Project Summary for the Barstow Solar Project

SUMMARY

Minneola Solar I, LLC ("Applicant") proposes to construct and operate the Barstow Solar Project ("Solar Project") on approximately 1,200-acres to produce approximately 600,000 megawatt-hours (MWhs) of renewable energy annually. The proposed solar project would be approximately 200 Megawatt alternating current (MWac) photovoltaic (PV) solar energy facility with associated on-site substation, inverters, fencing, roads, and supervisory control and data acquisition (SCADA) system. The proposed Solar Project also includes a 220-kilovolt (kV) overhead generation tie line (gen-tie line), which would extend approximately 6 miles west to Coolwater Substation.

LOCATION

The proposed Solar Project site is located 15 miles east of Barstow; north of Santa Fe Street; and south of Valley Center Road, in unincorporated San Bernardino County (County). The gen-tie line would extend west from the proposed Solar Project site to the SCE, Coolwater Substation, west of Hidden Springs Road.

The proposed Solar Project would consist of three non-contiguous areas: the western-most area will be referred to as Array 1, the central area, Array 2, and the eastern-most area, Array 3. The three component areas of the proposed Solar Project are detailed below.

Array 1

Array 1 is located within Section 19 of Township 9 North, Range 2 East, San Bernardino and Base Meridian (SBBM) (see Figure 2 Vicinity Map). More specifically, Array 1 is located immediately north of Santa Fe Street and encompasses the north-south Powerline Road and Hidden Springs Road (eastern-most boundary of the Unit). Array 1 includes 16 parcels of private land and one parcel of one parcel of public lands administered by the Bureau of Land Management (BLM) in the south half of the northeast quarter of Section 19.

The County of San Bernardino 2007 General Plan identifies portions of Array 1/Section 19 as Regional Industrial (IR), with 9 parcels in the southeast corner of Array 1 as Rural Living (RL)-5 (County of San Bernardino 2007a) (see Table 1, Proposed Solar and Energy Storage Project Existing Land Use and Land Use Zoning Districts). Commercial solar development is allowed in IR and RL (County of San Bernardino 2013) (see Figure 2, Vicinity Map).

Array 2

Array 2 is located within Section 22 of Township 9 North, Range 2 East, SBBM (see Figure 2). More specifically, Array 2 is located immediately north of Chloride Road, between Minneola Road and Wildhorse Road, and south of Hill View Road. Array 2 includes 13 parcels of private land.

The County of San Bernardino 2007 General Plan identifies Array 2/Section 22 as Rural Living (RL)-5) (County of San Bernardino 2007a) (see Table 1, Proposed Solar and Energy Storage Project Existing Land Use and Land Use Zoning Districts). Commercial solar development is allowed in RL (County of San Bernardino 2013) (see Figure 2, Vicinity Map).

Array3

Array 3 is located within Section 22 and 27 of Township 9 North, Range 2 East, SBBM and Section 30 and 31 of Township 9 North, Range 9 East, SBBM (see Figure 2). More specifically, Array 3 is located immediately north of National Trails Highway, between Wildhorse Road (western boundary) and Malibu Avenue (eastern boundary), and mostly south of Cottonwood Road, with the exception of two parcels. Array3 includes 44 parcels of private land.

The County of San Bernardino 2007 General Plan identifies Array 3 in Section 22 as Rural Living (RL)-5), in Section 27 as Rural Living (RL), and in Section 30 and 31 as Agriculture (AG) and Rural Living (RL)-5 (County of San Bernardino 2007a, 2007b). Commercial solar development is allowed in IR and RL (County of San Bernardino 2013) (see Table 1, Proposed Solar and Energy Storage Project Existing Land Use and Land Use Zoning Districts).

Development of the Project would require a Conditional Use Permit approved by the County of San Bernardino (County) in accordance with the County's Renewable Energy and Conservation Element (RECE) (County of San Bernardino 2017a)(see Figure 2, Vicinity Map).

PROPOSED SOLAR PROJECT SETTING

The location of the proposed Solar Project has been selected because of its proximity to the existing solar and transmission facilities on land that was previously disturbed by agriculture, the site has access to existing roads, and the site is in an area with excellent solar irradiance. The proposed Solar Project site is essentially flat with only an approximately 2 to 15 percent gradient overall. The site generally slopes from west to east with elevations of approximately 1,890 to 1,850 feet above mean sea level. Locally, the proposed Solar Project would be accessed via Minneola Road and an internally constructed road system. The Solar Project area would include approximately 6-mile gen-tie overhead transmission line from the proposed Solar Project's on-site substation to SCE's Coolwater Substation.

According to the USGS National Cooperative Soil Survey, Array 1 consists mostly of Cajon Sand (0%–2% slopes), with a mix of Cajon Gravelly Sand (2%–15% slopes) and Kimberlina Loamy Fine Sand (0%–2% slopes). Array 2 consists mostly of Cajon Loamy Sand (0%–2% slopes), Halloran Sandy Loam, and Halloran-Duneland Complex (0%–15% slopes), with smaller amounts of Cajon Sand (0%–2%–9% slopes), Kimberlina Loamy Fine Sand (0%–2% slopes) and Water. Array 3 consists mostly of Halloran-Duneland Complex (0%–15% slopes), with a mix of Kimberlina Loamy Fine Sand (0%–2% slopes), Halloran Sandy Loam, Dune Land, Cajon Gravelly Sand (2%–15% slopes), and Cajon Sand (0%–2% slopes) (USDA 2017).

The proposed Solar Project site is comprised of fallow agricultural fields, disturbed lands with some limited scrub vegetation in isolated patches. The gen-tie line would traverse approximately 6 miles following the existing Santa Fe Street.

The proposed Solar Project site is located within the Lower Mojave River Valley Groundwater Basin within the South Lahontan Hydrologic Region (United States Geological Survey 2017).

Based on a review of the United States Geological Survey (USGS) National Hydrography Dataset (NHD), no NHD blueline streams or wetlands are mapped within the proposed project area, however numerous NHD blueline stream or wetlands are designated immediately south of the project area, south of I-40. Portions of the project site are within a California Department of Water Resources (DWR) Awareness floodplain designation, an area that identifies a 100-year flood hazard areas using approximate assessment procedures and is shown as flood-prone areas without specific depths and other flood hazard data (California Department of Water Resources 2017). Additionally, the project is located within Flood Zone D, where flood hazards are undetermined in this area but possible. Because of past projects permitted in the area, it is foreseeable that a drainage study may be required for the project prior to issuance of a grading permit. The Mojave River located north of the project site is the only 100-year FEMA flood zone.

Existing Land Uses and Land Use Zoning Districts on and adjacent to the proposed Solar Project site are listed in Table 1.

Table 1
Proposed Solar and Energy Storage Project Existing Land Use and Land Use Zoning Districts

Location	Existing Land Use	Land Use Zoning District
Proposed Solar Site	Agriculture, rural living, rural living-5 acre minimum	AG (Agriculture) RL (Rural Living) RL-5 (Rural Living-5 Acre Minimum)
Gen-Tie	Rural living	RL (Rural Living)

North	Agriculture, resource conservation	AG (Agriculture) RC (Resource Conservation)
South	Resource conservation	RC (Resource Conservation)
East	Agriculture, rural living	AG (Agriculture) RL (Rural Living)
West	Agriculture, institutional	AG (Agriculture) IN (Institutional)

Source: San Bernardino County Land Use Services Department, 2017.

PROJECT CHARACTERISTICS

The proposed Solar Project consists of the following components:

- Solar System
- On-site Substation
- Generation Tie Line
- Ancillary Facilities

Solar System

The proposed Solar Project would be a 200 Megawatt MWac solar power generating installation. The 1,200-acre site would house all structures including solar panels, tracking/support structures, inverters, SCADA, and interconnection facilities (on-site substation) all of which would be enclosed by a perimeter security fence approximately 7-feet high.

Solar energy would be captured by an array of approximately 700,000 PV panels mounted to a single-axis tracking system. The high-efficiency commercially available PV panels convert incoming sunlight to direct current (DC) electrical energy. The panels are arranged in series to effectively increase output voltage to approximately 1,500 volts. These series chains of panels are called "strings" in industry terms, and provide the basic building block of power conversion in the solar array. The strings are combined in the solar field via an above- or below-ground DC collection system, and then further ganged together at the inverter stations, where the energy is converted to alternating current (AC) and then stepped to an intermediate voltage, typically 34.5kV. The chosen PV panel would either be crystalline silicon, poly crystalline silicon or thin film and would be well suited for the desert environment due to their durability and reliability.

The tracking system would be supported, when practical, by driven piers (piles) directly embedded into the ground and would be parallel to the ground. The system would rotate slowly throughout the day at a range of +/- 60 degrees facing east to west in order to stay perpendicular to the incoming solar rays so that production can be optimized. Each tracker would hold approximately

80-90 panels (depending on final configuration) and at its highest rotated edge would have a maximum height of approximately fifteen feet above grade, depending on the dimensions of the chosen panel. The minimum clearance from the lower edge of the panel to ground level is approximately 24 inches, pending final design.

The inverter stations would be up to 10 feet in height and perform three critical functions for the solar plant: (1) collect DC power in a central location, (2) convert the DC power into AC power, and, (3) convert low-voltage AC power to medium-voltage AC power. The inverter stations are typically open-air and well suited for the desert environments. The stations consist of DC collection equipment, utility-scale inverters, and a low-to medium-voltage transformer. The output power from the inverter stations is then fed to the AC collection system via an above- or below-ground collection system. This AC collection system would deliver the electricity to the on-site substation, where the voltage would be stepped up to the interconnection voltage.

On-site Substation

The proposed solar project substation is the termination point of the collection system of 34.5-kV AC electricity. The output of the entire field is passed through a final interconnection step-up transformer to convert it to the grid tie voltage at 220-kV. Additionally, the proposed solar project substation would host the grid intertie safety equipment and switches required to interconnect to the high voltage transmission system. The open air substation would likely be constructed on the western border of the solar array nearest the SCE Coolwater Substation. The footprint of the on-site substation would be approximately 300-feet by 300-feet. The project substation would consist of components up to 75 feet in height and feeders would be overhead lines constructed with 45 foot and 125 foot tall poles for the single and/or double circuits respectively.

Generation Tie Line

The energy is transported from the on-site substation to SCE's Coolwater Substation via a gen-tie transmission line. The gen-tie line would extend approximately 6 miles to the west, from the facility's on-site substation following an existing roadway alignment to SCE's Coolwater Substation property. The 220-kV gen-tie transmission line would consist of approximately 35 structures, up to 125 foot tall concrete or steel poles, spaced on an average of approximately every 500 to 1,200 feet. The poles would carry one conductor per phase, and would allow the line to maintain a minimum 30-foot vertical clearance to ground. The number of and height of the poles as well as the type of conductor will be finalized during detailed design. The right-of-way is expected to consist of a width of up to 150 feet for the gen-tie line with access to the transmission line facilitated by existing roads.

Ancillary Facilities

Signage

A small proposed solar project sign at the site main entry would be installed. The sign would be no larger than 4 feet by 8 feet, and read "Barstow Solar Project XX Minneola Road". In addition, required safety signs would be installed identifying high voltage within the facility on the fence near the entrance and at the gates off of Minneola Road as well as information for emergency services.

Perimeter Fence

The perimeter of the proposed Solar Project site would be enclosed by a 7 foot chain link fence likely topped with a foot of 3-strand barbed wire. Access into the project site would be provided through a drive through gate. The main purpose of the fence is to prevent unauthorized access to the site.

Lighting

Low-elevation controlled security lighting would be installed at primary access gates, the on-site substation. The lighting is only switched on when personnel enter the area (either motion-sensor or manual activation (switch)), unless otherwise required by SCE. All safety and emergency services signs would be lighted when the lights are on. The lighting would be shielded so that the light is directed downwards. Electrical power to supply the access gate and lighting would be obtained from SCE. Lighting would be only in areas where it is required for safety, security, or operations. All lighting would be directed on-site and would include shielding as necessary to minimize illumination of the night sky or potential impacts to surrounding viewers.

CONSTRUCTION

Schedule

This proposed Solar Project is anticipated to be built over an approximately 24 month timeframe from the onset of perimeter fence installation through testing and commissioning of the facility. It is anticipated that the work would be completed in eight or ten hour shifts, with a total of five shifts per week (Monday – Friday). Overtime and weekend work would be used only as necessary to meet scheduled milestones or accelerate schedule and will comply with all applicable California labor laws. Primary construction activities and durations are presented in Table 2 below. The activities shown in Table 2 would be overlapping in certain phases, and all are expected to occur within the estimated 24 month construction duration.

Activity	Duration	Equipment	Daily Workers
Perimeter Fence Installation	4 Months	Skid Loader with Auger Attachment	Maximum = 300 Average = 100 to 150
		Pick-up Truck	
		Flatbed Truck	
Site Preparation and Clearing/Grading	3 Months	Water Truck-3 axles	
		Grader	
		Bulldozer	
		Scraper	
		10-Ton Roller	
		Sheepsfoot Roller	
		Tractor (with Mower Attachment)	
Demolition of existing structures	4 Weeks	Backhoe	
		Bulldozer	
		5 Cubic Yard Dump Truck	
		Front End Loader	
Underground Work (Trenching)	12 Months	Excavator	
		Sheepsfoot Roller	
		Water Truck-3 Axles	
		5kW Generator	
		Aussie Padder (Screening Machine)	
		4x4 Forklift	
System Installation	18 Months	4x4 Forklift	
		Small Crane (80 Ton)	
		ATV Vehicle	
		Pile Driver	
		Pick-up Truck	
		5kW Generator	
Gentie Installation	5 Month	Line Truck (with Spool Trailer)	
		Boom Truck (with Bucket)	
		80 ton Crane	
Testing & Commissioning	6 Months	Pick-up Truck	
Site Clean-Up & Restoration	2 Month	Grader	
		Skid Loader	

Traffic

Peak daily construction employees would be approximately 300 with an average of 100 to 150 workers daily. As shown in Table 3 below, in addition to the 300 maximum daily workers traveling to the site there would be up to 30 truck trips per day at peak construction activity (trenching and system installation phases overlap). A total of up to 400 trips per day are anticipated during peak construction activities.

Table 3
Proposed Solar Project Construction Estimated Truck Activity

Truck Type	Average On-Site	Gross Weight (pounds (lbs))	Trips/Day	Duration
8,000 gallon water truck - will stay on site	6	80,000 lbs. loaded		16 months
20 Cubic Yard Dump/bottom dump Truck	2	80,000 lbs. loaded	8	4 months
Pick-up Trucks	25	8,000 lbs.	4	20 months
On-site	3	15,000 lbs.	2	16 Months
On-site	1	54,000 lbs.	2	6 months
Boom Truck with Bucket Component delivery trucks	2	42,000 lbs.	2	6 months
Utility Line Service Truck	3	30,000 lbs.	2	6 months

Delivery of material and supplies would reach the site via on-road truck delivery via Minneola Road. The majority of the truck deliveries would be for the PV system installation, as well as any aggregate material that may be required for road base. It is estimated that a total of up to 1,600 truck trips are required to complete the Solar Project, with the aggregate trucks accounting for approximately 7 percent of this number. It is estimated that there would be an average of 100 truck deliveries per month (about 5 per work day) with a peak number of truck deliveries of 250 deliveries per month (about 10 per work day) plus four other miscellaneous deliveries equates to a peak truck trip of 14 per work day. These truck trips would be intentionally spread out throughout the construction day to optimize construction efficiency as is practical by scheduling deliveries at predetermined times.

The heaviest delivery loads to the site would also consist of the tracker structures, rock truck deliveries, and the delivery of the generator step up (GSU). These loads would typically be limited to total weight of 50,000 pounds (lbs), with a cargo load of approximately 20 tons or 40,000 lbs of rock or tracker structures. The GSU could be up to 70,000 lbs. Typically, the rock is delivered in "bottom dump trucks" or "transfer trucks" with six axles and the tracker structures would be delivered on traditional flatbed trucks with a minimum of five axles. Low bed transport trucks would transport the construction equipment to the site as needed. The size of the low bed truck (axles for weight distribution) would depend on the equipment transported.

CONSTRUCTION ACTIVITIES

Because the proposed Solar Project site is fairly level, grading is expected to be minor in most instances. However, grading would occur throughout the site especially for the construction of

roads, on-site substation, and inverter pads. This would be accomplished with scrapers, motor graders, water trucks, dozers, and compaction equipment. The PV modules would be off-loaded and installed using small cranes, boom trucks, forklifts, rubber tired loaders, rubber tired backhoes, and other small to medium sized construction equipment as needed. Construction equipment would be delivered to the site on low bed trucks unless the equipment can be driven to the site (for example the boom trucks). It is estimated that there would be approximately 42 pieces of construction equipment on site each month (See Table 3 above).

Vegetation on the site would be modified only where necessary. Vegetation would be removed where roads would be constructed, where fill would be placed from grading operations, where structures are to be constructed, and where gen-tie pole and tracker foundations would be installed (if necessary). At locations where gen-tie pole and tracker foundations would be installed, minor cuts may be required where the foundations will be driven. Minor earth work would also occur to install access roads and gen-tie line maintenance roads. The surface of the roads would be at grade in order to allow any water to sheet flow across the site as it currently does. Throughout the remainder of the developed area on the site, the vegetation root mass would generally be left in place to help maintain existing drainage patterns on a micro level, and to assist in erosion control. During construction of the facility, it is expected that most of the vegetation would be cut, trimmed, or flattened as necessary, but otherwise undisturbed so that reestablishment is possible.

WATER USE

Water consumption during construction is estimated to be approximately 200 acre-feet (AF) for dust suppression and earthwork over an approximately 24 month period. Panel rinsing is expected to be conducted up to four times annually as performance testing and weather and site conditions dictate. Construction as well as operational water for panel rinsing would be provided by on-site ground water through an improved existing well or a new well permitted and drilled (if necessary). An on-site diesel generator may be used to power pumps for well water use during construction. In addition, during construction pumped directly into 2,000-4,000 gallon tanked water trucks or water may be stored in estimated 6 overhead temporary approximately 12,000 gallon water storage tower/tanks (up to 16 feet tall), to assist in the availability of water for trucks and expedient filling thereof. The existing wells on-site that would not be used for the proposed Solar Project would be capped in place in accordance with County requirements.

ON-SITE ELECTRICAL DISTRIBUTION

Existing electrical power distribution lines on site that serve existing facilities including well pumps would be relocated to allow for the Solar Project development and would provide backup power to the solar facilities and to the groundwater well pump(s), where possible.

OPERATION AND MAINTENANCE

The O&M building will be located adjacent to the project substation. It will be powered by electricity from the solar arrays or by existing electrical power distribution lines. Outside lighting will be downward facing and shielded, in conformance with County requirements. The approximately 20,000-square-foot O&M building would be constructed as part of the solar generation facility. The O&M building would have a maximum height of 25 feet and would include office space, storage, a conference room, receiving docks and an open hanger area (85 percent of the space). Outdoor storage for road maintenance materials, non-operational equipment and maintenance vehicles would be located in the fenced laydown yard adjacent to the O&M building.

In addition, the operations would be monitored remotely via the Supervisory Control And Data Acquisition (SCADA) system and periodic inspections and maintenance activities would occur. During Solar Project operations, solar panel washing is expected to occur one to six times per year and general labor (up to 10 individuals) may assist in the panel cleaning. Panel washing for a Solar Project of this size would require 21 days to complete per wash cycle. Water consumption is expected to be around 0.015 gallons per panel, based on other similar operations. Given a 200MWac plant, with an average of 2 cleaning cycles per year, the annual water usage is expected to consume up to approximately 0.2 AF of water. While Applicant only expects to actually wash the PV panels twice per year, the panels may need to be washed more frequently (up to six times per year) based on site conditions. Conditions that may necessitate increased wash requirements include unusual weather occurrences, forest fires, local air pollutants, and other similar conditions. Therefore, the proposed Solar Project is requesting the use of up to 0.6 AF per year for the explicit use of washing panels. This amount is in addition to the amount of water necessary for the operations, fire suppression, and site maintenance which is a small amount of groundwater (i.e., approximately 2.0 AF) to be used for this purpose. In the event that electrical power distribution cannot be delivered to the groundwater pump, a generator would be located adjacent to the well pump to provide power.

DECOMMISSIONING

The PV system would be recycled when the project's life is over. Most parts of the proposed system are recyclable. Panels typically consist of silicon, glass, and a metal frame. Tracking systems (not counting the motors and control systems) typically consist of aluminum and steel. Site structures would include steel or wood and concrete. All of these materials can be recycled. Concrete from deconstruction is to be recycled. Local recyclers are available. Metal and scrap equipment and parts that do not have free flowing oil may be sent for salvage.

Fuel, hydraulic fluids and oils would be transferred directly to a tanker truck from the respective tanks and vessels. Storage tanks/vessels would be rinsed and transferred to tanker trucks. Other items that are not feasible to remove at the point of generation, such as smaller containers lubricants, paints, thinners, solvents, cleaners, batteries and sealants would be kept in a locked utility building with integral secondary containment that meets Certified Unified Program Agencies (CUPA) and Resource Conservation and Recovery Act (RCRA) requirements for hazardous waste storage until removal for proper disposal and recycling. It is anticipated that all oils would be recycled at an appropriate facility. Site personnel involved in handling these materials would be trained to properly handle them. Containers utilized to store hazardous materials would be inspected regularly for any signs of failure or leakage. Additional procedures would be specified in the Hazardous Materials Business Plan (HMBP) closure plan submitted to the CUPA. Transportation of the removed hazardous materials would comply with regulations for transporting hazardous materials, including those set by the Department of Transportation (DOT), EPA, California Department of Toxic Substances Control (DTSC), California Highway Patrol (CHP), and California State Fire Marshal.

Upon removal of the proposed Solar Project components the site would be left as disturbed dirt generally consistent with the existing (pre-solar development) conditions.

REFERENCES

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Figure 1 Vicinity Map

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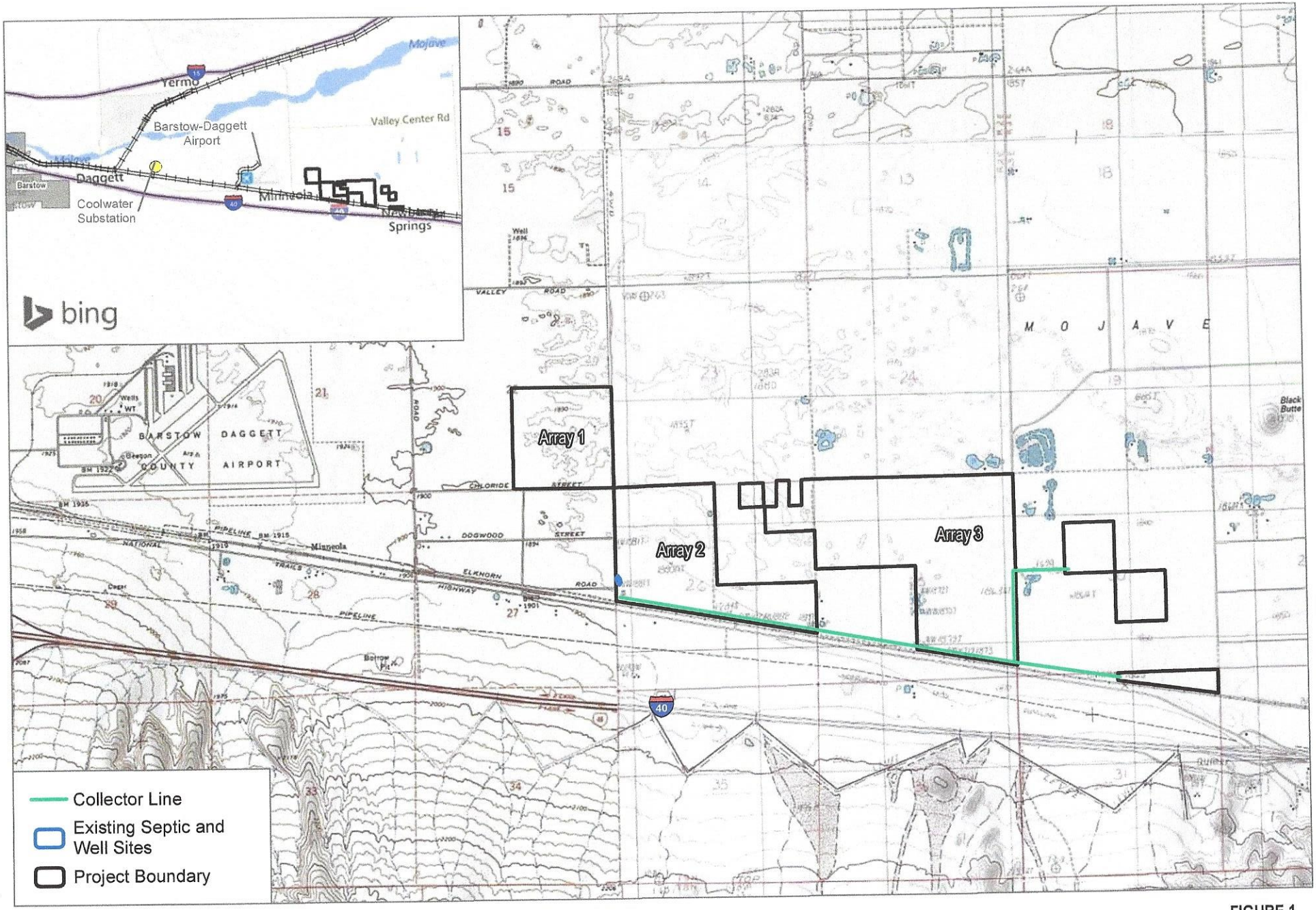

SOURCE: USGS 7.5-Minute Series Minneola and Newberry Springs Quadrangles

DUDEK

0 1,650 3,300 Feet

FIGURE 1

Project Location

Barstow Solar Project