	6	ft (front battery access + 1 8' side for aux
Rated power (DC bus BESS-PCS)	Approximately 2000	kW
Rated energy (DC bus BESS-PCS)	Approximately 8000	kWh
Rated Voltage	1500	Vdc
Electrical Aux load per enclosure	~1	kW
Estimated Gross Weight	71,000	kg





Auxiliary Enclosure Support Systems

Battery Racks

Bi-fold
Doors

Chiller



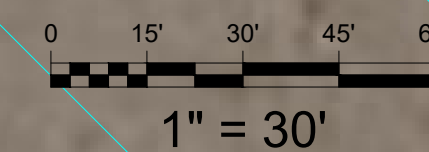
Auxiliary Enclosure Support Systems



PROJECT BOUNDARY
20' PROJECT BOUNDARY SET BACK



SUBJECT TO CHANGE



GENERAL NOTES:

- THIS DRAWING IS PRELIMINARY AND FOR ESTIMATING PURPOSES ONLY. IT IS NOT FOR CONSTRUCTION.
- QUANTITY OF PCS AND BATTERY EQUIPMENT ARE AS PER AES SIZING CALCULATIONS.
- LOCATION OF ALL EXISTING ITEMS ARE APPROXIMATE AND MUST BE VERIFIED IN THE FIELD PRIOR TO CONSTRUCTION.
- CONTAINER FOUNDATION TO ALLOW FOR 4' CLEARANCE AROUND ALL CONTAINERS AS PER AES STANDARDS.
- PCS INVERTERS ARE RATED FOR 3.607 MVA AND CONSIDERING THE ALTITUDE DERATING AS PER THE INFORMATION PROVIDED BY THE MANUFACTURER PCS INVERTERS ARE DERATED TO 3.2 MVA.
- AUXILIARY TRANSFORMER AND STAND BY GENERATOR RATING AND FOUNDATION PAD SIZES ARE PRELIMINARY AND MAY DIFFER BASED ON FINAL EQUIPMENT SELECTION.
- ALL DIMENSIONS ARE IN FEET OTHERWISE SPECIFIED.
- NAMEPLATE VALUES ARE AT BEGINNING OF LIFE.
- SERVICE & ACCESS ROADS ARE MAINTAINED AT 20' WIDE.

SHEET NOTES

◇ SITE ENTRANCE W/ 20' GATE

LEGEND:

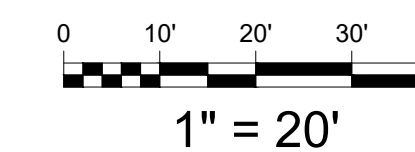
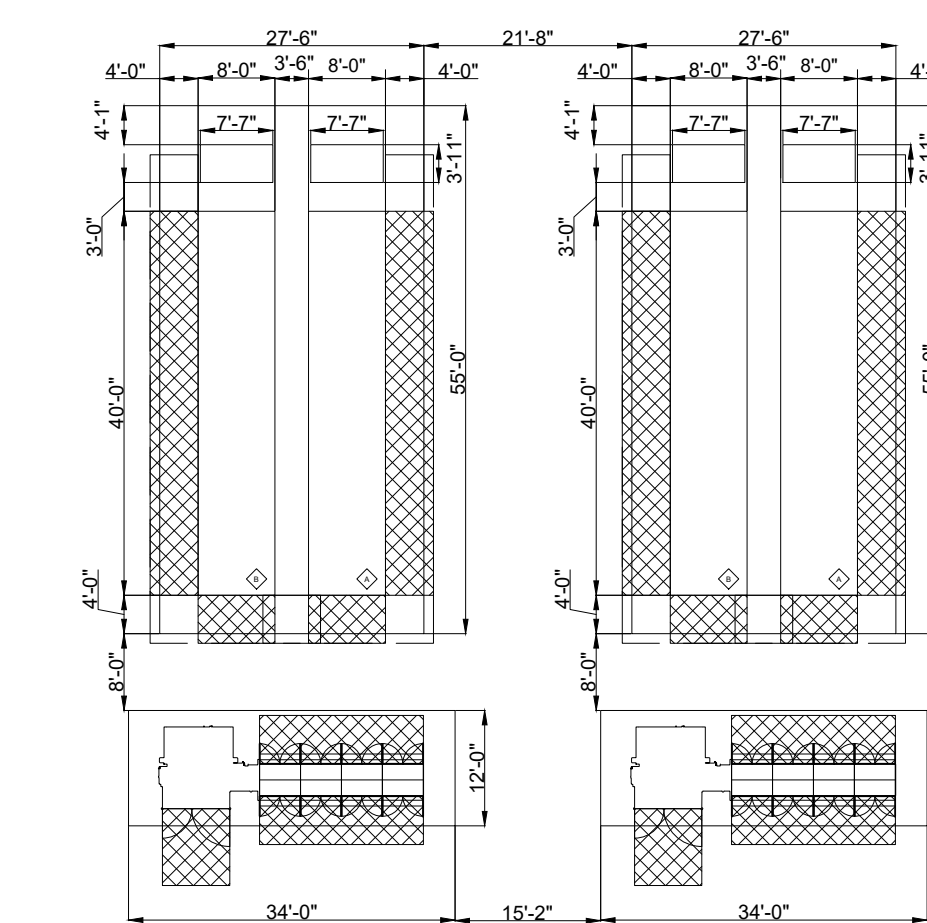
- PROJECT BOUNDARY
- PROJECT BOUNDARY - 20' SETBACK
- X FENCE
- INTERIOR ROADS
- BESS FOUNDATION
- BESS EQUIPMENT - MAJOR
- AUXILIARY TRANSFORMER WITH ATS
- ENVIRONMENTALLY SENSITIVE AREA
- ENVIRONMENTALLY SENSITIVE AREA - 100' SETBACK
- LAYDOWN AREA

SYSTEM DETAILS:

BESS CAPACITY AT POI	48 MWAC
BESS DURATION	4 HR
INSTALLED ENERGY CAPACITY BOL	277.8 MWh DC STC
INSTALLED ENERGY CAPACITY EOL	207.9 MWh DC STC
BATTERY MODULE (MANUFACTURER - MODEL)	SAMSUNG SDI-E5S
BATTERY STRING LENGTH (# OF MODULES)	12
STRINGS PER CONTAINER BOL	20
STRINGS PER CONTAINER BOL	19
STRINGS PER CONTAINER EOL	18
STRINGS PER CONTAINER EOL	20
STRINGS PER CONTAINER EOL	19
STRINGS PER CONTAINER EOL	18
TOTAL DESIGN OVERBUILT	44.6%
CONTAINER TYPE	CEN 40'
TOTAL CONTAINER COUNT BOL	38
TOTAL CONTAINER COUNT EOL	38
CONTAINER COUNT	13
CONTAINER COUNT	13
CONTAINER COUNT	12
BESS PCS COUNT: GPTECH 3MSWD3-V730	19
BESS PCS RATED AC OUTPUT POWER	3.607 MVA
BESS PCS DERATED AC OUTPUT POWER	3.210 MVA
MV AC COLLECTION SYSTEM VOLTAGE	34.5 kV
ASHRAE MIN DESIGN TEMP	-16.7 °C
ASHRAE MAX DESIGN TEMP	33.6 °C
POWER FACTOR @POI	0.95

FENCE COORDINATES

POINT	PLANE COORDINATES
F1	N=1657035.1492, E=1713479.5135
F2	N=1657035.1492, E=1714008.7756
F3	N=1656792.7069, E=1714008.7756
F4	N=1656792.7069, E=1713479.5135



2180 South 1300 East, Suite 600
Salt Lake City, UT 84106-2749
(801) 679 - 3500



5717 Legacy Dr Suite 250,
Plano, Texas 75024

PE STAMP:

30% DESIGN
NOT FOR CONSTRUCTION

KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
0	08/02/2023	ISSUED FOR 30% DESIGN
1	08/11/2023	UPDATED 30% DESIGN

PROJECT TITLE:

**RANCHO VIEJO SOLAR
UTILITY**

PROJECT LOCATION:

**SANTA FE COUNTY
NEW MEXICO
(35.5415, -106.0106)**

SHEET TITLE & DESCRIPTION:

OVERALL BESS LAYOUT

48 MWAC BESS

**PROJ
NUM:**

DES: R GOPINATH

DWN: M R ANKITH

CHK: R M VAMSEE

APV: P KRISHNA

DATE: 08/11/2023

SCALE AT 24" x 36":

AS NOTED

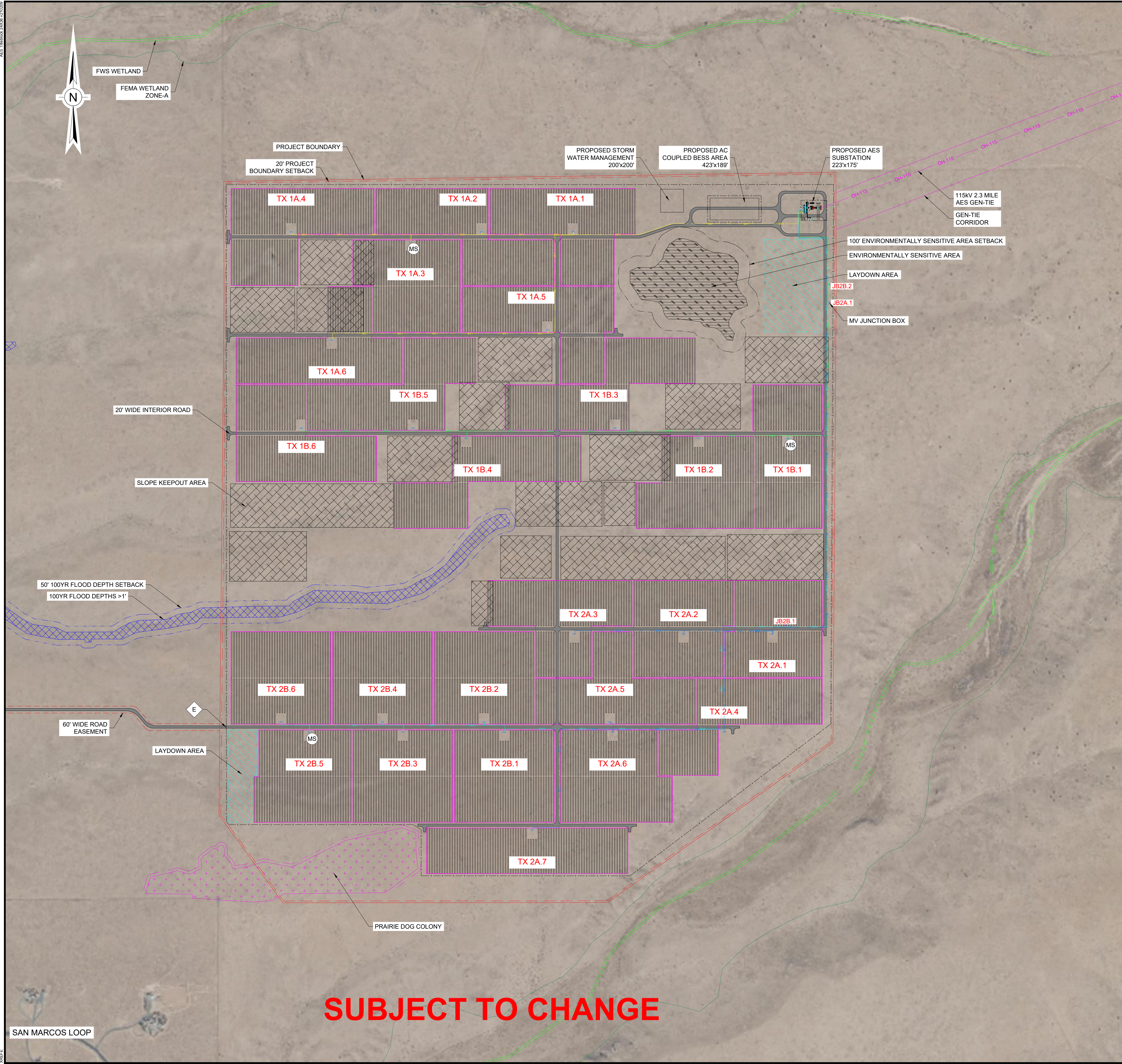
SHEET NO:

ES-E.01.01

REV:

1

AES Tracking 2428-031020
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SUBJECT TO CHANGE

SYSTEM INFORMATION	
MW-AC @ POI:	96
NAMEPLATE MVA:	110
POI VOLTAGE (KV):	115
COLLECTION SYSTEM VOLTAGE (KV):	34.5
MW-DC:	115.2
SITE DC-AC RATIO @ POI:	1.2
SITE INFORMATION	
ASHRAE STATION NAME:	SANTA FE, NM, USA
ASHRAE 0.4% DB MAX. TEMPERATURE:	33.6°C
ASHRAE ANNUAL DB MEAN MIN. TEMP.:	-16.7°C
LATITUDE:	35.5415
LONGITUDE:	-106.0106
MODULE	
MODULE MANUFACTURER:	BYD SOLAR
MODULE MODEL #:	MLTK-36
STC WATTAGE (W):	560
VOLTAGE RATING (V):	1500 (VDC)
DIMENSIONS:	2278x1134x35MM
MODULES PER STRING:	26
PV ARRAY	
MODULE QUANTITY:	205,712
TOTAL STRINGS:	7912
LOAD BREAK DISCONNECT QUANTITY:	456
PV INVERTER	
INVERTER MANUFACTURER:	SUNGROW
INVERTER MODEL #:	SG4400UD-MV-US
KVA @ 40° C:	4400
KVA @ DESIGN TEMP.:	4400
MAX. INPUT VOLTAGE (V-DC):	1500
INV QUANTITY:	25
TRACKER	
TRACKER MANUFACTURER AND MODEL:	ATI DURATRACK HZ V3
AZIMUTH (DEG):	180
CONFIGURATION:	1-HIGH PORTRAIT
ROTATION ANGLE LIMITS:	52°±
78 MODULE (3-STRING) TRACKER QUANTITY:	96
104 MODULE (4-STRING) TRACKER QUANTITY:	1906
TOTAL TRACKER QUANTITY:	2002
PITCH (FT) / GCR (%):	21.98' / 34%
MIN INTER-ROW SPACING (FT):	14.5

NOTES:

- ALL DIMENSIONS ARE IN FEET OTHERWISE SPECIFIED.
- THIS DRAWING IS PRELIMINARY AND FOR ESTIMATING PURPOSES ONLY. IT IS NOT FOR CONSTRUCTION.
- ALL SPECIFIED EQUIPMENTS ARE PRELIMINARY. FINAL EQUIPMENT SELECTION SHALL BE APPROVED BY OWNER.
- PCS SIZE CONSIDERED FOR THE LAYOUT IS 4400 KVA.
- LOCATION OF ALL EXISTING ITEMS IS APPROXIMATE AND MUST BE VERIFIED IN THE FIELD PRIOR TO CONSTRUCTION.
- 50' N/S DISTANCE HAS BEEN MAINTAINED BETWEEN TABLE TO TABLE WHERE PCS'S ARE LOCATED AND FOR OTHERS 12' HAS BEEN MAINTAINED.
- INTERIOR ROADS ARE MAINTAINED AT 20' WIDE.
- OFFSET OF 25' HAVE BEEN MAINTAINED FROM INTERIOR ROADS CENTER TO PV TRACKERS.
- OFFSET OF 16' HAVE BEEN MAINTAINED FROM FENCING TO INTERIOR ROADS CENTER.
- MINIMUM OFFSET OF 20' HAVE BEEN MAINTAINED FROM PROJECT BOUNDARY TO FENCE.
- CURRENT LAYOUT IS BASED ON THE ALTA SHARED ON 08.10.2022
- FOR DETAILS RELATED TO THE COLLECTOR SUBSTATION, SWITCHYARD AND BESS DESIGN DRAWINGS, REFER TO THE DRAWING SET AS PREPARED BY SUBSTATION CONTRACTOR.

LEGEND:

	SITE ENTRANCE W/ 20' GATE
	MET STATION
	PROJECT BOUNDARY
	PROJECT BOUNDARY - 20' SETBACK
	100YR FLOOD DEPTHS > 1'
	100YR FLOOD - 50' SETBACK
	ENVIRONMENTALLY SENSITIVE AREA
	ENVIRONMENTALLY SENSITIVE AREA - 100' SETBACK
	PRAIRIE DOG COLONY
	PRAIRIE DOG COLONY - 25' SETBACK
	SLOPE KEEPOUT AREA
	115KV OVERHEAD TRANSMISSION LINE
	FWS WETLAND
	FEMA WETLAND (ZONE-A)
	LAYDOWN AREA
	FENCE
	INTERIOR ROADS
	XFMR SKID
	MEDIUM VOLTAGE AC, CIRCUIT #1
	MEDIUM VOLTAGE AC, CIRCUIT #2
	MEDIUM VOLTAGE AC, CIRCUIT #3
	MEDIUM VOLTAGE AC, CIRCUIT #4
	XFMR SKID GROUPING
	MV JUNCTION BOX
	PV PANELS 1P 4 STRING
	PV PANELS 1P 3 STRING

PE STAMP:

30% DESIGN
 NOT FOR CONSTRUCTION

KEY PLAN:

REVISIONS:		
NO.	DATE	DESCRIPTION
0	08/02/2023	ISSUED FOR 30% DESIGN
1	08/11/2023	UPDATED 30% DESIGN

PROJECT TITLE:		
RANCHO VIEJO SOLAR UTILITY		

PROJECT LOCATION:	
SANTA FE COUNTY, NEW MEXICO (35.5415, -106.0106)	

SHEET TITLE & DESCRIPTION:	
SOLAR FIELD LAYOUT PLAN	

96 MWAC/115.2 MWDC	
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PROJ. NUM:	PC BALAJI
DES:	L RAMA KRISHNA
CHK:	M AJAY
APV:	P KRISHNA
DATE:	08/11/2023
SCALE AT 24" x 36"	
0 200' 400' 600' 800' 1" = 400'	
SHEET NO:	PV-E.04.01
REV:	1