Sienna Solar and Storage Project

Water Supply Assessment

prepared for

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Acronyms and Abbreviations

AF	acre-feet
AFY	acre-feet per year
BAP	Base Annual Production
CEQA	California Environmental Quality Act
DWR	California Department of Water Resources
ESS	Energy Storage System
FPA	Free Production Allowance
gpm	gallons per minute
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
GWMP	Groundwater Management Plan
kV	kilovolt
PSY	Production Safe Yield
PV	photovoltaic
MW	megawatts
MV	medium voltage
mg/L	milligrams per liter
MWA	Mojave Water Agency
NMP	Nutrient Management Plan
O&M	operations and maintenance
PV	photovoltaic
RO	reverse osmosis
RWMG	Regional Water Management Group
SCE	Southern California Edison
SB	Senate Bill
SGMA	Sustainable Groundwater Management Act
SMP	Salt Management Plan
TDS	Total Dissolved Solids
USGS	United States Geological Survey
UWMP	Urban Water Management Plan
WSA	Water Supply Assessment

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1 Introduction

In 2001, California adopted Senate Bill (SB) 610 and SB 221, amending the California Water Code to require that certain types of development projects provide detailed assessments of water supply availability and reliability to city and county decision-makers prior to project approval. These Water Supply Assessments (WSAs) identify water supply for an identified project over a 20-year projection under varying climactic (drought) conditions. The primary purpose of these requirements is to promote collaborative planning between local water supply and land use decisions.

SB 610 was not originally clear as to whether renewable energy developments are subject to SB 610 and require the preparation of a WSA. SB 267 was signed into law on October 8, 2011, amending California's Water Law to revise the definition of "project" specified in SB 610. Under SB 267, wind and photovoltaic (PV) projects that consumed less than 75 acre-feet per year (AFY) of water were not considered to be a "project" under SB 610; subsequently, a WSA would not be required for this type of project. The renewable energy exclusions provided by SB 267 expired in January 2017. Since the language of SB 610 remains unclear as to whether renewable energy projects meet the definition of a "project," this WSA takes a conservative approach and considers renewable energy projects to be subject to the requirements of SB 610.

Water requirements associated with the Sienna Solar and Storage Project ("project" or "proposed project") are described in Section 2.3, *Project Water Demands*. The Project is located in the Lucerne Valley Subbasin in the Este Subarea of the Mojave Basin Area. Water supply for the project would either be sourced from the underlying groundwater basin, using existing water extraction rights associated with the subject properties, or it would be purchased from a local retail supplier and trucked to the site. Most local retail providers in the project area do not meet the Urban Water Management Planning Act's minimum threshold statutory criteria to be required to prepare an Urban Water Management Plan (UWMP). The largest retail purveyors near the Project are the Jubilee Mutual Water Company, and the Golden State Water Company, both of which overlie the Lucerne Valley Subbasin, as with the proposed project, and are assessed herein.

In accordance with California Water Code, a WSA must examine the availability of an identified water supply under normal-year (no drought), single-dry-year (limited drought), and multiple-dry-year (extended drought) conditions, over a 20-year projection. The WSA must account for the projected water demand of the project in addition to other existing and planned future uses of the identified water supply, including agricultural and manufacturing uses, to the extent information is available. A common lack of data for groundwater usage and replenishment rates often makes it difficult to estimate baseline conditions regarding water supply availability; therefore, where data is not available to make quantitative estimates of water supply, reasonable assumptions are made based on available information and data. In the interest of effective planning, this WSA examines the water supply up to the year 2055 to encompass the entire lifespan of the proposed project.

Figure 1 shows the regional location of the proposed Project, Figure 2 shows the 27 parcels that comprise the site, and Figure 3 shows the boundaries of the Lucerne Valley Subbasin within the Este Subarea of the Mojave Basin Area. The steps followed to ensure compliance of this WSA with California Water Code are described in Attachment A to this WSA.

Figure 1 Regional Location and Project Site

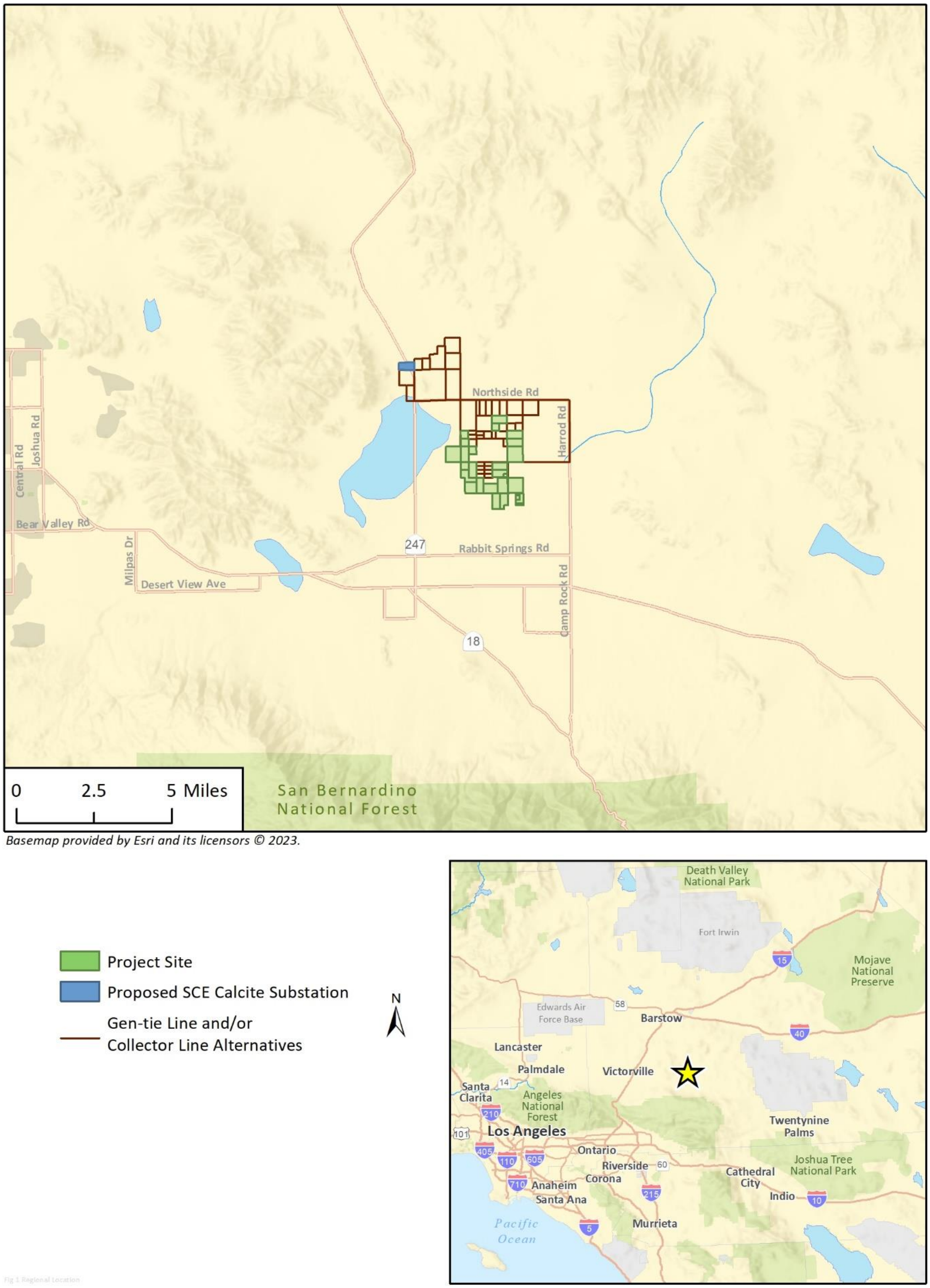

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Figure 2 Project Location with Assesor Parcel Numbers

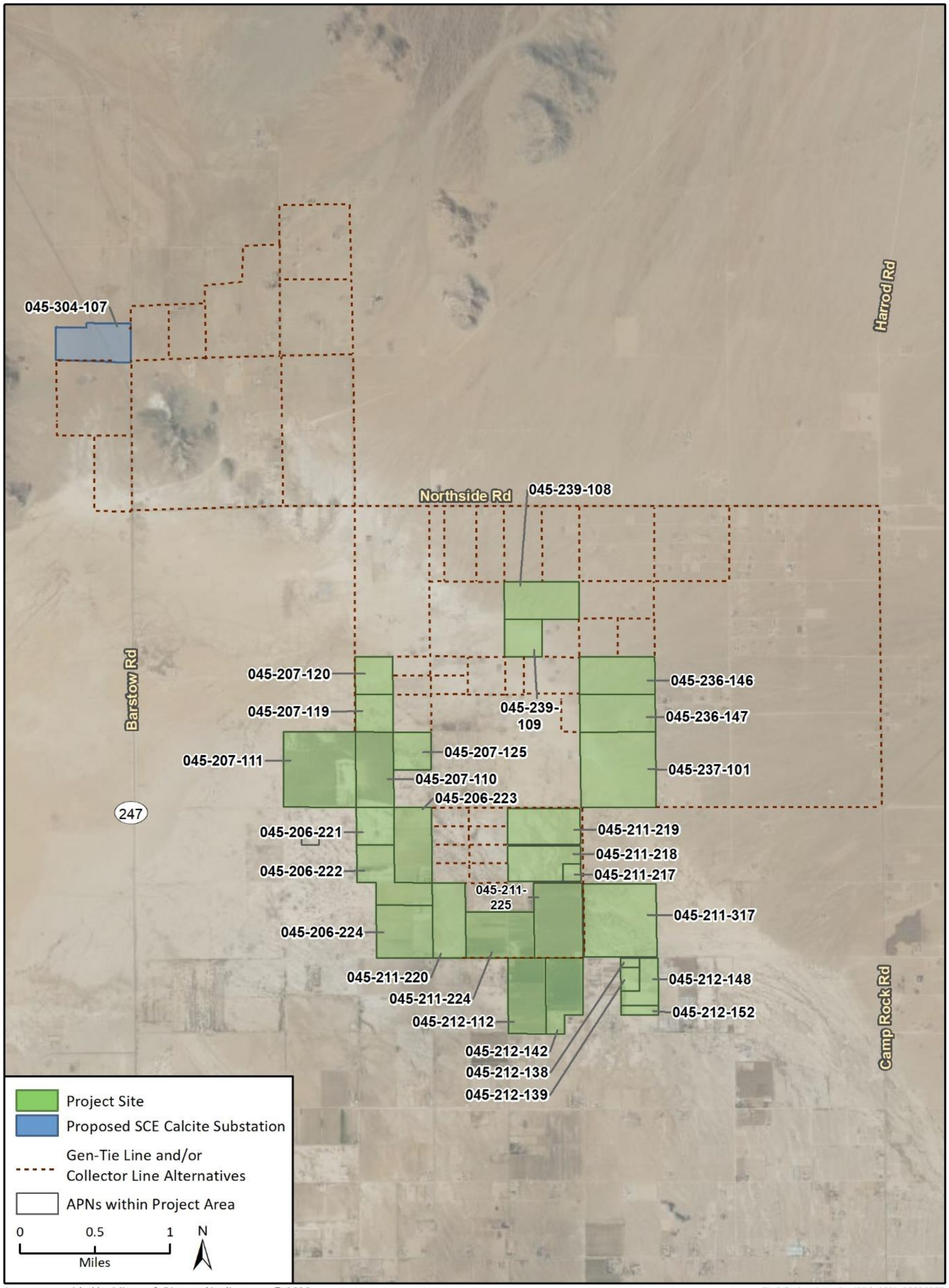

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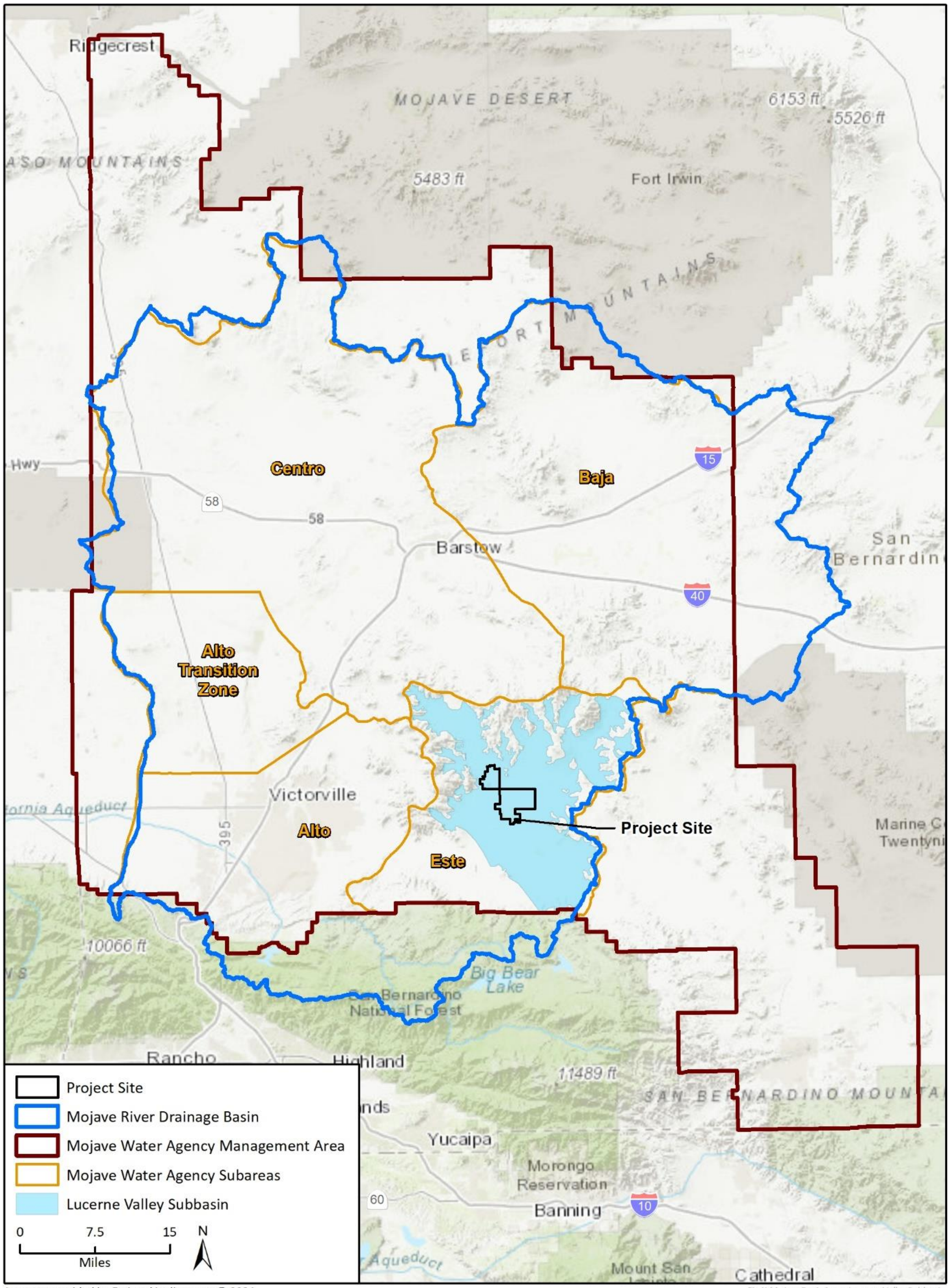
Fig 2 Project Location With APNs 20230303

Figure 3 Groundwater Resources and Management Area



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Additional data provided by USGS and Mojave Water Agency, 2021.

2 Project and Property Description

2.1 Location and Setting

The proposed Project area encompasses 1,854.7 acres, with an additional 77 acres dedicated to a substation, for a total Project footprint of 1,931.7 acres, located in the southwestern portion of Mojave Desert in unincorporated San Bernardino County, California. The Project is within the historic bed of Lucerne Dry Lake and along its eastern and northern margins. The Project is 35 miles south of the City of Barstow, 45 miles northwest of the town of Yucca Valley, 15 miles southeast of the town of Apple Valley, and 20 miles north of the City of Big Bear Lake. Barstow Road would provide primary access to the Project. Land uses in the area are primarily farmland, open space, and transportation corridors, with some rural residential and recreational uses consisting primarily of open space enjoyment and off highway vehicle (OHV) activities. Table 1 lists the Assessor Parcel Number (APN) and associated acreage of each parcel within the Project, as shown on Figure 2; these are used to inform the discussion of water supply allocations associated with the Mojave Area Basin Adjudication Judgement, which governs groundwater use in the Project area.

Table 1 Parcels Within the Project Area

APN	Acreage (per Assessor's Map)	APN	Acreage (per Assessor's Map)
45207120	40.201988	45211217	8.8374063
45207119	40.21116	45211317	151.40044
45207111	154.92994	45212112	80.724638
45207125	40.206093	45212142	70.847518
45207110	80.411658	45212138	5.0164927
45206223	80.447237	45212139	12.554045
45206221	40.207435	45212148	33.286326
45206222	76.437885	45212152	10.188996
45206224	84.470432	45237101	161.27385
45211220	70.208881	45236147	80.707295
45211224	89.9045	45236146	80.667639
45211225	103.44547	45239109	39.915267
45211219	73.471912	45239108	80.023993
45211218	64.725183		

2.2 Description of Project

The proposed project is a utility-scale solar energy generation and battery energy storage system and a parcel subdivision. The solar facility would generate up to 525 megawatts (MW) of photovoltaic (PV) power on 1,854.7 acres, with an additional 77 acres dedicated to a substation, for a total Project footprint of 1,931.7 acres. The Project is located in unincorporated San Bernardino County in the Lucerne Valley area (see Figure 2). Power generated by the Project would be delivered from the site via 230-kilovolt (kV) overhead and/or underground generation-interconnect ("gen-tie") lines to a new Southern California Edison (SCE) 230-kV substation. The Project applicant would secure Conditional Use Permits from San Bernardino County, along with permits from other relevant agencies as required by law.

Primary components of the proposed Project are detailed in the following sections, and include: PV modules, energy storage system, substation, gen-tie lines, water storage tank, water quality treatment system, operations and maintenance building, site security and fencing, and site lighting. As discussed in the analysis provided in Section 2.3, *Project Water Demands*, water demand for the project has been estimated based upon the water demands of other similarly scaled and located projects, as well as publicly available information and guidance developed by the USGS and Sandia National Laboratories (SNL) (SNL 2013).

2.2.1 Solar Photovoltaic System

The Project would use solar PV panels or modules on mounting frameworks to convert sunlight directly into electricity. The solar panel array would be arranged in groups called blocks, with inverter stations generally located centrally within the blocks. The solar blocks would produce direct electrical current (DC), which is converted to alternating current (AC) at the inverter stations.

During operation and maintenance of the PV panels, they would be washed with water on an as-needed basis. The frequency of panel washing activities will primarily depend on weather conditions and the associated rate of dust accumulation. Cleaning the PV panels of accumulated dust and debris is necessary to maintain operational efficiency of the PV panels. In addition, it is necessary that the water used to wash PV panels does not have high concentrations of total dissolved solids (TDS), which can cling to the PV panels and reduce operational efficiency; therefore, to be conservative for the purposes of this WSA, it is assumed the Project would include a water quality treatment system to reduce TDS concentrations in wash water. Please see Section 2.3 for discussion of water demands for solar panel washing and water quality treatment.

2.2.2 Project Substation and Gen-Ties

Energy output from the inverter stations would be transferred via electrical conduits and electrical conductor wires to an on-site substation. Substations typically include a small control building (roughly 500 square feet), comprised of either prefabricated concrete or steel. The control building would house voltage switch gear and metering equipment, a station supply transformer, and a control technology room for a main computer, distribution euipment, and intrusion detection system. From the Project substation, power would be transmitted to SCE's planned Calcite Substation via up to 230-kV overhead and/or underground gen-tie lines.

No water demand is associated with operation of the substation and gen-tie lines.

2.2.3 Energy Storage

An energy storage system (ESS) may be installed as part of the Project to capture energy produced at one time for use at a later time. Energy storage involves converting energy from forms that are difficult to store to forms that may be stored more conveniently or economically storable forms. The ESS would be located at or near the substation on site, or at the inverter station. The ESS would consist of modular and scalable battery packs and battery control systems that conform to national safety standards. ESS modules typically consist of ISO-standard containers housed in pad- or post-mounted, stackable metal structures; ESS modules may alternatively be housed in a dedicated building(s). The actual dimensions and number of ESS modules and structures required for the Project will be determined by the applicant, supplier, and configuration chosen, as well as on- off-taker/power purchase agreement requirements, and County building standards.

No water demand is associated with operation of the ESS.

2.2.4 Operations and Maintenance Building

The proposed Project components would include an operations and maintenance (O&M) building, which is assumed to include an office space, repair and storage area, control room, and restroom facilities. Roads, driveways, and parking lot entrances would be constructed in accordance with San Bernardino standards and California Accessibility Regulations. For the purposes of this WSA, and based on the size of similar buildings at other utility-scale solar installations, the O&M building is estimated to cover approximately 2,000 square feet.

Water demands associated with the O&M building are described in Section 2.3.2

2.2.5 Reverse Osmosis/Deionization Water Treatment System

As discussed in Section 4.2, Lucerne Valley Subbasin groundwater is characterized by high concentrations of total dissolved solids (TDS). High concentrations of TDS in wash water can leave behind a residue that decreases panel efficiency; therefore, water for washing the PV panels must not have high TDS concentrations. Because local groundwater may be used to meet the Project's water demands, and the local groundwater is known to have high TDS concentrations, for the purposes of this WSA it is assumed that water would need to be treated prior to application on the solar panels. It is further assumed that a combined reverse osmosis (RO) and deionization (DI) system would be used to treat the water used for panel washing.

Water demands for the panel washing are discussed in Section 2.3.2.

2.2.6 Water Storage Tanks

It is assumed for the purposes of this WSA that a water supply for emergency fire suppression would be stored on-site in an above-ground water storage tank with a capacity of up to 80,000 gallons (0.25 acre-foot); the amount of water stored on-site for fire suppression may be greater if required by local fire safety requirements. The water storage tank would be placed on site, near the O&M building. The storage tank would have the appropriate fire department connections so it could be used for fire suppression on an as-needed emergency basis.

Water demand associated with the Project's water storage tank is discussed in Section 2.3.2.

2.2.7 Construction

The duration of Project construction is currently undetermined. An analysis of utility-scale solar projects of similar size and in similar conditions, both operating, under construction, and planned, reveals that construction periods generally range between nine and 18 months, with projects over twice as large as the proposed Project rarely exceeding two years for construction (Solar Energy Industries Association 2021). Construction of the proposed Project would occur over approximately 12 to 24 months.

For the purposes of this WSA, construction water demands are analyzed for a 12-month construction period. The project's monthly water demands would be higher for a 12-month construction period than a 24-month construction period, because the project's total construction water demands would remain the same regardless of the duration of construction. Therefore, assuming a 12-month construction period provides a more conservative analysis than would be reflected by distributing water demands over a 24-month construction period.

Construction activities would include site preparation, installation of interconnection facilities and ESS, cable installation, pile and skid installation, tracker and module installation, and site cleanup. All construction staging areas would be located within the development footprint of the solar facility.

Water demands associated with construction are described in Section 2.3.1, and detailed in Table 2.

2.2.8 Operation and Maintenance

The proposed Project is anticipated to have an operating life of 30 years, which is 10 years longer than the 20-year projection required by California Water Code (as amended by SB 610) to be considered in a WSA. However, for the purposes of full disclosure and to provide a conservative analysis, this WSA presents all anticipated water demands of the Project over the entirety of its anticipated lifespan, including for the final decommissioning or repowering phase.

During the O&M phase, the proposed Project would passively generate power during daylight hours over seven days per week, 365 days per year. The proposed Project facilities would be tested, maintained, and regularly inspected and repaired as needed. The ESS would store and dispatch power during both daylight and non-daylight hours as required by grid operators year-round.

Up to 15 O&M staff may be on-site at a time for as-needed facility maintenance and repairs. As many as four times per year, up to 12 workers could be on site to support annual module washing activities. Solar module washing would include the use of a water truck and high-pressure washer to clean dust and debris accumulated on the solar modules. In addition, it is conservatively assumed that an on-site water treatment system would be implemented to treat locally-sourced groundwater for panel-washing purposes during the O&M period.

Water demands associated with Project O&M are described in Section 2.3.2.

2.2.9 Decommissioning or Repowering

Once the functional operating life of the Project is over, the facility would either be decommissioned to remove Project components and restore the site, or it would be repowered to continue providing solar energy generation and storage. Project decommissioning would occur in accordance with the expiration of the Conditional Use Permit and would involve the removal of above-grade facilities, buried electrical conduit, and all concrete foundations in accordance with a project-specific Decommissioning Plan. Equipment would be repurposed off-site, recycled, or disposed of in a landfill as appropriate. It is anticipated that repowering would also require ground-disturbing activities to replace or upgrade Project components that were not otherwise replaced or upgraded as part of regular O&M for the Project.

For the purposes of this WSA, it is assumed that water demands associated with decommissioning or repowering the Project would be comparable in duration and scale to water demands associated with the construction period, and would primarily be related to dust suppression and soil compaction. As discussed above in Section 2.2.7, although construction activities could occur for up to 24 months, for the purposes of this WSA, water demands are analyzed for a 12-month construction period as a more conservative approach. Because decommissioning or repowering would be comparable in duration and scale to the construction period, it is assumed that this phase would occur over 12 months, to provide a more conservative analysis for this WSA.

2.3 Project Water Demands

The proposed Project would require a temporary water supply during the construction and decommissioning/repowering phases, as well as a long-term water supply over the Project's 30-year operational lifetime. As discussed above, the construction and decommissioning/repowering phases would both occur over 12 to 24 months and, for the purposes of this WSA, analysis of water demands assumes a 12-month construction period because this provides a more conservative analysis that distributing water demands over a 24-month period. If sufficient water is determined to be available under the most conservative approach (12 months) then sufficient water will also be available under longer construction and decommissioning/repowering periods (up to 24 months).

For the purposes of this WSA, it is assumed the Project's water supply would be obtained from on-or off-site groundwater wells in the Lucerne Valley Subbasin of the Mojave Basin Area, and/or it would be purchased from local water purveyor and trucked to the Project. As described in Section 4.3, any water pumped from the local groundwater basin underlying the Project area would be regulated by Mojave Water Agency in its role as Watermaster for the Mojave Basin Area.

Table 2 details the estimated water demands associated with each Project phase, including construction, operation, and decommissioning. Conservative assumptions were developed and applied to each of the Project's water-demanding activities to inform the estimates provided in Table 2; these assumptions are detailed following the table below.

Table 2 Project Water Demands

Project Phase (Duration of Phase)	Annual Demand (acre-feet/year)	Total Demand (acre-feet)
Construction[1]		
Dust Suppression	225	225.0
Total Construction	**225**	**225.0**
Operation and Maintenance (30 years)[2]		
Panel Washing[3]	25	750.0
Water Treatment Brine[4]	25	750.0
Fire Suppression[5]	0.25	7.5
O&M Building[6]	0.11	3.3
Total O&M	**50.36**	**1,510.8**
Decommissioning[7]		
Dust Suppression	225	225.0
Total Decommissioning	**225**	**225.0**
TOTAL DEMAND	–	**1,960.8**
Amortized Demand[8]	**61.28**	

[1] The construction and decommissioning periods would each occur over 12 to 24 months. The total water demand for each phase is assumed to be 225 acre-feet regardless of the duration of the respective Project phase; as such, a longer duration would result in a lower monthly demand. For the purposes of this WSA, water demands are analyzed for a 12-month period for each phase, as this provides a more conservative analysis than assuming a 24-month duration, which would reduce monthly water demands by approximately half (i.e., if sufficient water would be available for a 12-month period, then sufficient water would also be available for a 24-month period because the longer the phase duration, the lower the monthly water demands will be.

[2] The O&M period is assumed to be 30 years, which is 10 years longer than the 20-year projection required by California Water Code (as amended by SB 610) to be considered in a WSA. However, for the purposes of full disclosure and to provide a conservative analysis, this table presents all anticipated water demands of the Project over the entirety of its anticipated operational lifespan of 30 years. During the O&M period, the activities requiring water supply would include washing the solar panels (including accounting for the water in the brine waste stream produced from water treatment), for emergency fire suppression water, and for uses in the O&M building.

[3] This analysis assumes that solar PV panel washing requires approximately 0.05 AFY of water per MW of the Project, based on other utility-scale solar PV projects in California (SNL 2013). The Project is anticipated to produce up to 500 MW. Therefore, operational requirements for solar PV panel washing would be approximately 25 AFY. Please see Section 2.3.2.

[4] Water treatment brine consists of the waste product from the Project's assumed water treatment system. This analysis conservatively assumes the recovery rate of the water treatment system will be approximately 50 percent, meaning that for every gallon of clean water produced, one gallon of waste product (concentrated brine) would be produced, such that two gallons of raw water are required to produce one gallon of treated water (and one gallon of water treatment brine). This is likely an over-estimation; please see Section 2.3.2.

[5] This analysis assumes that approximately 0.25 acre-feet of water would be stored on-site and designated for emergency fire suppression use only. In addition, this analysis conservatively assumes that the fire suppression water would be entirely replenished each year; this is likely an over-estimation, as emergency fire suppression activities are unlikely to occur on an annual basis.

[6] This analysis assumes the Project would include one O&M building encompassing approximately 2,000 square feet, and further assumes that an adjusted water demand factor for commercial land uses of approximately 2,000 gallons per day per acre, or 0.046 gallons per day per square foot (Hesperia 2008) is appropriate for the Project's O&M building. Please see Section 2.3.2.

[7] Decommissioning activities for the proposed Project are not specifically known at this time; therefore, in order to provide a conservative analysis that accounts for all Project phases, this analysis assumes that the duration of decommissioning activities would be the same as the duration of construction activities. As discussed above (see footnote no. 1), Project construction would occur over 12 to 24 months; for the purposes of this WSA, a 12-month construction period is assumed because this provides a more conservative analysis of water supply availability than a 24-month period, which would reduce monthly water demands by approximately half.

[8] The amortized demand of 61.28 AFY is the Project's total estimated water demand (1,960.8 acre-feet) averaged over the cumulative duration of all Project phases (32 years).

AFY = acre-feet per year

As shown in Table 2, the Project's amortized annual water demand is 61.28 AFY, which accounts for the total construction (one year), operation and maintenance (30 years), and decommissioning (one year) period water demands of 1,960.8 acre-feet divided by the Project's cumulative total duration of 32 years. The amortized water demand is considered a useful tool in assessing long-term water supply availability. For the purposes of this WSA, water supply availability is considered for each phase's anticipated annual demand, as well as the Project's cumulative total demand. Water demands associated with each Project component are discussed in detail in Sections 2.2.1 through 2.2.9. Water supplies that would be used to meet the Project's water demands are discussed in Section 4, *Water Supply Analysis.*

2.3.1 Construction Water Assumptions

As shown in Table 2, construction of the proposed Project would require approximately 225 acre-feet of water for dust suppression over the assumed 12-month construction period. The following additional assumptions were developed to inform the analysis provided herein:

- Water supply for Project construction would either be produced from the local Lucerne Valley Subbasin, or it would be purchased from a local purveyor and trucked to the Project area; as discussed in Section 5, this analysis assumes the Jubilee Mutual Water Company and the Golden State Water Company could potentially serve the Project
- If construction water is pumped from an off-site groundwater well, such as those owned by Jubilee Mutual Water Company or Golden State Water Company, it is assumed such a well would source water from the Lucerne Valley Subbasin
- Drinking water for construction personnel would be provided as bottled water, and would be delivered to the Project area via truck
- Restroom facilities would be provided as portable units to be serviced by licensed providers, and would not require an on-site water source
- Construction water uses would not require an on-site water quality treatment system, as high TDS concentrations in the local groundwater do not adversely affect the water's effectiveness in use for on-site dust suppression
- Construction water demands do not include water for concrete production, because it is assumed that concrete for Project features such as but not limited to the footings for solar PV modules would be purchased from a local retailer that would provide pre-mixed concrete, and the retailer would therefore be responsible for ensuring the water supply availability for production of their product

2.3.2 Operational Water Assumptions

During the Project's 30-year lifetime, water demands would be associated with annual washing of the solar PV panels to maintain efficiency, potential wastewater associated with water treatment by an RO/DI system, emergency fire suppression water (stored on-site), and potential operation of the Project's O&M building. For the purposes of this WSA, additional assumptions were developed to provide a conservative analysis respective to the long-term water supply availability and reliability for the Project. Based upon these additional assumptions, which are detailed below and in the Table 2 notes, this WSA assesses an operational water demand of up to 50.36 AFY for each year the Project is operational.

Panel Washing

To maintain energy production efficiency of the PV solar panels, they would be washed with water once per year to clean accumulated dust from the panel surfaces. This requires the wash water to have low concentrations of TDS so that salts in the wash water are not deposited on the panel surfaces, which would decrease efficiency of the panels. It is assumed the Project's water supply would be sourced from the local groundwater, or it would be purchased from a local purveyor and trucked to the site. As discussed in Section 2.2.5, the Lucerne Valley Subbasin has elevated TDS concentrations, and it is therefore assumed that a combined RO/DI system would be installed on-site and used to treat the Project's water supply and reduce TDS concentration prior to use as panel washing water.

Industrial RO systems typically run between 50 and 85 percent recovery, depending on the feed water characteristics and other design considerations (PureTec Industrial Water 2019). Recovery is the amount of water permeated per unit time, typically measured in gallons per minute (gpm) and expressed as a percentage of the source water flow rate. In other words, an 85 percent recovery rate means that 85 percent of the amount of water fed into a system is produced as treated water, and 15 percent is produced as concentrate for disposal. Source water that has higher concentrations of water quality constituents results in lower recovery rates from a RO/DI system (PurTec 2019). Because water from the Lucerne Valley Subbasin is known to have high concentrations of TDS, it is conservatively assumed the RO recovery rate for the Project would be at the lowest level of approximately 50 percent. As such, for every 100 gallons of source water that enters the proposed RO/DI system, 50 gallons would be produced as clean wash water, and 50 gallons would be produced as concentrate for disposal. This is reflected in the estimates provided in Table 2.

The solar PV panel washing analysis relies on an assumed water demand rate of 0.05 AFY of water per MW, based on other utility-scale solar PV projects in California (SNL 2013). As discussed in Section 2.2, *Description of Project*, the Project is anticipated to produce up to 500 MW. Therefore, operational requirements for solar PV panel washing would be approximately 25 AFY. In addition, based on the conservatively assumed 50 percent recovery rate of the RO/DI water treatment system, the Project's operational water demand has been expanded to account for this, such that the total water demand associated with panel washing would be approximately 50 AFY, which includes 25 AFY for the wash water plus 25 AFY for wastewater produced by a potential RO/DI system[1].

Fire Suppression

It is assumed that a water supply for emergency fire suppression would be stored in the Project area throughout the O&M period. The San Bernardino County Fire Protection District may recommend as a condition of approval of the Project that a supply of emergency fire suppression water is stored on the Project area for as needed use. Other recent solar energy developments were reviewed to determine that approximately 29 gallons/acre is a typical quantity of fire suppression water stored on-site for emergency purposes. Accordingly, this factor was applied to the Project's proposed 1,931.7 acres of development area, for an estimated total of 56,019 gallons of water for emergency fire suppression. The Project's fire suppression water would be contained in an on-site storage tank sized for up to 80,000 gallons of water, or approximately 0.25 acre-feet. This size is slightly larger than the Project's required tank size for emergency fire suppression, allowing for the storage of

[1] Assuming a 50 percent recovery rate for water treatment, 50 acre-feet of raw water would need to enter the treatment system, so that 25 acre-feet (50 percent of 50 acre-feet) of clean (treated) water will be produced for use in panel washing operations.

excess water not used during a given calendar year and ensuring that sufficient water remains in storage on site to respond to emergencies as needed.

It is unlikely that O&M of the Project would require use of the full 0.25 acre-feet of stored fire suppression water every year; however, in the interest of providing a conservative analysis for this WSA, it is assumed that the 0.25 acre-feet of water would be replaced every year. Excess water may be used for dust suppression as needed.

O&M Building

The Project may include one O&M building which is assumed to encompass approximately 2,000 square feet. Hesperia Water District, a nearby water district in San Bernardino County, identifies an adjusted water demand factor for commercial land uses of approximately 2,000 gallons per day per acre, or 0.046 gallons per day per square foot (Hesperia 2008). Using this adjusted water demand factor, commercial land uses totaling 2,000 square feet in size would require approximately 92 gallons per day, or approximately 0.11 AFY. To provide a conservative analysis for this WSA, the Project's O&M building is considered a commercial land use and would require 0.11 AFY to support operations. It is assumed this water supply would be stored on-site and replenished annually. During Project operation, sanitary waste produced at the O&M building would be held in a tank system and regularly removed and transported via truck to an approved off-site disposal facility, such that the O&M building would not include a septic system and leach field.

2.3.3 Decommissioning Water Assumptions

For the purposes of quantifying total water demand of the proposed Project, it is assumed the Project's potential decommissioning or repowering phase would be comparable to the Project's construction period, with a duration of 12 months and a water demand of 225 acre-feet.

3 Senate Bill 610 Applicability

This regulatory setting discussion is specific to the assessment of water supply availability, as required by SB 610, which became effective in 2002 and amended California Water Code to require detailed analysis of water supply availability for certain types of development projects. The primary purpose of SB 610 is to improve the linkage between water and land use planning by ensuring greater communication between water providers and local planning agencies and guaranteeing land use decisions for certain large development projects are fully informed as to whether sufficient water supplies are available to meet Project demands. SB 610 requires the preparation of a WSA for a project that is subject to CEQA and meets certain requirements, each of which is discussed below.

California Water Code, as amended by SB 610, requires a WSA address the following questions:

- Is there a public water system that will service the proposed project? (Section 3.3)
- Is there a current Urban Water Management Plan that accounts for the project demand? (Section 3.4)
- Is groundwater a component of the supplies for the project? (Section 3.5)
- Are there sufficient supplies to serve the project over the next twenty years? (Section 3.6)

The primary question to be answered in a WSA is:

> Will the total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection meet the projected water demands of the proposed project, in addition to existing and planned future uses of the identified water supplies, including agricultural and manufacturing uses?

The following sections address the SB 610 WSA questions as they relate to the Project.

3.1 Is the Proposed Project Subject to CEQA?

California Water Code Section 10910(a) states any city or county that determines a project, as defined in Section 10912, is subject to CEQA must prepare a WSA. Projects requiring an issuance of a discretionary permit by a public agency, projects undertaken by a public agency, and projects funded by a public agency are subject to CEQA.

The proposed Project requires issuance of discretionary permits, consisting of a Conditional Use Permit from San Bernardino County. Therefore, the Project is subject to CEQA.

3.2 Is the Proposed Project a "Project" Under SB 610?

California Water Code, as amended by SB 610, states any proposed action that meets the definition of "project" under SB 610 is required to prepare a WSA to demonstrate whether sufficient water supplies are available to meet requirements of the Project under normal and drought conditions. Water Code Section 10912 defines a "project" as any one of six different development types with certain water use requirements. Each identified development type and associated water requirements is addressed below.

3.2.1 Residential Development

A proposed residential development of more than 500 dwelling units is defined as a “project” under SB 610.

The Project is not a residential development.

3.2.2 Shopping Center or Business Establishment

A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space is defined as a “project” under SB 610.

The Project is not a shopping center or business establishment.

3.2.3 Commercial Office Building

A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space is defined as a “project” under SB 610.

The Project is not a commercial office building.

3.2.4 Hotel or Motel

A proposed hotel or motel, or both, having more than 500 rooms is defined as a “project” under SB-610.

The Project is not a hotel or motel.

3.2.5 Industrial, Manufacturing, or Processing Plant or Industrial Park

A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area is defined as a “project” under SB 610.

The Project is not a manufacturing plant, processing plant, or industrial park. However, the Project is an industrial facility occupying more than 40 acres. As such, this analysis conservatively determined the Project to be considered a “project” under Water Code Section 10912. Therefore, this WSA has been prepared to satisfy the requirements of SB 610.

3.3 Is There a Public Water System that Will Serve the Proposed Project?

California Water Code Section 10912 defines a “public water system” as a system that has 3,000 or more service connections and provides piped water to the public for human consumption.

Furthermore, California Water Code Section 10910 (b) states:

> The city or county, at the time that it determines whether an environmental impact report, a negative declaration, or a mitigated negative declaration is required for any project subject to the California Environmental Quality Act pursuant to Section 21080.1 of the Public Resources Code , shall identify any water system whose service area includes the project site and any water system adjacent to the project site that is, or may become as a result of supplying water

> to the project identified pursuant to this subdivision, a public water system, as defined in Section 10912 , that may supply water for the project. If the city or county is not able to identify any public water system that may supply water for the project, the city or county shall prepare the water assessment required by this part after consulting with any entity serving domestic water supplies whose service area includes the project site, the local agency formation commission, and any public water system adjacent to the project site.

Water for the proposed Project would either be sourced from locally produced groundwater in the Lucerne Valley Subbasin, or it would be purchased from a local water purveyor and trucked to the Project area. There are no water purveyors meeting the Urban Water Management Planning Act definition of a "public water system" that would serve the Project.

3.4 Is There a Current UWMP that Accounts for the Project Demand?

California's urban water suppliers prepare UWMPs to support long-term resource planning and ensure adequate water supplies. Every urban water supplier that either delivers more than 3,000 AFY of water annually or serves more than 3,000 connections is required to assess the reliability of its water sources over a 20-year period under normal, single-dry, and multiple-dry year scenarios. UWMPs must be updated and submitted to the California Department of Water Resources (DWR) every five years for review and approval (DWR 2016). As stated above, there is not a public water system in the Project area that would provide a water service connection to the Project. However, the Mojave Water Agency, which is a regional water wholesaler and State Water Project (SWP) contractor, has prepared an UWMP for the entire Mojave Basin Area, which does encompass the proposed Project area (MWA 2020a). The Mojave Water Agency's UWMP does not specifically analyze the proposed Project; however, it does analyze water supply availability and reliability in the Project area, and is therefore incorporated by reference to this WSA. As discussed in the analysis provided in Sections 4 and 5, the Mojave Water Agency's UWMP describes that excess water is available for use in the Este Subarea of the Mojave Basin Area, and the UWMP includes projections of how water demand is anticipated to increase over time throughout its service area.

3.5 Is Groundwater a Component of the Supplies for the Project?

The Project's water demands may be met in part or in full by groundwater produced from the underlying Lucerne Valley Subbasin of the Este Subarea of the Mojave Basin Area.

3.6 Are There Sufficient Supplies to Serve the Project Over the Next Twenty Years?

The sufficiency of water supply availability for the Project is assessed in Section 5, *Water Supply Analysis*. The information and analysis provided in this WSA support the conclusion that there are sufficient water supplies available to meet the needs of the Project. Conclusions associated with the sufficiency of available water supplies are discussed in Section 6, *Conclusions.*

4 Water Supply Analysis

As shown on Figure 3, the Project overlies the Lucerne Valley Subbasin of the Este (East) Subarea within the Mojave Basin Area, which is managed by the Mojave Water Agency, a wholesale water agency in San Bernardino County. Figure 3 also indicates the boundaries of the Mojave River Drainage Basin; this area refers to the surface drainage area associated with the Mojave River, which is interrelated with the underlying groundwater resources, which have been adjudicated for management purposes, and to facilitate the management of sustainable groundwater conditions. Mojave Water Agency is a SWP contractor and Watermaster for the Mojave Basin Area Adjudication Judgement; Section 4.1.2 provides further discussion of the Adjudication Judgement and the Mojave Water Agency's role as Watermaster. There are numerous individual private water users in the Mojave Basin Area, consisting of individual farms, ranches, homes, and some industrial uses. The Mojave Basin Area, Lucerne Valley Subbasin, and Mojave Water Agency are described below, to provide a background of the region's water supply sources.

4.1 Mojave Basin Area

4.1.1 Basin Description and Hydrology

The MWA service area overlies all or a portion of 36 groundwater basins and subbasins as defined by DWR Bulletin 118.28, covering approximately 4,900 square miles. Collectively, these basins and subbasins are broadly grouped into two larger hydrogeologic distinct areas–the South Lahontan Hydrologic Region and the Colorado River Hydrologic Region. Groundwater basins along the Mojave River and adjacent areas are referred to as the Mojave River Groundwater Basin and are commonly referred to as the Mojave Basin Area. Remaining basins in the southeastern Mojave Region are generally referred to as the Morongo Basin/Johnson Valley Area or "Morongo Area," with the exception of the Lucerne Valley. The Lucerne Valley subbasin is divided along the Helendale Fault with the southwest portion in the Mojave River Groundwater Basin and the northeast portion in the Morongo Area. Surface water drainage of Lucerne Valley is in the Colorado River Hydrologic Region but is not included in with the "Morongo Basin Area," isolating this area due to the hydrogeologic conditions. (MWA 2014; MWA 2020a)

The Mojave River is the largest river in the Mojave Basin Area, formed by the confluence of the West Fork of the Mojave River and Deep Creek. These streams originate in the northwestern San Bernardino Mountains. The Mojave Basin Area is essentially a closed basin meaning that very limited amounts of groundwater enter or exit the basin. However, within the basin, groundwater movement occurs between the different Subareas, as well as groundwater-surface water and groundwater-atmosphere interchanges. Groundwater is recharged into the basin predominantly by infiltration of stormflow runoff water from the San Bernardino Mountains into the Mojave River. Other sources of recharge include infiltration of storm runoff into small streams and desert washes, and other activities such as irrigation return flows, wastewater discharge, and enhanced recharge with imported water. (MWA 2014; MWA 2020a)

Groundwater is discharged from the Mojave Basin Area primarily by well pumping, evaporation through soil, transpiration by plants, seepage into dry lakes where accumulated water evaporates, and seepage into the Mojave River.

Recent investigations by MWA, USGS, and others have resulted in an improved understanding of the geology and hydrogeology of the Mojave Basin Area. Specifically, a more refined examination of the hydrostratigraphy has allowed for differentiation between the more permeable Floodplain Aquifer that has a limited extent along the Mojave River and the more extensive but less permeable Regional Aquifer. In the Mojave Basin Area, Alto, Centro, and Baja Subareas contain both the Floodplain Aquifer and the Regional Aquifer, while Oeste and Este Subareas only contain the Regional Aquifer. (MWA 2014; MWA 2020a)

The Regional Aquifer underlies and surrounds the Floodplain Aquifer with interconnected alluvial fan and basin fill deposits. The Regional Aquifer is generally recharged by groundwater movement from the Floodplain Aquifer to the Regional Aquifer, infiltration of runoff from the higher altitudes of the San Gabriel and San Bernardino Mountains, and smaller amounts of runoff from local intermittent streams and washes.

4.1.2 Basin Adjudication

The Mojave Basin Area is adjudicated and is managed by MWA in its role as Watermaster. Adjudicated groundwater basins are not required to be managed under a Groundwater Sustainability Plan (GSP) for compliance with the Sustainable Groundwater Management Act (SGMA), because implementation of the Adjudication Judgement by the designated Watermaster serves the same purpose towards achieving and maintaining groundwater sustainability as would occur under a GSP. For those basins that are not adjudicated, SGMA establishes a framework for local groundwater management and requires local agencies to bring over-drafted basins into balanced levels of pumping and recharge. The DWR uses the California Statewide Groundwater Elevation Model (CASGEM) Priority List to rank groundwater basins across the state according to priority levels of High, Medium, Low, or Very Low, and SGMA specifies deadlines for completion of GSPs in order of basin priority. Currently, deadlines are only applicable to High- and Medium-Priority basins, and all subbasins within the Mojave Basin Area, including Lucerne Valley Subbasin, are designated by the DWR as Very Low Priority (DWR 2019).

The Adjudication process was initiated in 1990, prior to which rapid growth had resulted in groundwater levels becoming severely depleted. The Final Adjudication Judgement was entered into on January 10, 1996, adopting the physical solution set forth in the Stipulated Judgement.

For the purposes of this assessment, the key elements of the Judgement are:

- The installation of MWA as the Watermaster for the Mojave Basin Area
- The creation of a class of producers who are exempt from the Judgement's restrictions ("minimal producers") as long as they withdraw less than 10 AFY
- The assignment of Base Annual Production (BAP) rights to each producer using 10 AFY or more based on their historical usage during 1986-1990, the determination of annual Free Production Allowances (FPA), and the purchase of Replacement Water by producers who pump more than their FPA

The MWA does not supply water directly to consumers; virtually all water utilized by end-users in the Mojave Basin Area comes from a local well managed by a local agency under the oversight of MWA. Minimal producers, or those which withdraw less than 10 AFY from within the Adjudication area, are largely exempt from the provisions of the Adjudication Judgement. In practice there is little oversight of minimal producers. Many rural residential areas and small industrial uses have their own wells on their property and qualify as minimal producers.

As the Watermaster, MWA assigns each non-minimal producer a variable FPA each year, which is a percentage of their BAP based on current and projected hydrological conditions and the long-term groundwater sustainability goals of MWA. The BAP is also reduced over time until the FPA comes within five percent of the Production Safe Yield (PSY) defined by the Judgement, thus gradually reducing over-drafting and bringing the Basin water levels back into stability. If a producer pumps more than their FPA, they must transfer unused FPA internally within the subarea, or purchase from the Watermaster sufficient Replacement Water to replace the water used above the FPA in terms of time, place, quantity, and quality. MWA uses the funds from Replacement Water purchases to in turn purchase additional imported surface water from the SWP, as available, and uses that additional purchased SWP supply to recharge the local aquifers. MWA also purchases and stores water for future obligations and to maintain supply in dry years.

Producers who use less than their FPA can keep a portion of the unused amount as a credit for the next year, referred to as “carryover”, which allows the producer to withdraw up to their FPA plus their carryover amount. The FPA for the Este Subarea for 2020-2021 was set at 70 percent of BAP, and the FPA for 2021-2022 will be set at 65 percent (MBAW 2021).

4.1.3 Water Quality

Numerous studies dating back to the early 1900s have been conducted by various agencies to characterize groundwater quality in the Mojave service area and further the understanding of the Mojave River and Morongo Groundwater Basins. The MWA has also established a program with the USGS to maintain an 850-well monitoring network, from which groundwater quality is regularly sampled, analyzed, and recorded. In addition, the Mojave Salt and Nutrient Management Plan (SNMP) was completed in 2015. The results of these studies generally confirm the suitability of groundwater for beneficial uses in the Region. Investigations have also been conducted to identify the source and occurrence of key naturally occurring groundwater contaminants, including hexavalent chromium and arsenic, in the Mojave Desert region. (MWA 2014, 2020a)

The impairment of groundwater from the perspective of its beneficial use as drinking water is determined by comparing concentrations of constituents of concern in the groundwater against drinking water maximum contaminant levels (MCLs) and agricultural water quality parameters needed for specific crops. Key groundwater constituents of concern in the MWA service area include arsenic, nitrates, iron, manganese, Cr-VI, fluoride, and total dissolved solids (TDS), primarily comprised of salts (nitrates). Measurements exceeding drinking water standards have been found for some of these constituents within the Mojave River Basin and the Morongo Basin. Groundwater in these areas may require treatment prior to consumption. (MWA 2014, 2020a)

4.2 Lucerne Valley Subbasin

The Lucerne Valley Subbasin (DWR Basin No. 7-19) underlies a large portion of the Este Subarea of the Mojave Basin Area, and covers approximately 230 square miles in the northwest part of the Colorado River Hydrologic Region. The basin is bounded on the south by the San Bernardino Mountains and on the west by the Granite Mountains and the Helendale fault. The Ord Mountains bound the basin on the north. The Camp Rock fault and Kane Wash Area Groundwater Basin bound this basin on the east and the Fry Mountains bound this basin on the southeast. Surface water drains toward Lucerne Dry Lake in the western portion of the basin, which has an altitude of 2,850 feet above sea level. (DWR 2004)

The principal water-bearing deposits in the Lucerne Valley Subbasin are Quaternary age alluvium, and dune sand. The deposits are unconsolidated or semi-consolidated and the alluvium is composed of gravel, sand, silt, clay, and occasional boulders. Where saturated, the alluvium yields water freely to wells. Irrigation wells in the basin yield as much as 1,000 gpm (DWR 2004). Thickness of the alluvial deposits varies throughout the basin and reaches at least 1,800 feet along the Helendale fault. Water well and oil well logs indicate that the thickness of the alluvium averages about 600 feet. Fine-grained playa deposits in the western part of the basin yield little water to wells and the water is usually of poor quality. In the western part of the basin, between Lucerne Lake and Helendale faults, a thick layer of playa deposits separates the groundwater system into an upper unconfined aquifer and a lower, confined aquifer. Throughout the rest of the basin, groundwater is unconfined, meaning that it moves between subsurface layers without restriction. The basin is principally recharged by runoff from the San Bernardino Mountains and secondarily by runoff from the Granite, Ord, and Fry Mountains to the north. Groundwater generally flows from areas of recharge (infiltration from the surface) toward Lucerne Lake. (DWR 2004)

Water quality in the Lucerne Valley Subbasin is characterized by calcium-magnesium bicarbonate, calcium bicarbonate, and magnesium-sodium sulfate. These constituents result in the groundwater typically containing high concentrations of TDS, particularly in areas near Lucerne Dry Lake, including the proposed Project area, where the groundwater is sodium chloride in character and has very high TDS concentrations (DWR 2004). The concentration of TDS in groundwater tends to increase in the direction of groundwater flow, which is generally towards the dry lakebed, because as water is withdrawn or evaporates the overall salinity of the remaining water increases (DWR 2004). The USGS and MWA maintain an extensive network of wells throughout the Mojave Basin Area to monitor water quality parameters; monitoring wells in the vicinity of the Project show the highest recorded values of TDS throughout MWA's jurisdiction (California Water Science Center [CWSC] 2021a). For example, the Maximum Contaminant Level (MCL) for TDS set by the United States Environmental Protection Agency (USEPA) for drinking water is 500 mg/L (USEPA 2021), while untreated groundwater in the vicinity of the Lucerne Dry Lake has measured as high as 19,200 mg/L (CWSC 2021b). As discussed in Section 2, groundwater high in TDS needs to be treated to reduce the TDS concentration prior to the water being used for washing solar panels during Project operation; this factor is accounted for in the water demand and availability projections developed for this WSA.

4.3 Mojave Water Agency

The Mojave Water Agency serves as the Watermaster for the entire Mojave Basin Area, including the Lucerne Valley Subbasin which underlies the proposed Project area. For management purposes, the Mojave Basin Area is divided into five Subareas; the proposed Project area within the Lucerne Valley Subbasin is within the Este Subarea, as shown on Figure 3. The Mojave Water Agency does not sell water directly to consumers; rather, in its role as Watermaster, it regulates the groundwater supplies in the Mojave Basin Area, sets FPA limits for each owner of BAP rights, and manages the purchase and import of Replacement Water and the storage of groundwater supplies for future use during dry years. As defined in Section 4.1.2 above, BAP refers to the water rights associated with landowners that historically produced more than 10 AFY from the basin, while FPA refers to the annually variable percentage of its BAP that each non-minimal (more than 10 AFY) producer is allowed to use before it is required to purchase Replacement Water; these requirements are in place for compliance with the Adjudication Judgement, as administered by MWA as Watermaster.

The MWA uses water from several sources to manage recharge groundwater within its management jurisdiction, including:

- Imported water from the SWP
- Reclaimed wastewater imports from treatment facilities outside the MWA service area, including facilities in Victorville, Big Bear, Crestline, and Lake Arrowhead
- 'Return Flow' water, or water flowing back into the Basins' groundwater after being discharged by industrial and wastewater facilities, runoff from irrigation, percolating septic system outflows, and stormwater discharges.

Mojave Water Agency also manages several large water storage projects that are used to maintain water supply in case of extended drought. Each Subarea is assigned a storage allowance that it can bank and then maintain; once a Subareas storage limit is reached it cannot bank further credits. The storage limits are intended to provide several years of historical average consumptive use. Currently the Este Subarea, where the Project area is located, has reached its maximum storage allotment (MWA 2020a). Other Subareas in the region, as shown on Figure 3, include Centro Subarea, which is approaching its limit and continuing to store water, Oeste Subarea, which has no storage available, and Baja and Alto Subareas, which have declining storage levels as water use continues to exceed supply (MWA 2020a).

As a SWP contractor, MWA receives SWP supplies via the California Aqueduct. MWA purchases Replacement Water from the SWP on behalf of purveyors in its service area that exceed their FPA in a given year, and uses the Replacement Water in spreading grounds to recharge the local groundwater in the same Subarea where the excess withdrawal occurred. As MWA continues to manage the groundwater supplies in the various Subareas, it has relied less and less on imported SWP water. Availability of SWP water in the future and MWA's ability to access increased imports if needed is discussed in Section 5.2.2. The tables below provide an overview of MWA's water demands and supplies. Table 3 shows the total annual water use in the MWA service area from 2015 to 2020, with water uses broken down for large retailers (those required to maintain an UWMP), small water systems and rural domestic systems, agricultural uses, and other uses including industrial and recreational uses.

Table 3 Mojave Water Agency Water Use 2015-2020

Water User Category	2015	2016	2017	2018	2019	2020
Large Retailer	63,687	63,492	65,406	64,588	65,893	69,858
Small Systems and Rural Domestic	13,163	12,141	12,720	16,896	12,393	11,014
Agricultural	38,800	39,400	33,000	32,200	30,100	26,600
Other (Industrial, golf course, recreational)	21,100	20,600	21,700	23,600	21,600	21,720
Total Water Use	**136,750**	**135,633**	**132,826**	**137,284**	**129,986**	**129,192**

Source: MWA 2020

As shown in Table 3, the total water demands and uses in MWA's jurisdiction was 136,750 acre-feet in 2015, which consistently decreased each year through 2020, when water demands totaled 129,192 acre-feet. This is a reduction of approximately 5.5 percent. Table 4, below, provides an overview of water supply in MWA's jurisdiciton, including total imports, return flow (groundwater), and natural supply for the 2019-2020 water year.

Table 4 Mojave Water Agency Estimated Water Supply 2020

Water Supply Source	Amount (AF)
Natural Supply[1]	57,349
Imported Wastewater (Victorville)	13,719
Imported Wastewater (Other)	4,019
Imported SWP	9,397
Return Flows (estimated)	44,347
Total	**128,831**

[1] MWA estimates the average natural supply to the basin, from precipitation and snowmelt, as 57,349 AFY. This long-term average is assumed to be stable despite changing drought conditions which may affect hydrological conditions and recharge.

Source: MWA 2020

As shown in Table 4, MWA's total estimated water supply for water year 2019-2020 was 128,831 acre-feet. This is a difference of approximately 361 acre-feet, representing 0.3 percent less supply than the total demand projected for year 2020, as shown in Table 3. Considering the scope of the MWA jurisdiction, and the multitude of factors affecting supply availability, this difference is considered minimal. Water supply availability and reliability with respect to the proposed Project are detailed in the following section.

5 Water Supply Analysis

This section provides analysis of the availability and reliability of all potential water supply sources that may be used to meet the water demands of the proposed Project, consisting of groundwater pumped on- or off-site from the Lucerne Valley Subbasin or water purchased from a local purveyor and trucked to the site. For the purposes of this analysis, the focus is on the supply situation primarily in the Este Subarea of the Mojave Basin Area, of which the Lucerne Valley Subbasin is a major component. Individual data for the Lucerne Valley Subbasin is not readily available, and the majority of the water use in the Este Subarea lies within the Lucerne Valley Subbasin. Therefore, MWA data on the state of the Este Subbasin is considered a proxy for the state of the Lucerne Valley Subbasin. Supply reliability for MWA as a whole will also be examined, as supply issues in the Este Subarea would require MWA to meet the demand with other sources.

5.1 Water Supply Availability

Water supply for the proposed Project would be obtained from locally produced groundwater using an on- or off-site well, or by purchasing treated water from a local purveyor and trucking it to the site. Both potential options are addressed below, followed by discussion of their long-term availability and reliability.

5.1.1 Locally Produced Groundwater

As discussed previously, groundwater local to the proposed Project area is within an area managed in accordance with an Adjudication Judgement; as such, each property owner and water user within the Adjudication Area has an allocated amount of groundwater that is allowed to be produced from that respective parcel(s) in any given year, subject to the management direction of the MWA. The proposed Project area consists of up to 27 individual parcels distinguished by APNs, as shown on Figure 2 and listed in Table 1. Some of the parcels within the proposed Project area are currently in use as agricultural land and/or have existing water supply, as well as BAP rights and allotted FPAs. Of the 27 parcels within the Project area, several parcels comprise nearly one third of groundwater produced in the Lucerne Valley Subbasin, as shown in Table 5 below.

Table 5 Sample Parcel Water Allocations

Parcel APN	Base Annual Production	2020-2021 FPA	2019-2020 Production	2021-2022 FPA	2021 Carryover	Percent of Este Total BAP[1]
045 206 224	1,500	1,050	80	975	1,125	7.7
045 211 224	1,773	1,242	1,037	1,153	1,330	9.2
Totals						**27.9**

All values are in acre-feet (AF)

[1]The Este Subarea has a total of 19,251 AF in assigned BAP amongst 65 different owners (MBAW 2021)

Source: San Bernardino County 2021, MBAW 2021

As discussed above and shown in Table 5, several parcels within the proposed Project area collectively account for at least 27.9 percent of the total BAP rights assigned to the Este Subarea under the Adjudication Judgement for the Mojave Basin Area. Each of these parcels had 2021

Carryover values between 1,125 and 1,651 acre-feet, where “carryover” represents a portion of unused FPA which producers are allowed under the Adjudication Judgement to use in the year subsequent to the FPA allocation. The values from 2020 indicate that a large portion of the allocated water was not used during the 2019-2020 water year. The fact that the three largest producers in the Mojave Basin Area are located within the proposed Project area and all experienced excess supply as 2021 Carryover from their 2019-2020 FPA indicates that the region is coming into balance (i.e., making progress towards sustainable groundwater conditions), with excess supply availability even while FPA allocations are decreasing in accordance with the Adjudication Judgement.

Notably, in accordance with the Adjudication Judgement, the water rights associated with individual parcels may be transferred to other parcel(s) owned by the same party/parties within the Este Subarea, as the BAP is attached to the property owner(s) over the individual parcel(s); i.e., if the owners of the parcels described in Table 5 also have ownership of other parcels in the Este Subarea, their BAP is freely assignable amongst their other parcels, such that a change of ownership may also result in a change of water supply allocations to the subject properties. The issue of water rights would be addressed between the Project applicant, the individual property owners, and the Watermaster, prior to initiation of water uses for the Project.

5.1.2 Purchased Water from a Local Retailer

Alternative to using locally produced groundwater for the proposed Project, water supply may also be purchased from a local retailer with capacity to provide the required supply. In the Este Subarea, the largest retailers are the Jubilee Mutual Water Company and the Golden State Water Company. Neither of these purveyors has an UWMP, as they each have fewer than 3,000 connections or deliver less than 3,000 AFY, however, in its role as Watermaster, the MWA tracks their production rates and assigns them each an annual FPA for compliance with the Adjudication Judgement.

In the 2019-2020 water year, Jubilee Mutual Water Company had an FPA of 107 acre-feet as well as a carryover of 50 acre-feet. During the same water year, Jubilee pumped 117 acre-feet of its allocated 157 acre-feet, resulting in 40 acre-feet of unused water allocation which was then contributed to Jubilee’s 2020-2021 allocation as carryover supply. Similarly, in the 2019-2020 water year, Golden State Water Company had an FPA of 134 acre-feet FPA as well as a carryover of 143 acre-feet, of which it pumped 151 acre-feet, leaving 126 acre-feet unused to carryover to water year 2020-2021 (MBAW 2021).

This data indicates that Jubilee Mutual Water Company and Golden State Water Company both had excess water supply available in water year 2019-2020, resulting in carryover to water year 2020-2021. In accordance with the Adjudication Judgement, there will be annual decreases in the FPA allocated to all water rights holders in the Mojave Basin Area, including these local purveyors, in an effort to achieve and maintain sustainable groundwater conditions. As such, the water supply availability for these local purveyors may decrease in future years.

5.2 Water Supply Reliability

SB 610 requires that a WSA include the consideration of water supply availability under varying climatic (drought) conditions, including normal [water] year, single-dry year, and multiple-dry year scenarios for the next 20 years, which for this analysis would be further extended to 30 years to cover the expected lifespan of the Project. For this WSA, the analysis of varying drought scenarios is based on MWA’s drought planning and management activities as described in its current UWMP. As discussed, the Project’s water supply may be sourced from an on- or off-site groundwater well in the Lucerne Valley Subbasin, or it may be purchased from a local retailer and trucked to the site. Groundwater produced from the Lucerne Valley Subbasin would be subject to compliance with the Adjudication Judgement, under the management direction of the MWA.

Currently the Mojave Basin Area is recovering from historic patterns of over-use and, while some areas continue to be affected by overdraft conditions, other areas are in balance. MWA continues to bolster and expand its available water supply through ongoing banking activities, including through storage of Carryover supplies in San Luis Reservoir. While the SWP allocation has declined and is expected to continue to decline, MWA is well-placed to continue providing supply to its customers under varying drought scenarios.

Table 6 details MWA's total projected supply and demand amounts through 2055. This table reflects supplies associated with groundwater resources and imported SWP water, as well as water storage and banking activities conducted by MWA. The reliability of groundwater and imported surface water supplies are discussed respectively in the following Sections 5.2.1 and 5.2.2.

Table 6 Total MWA Projected Supply and Demand Through 2055[1]

		2025	2030	2035	2040	2045	2050	2055
Normal Year								
Supply Totals		158,541	159,452	159,372	159,299	160,710	161,985	163,141
Demand Totals		130,800	135,300	137,700	140,200	142,900	145,500	147,801
Difference		**27,741**	**24,152**	**21,672**	**19,099**	**17,810**	**16,485**	**15,341**
Single Dry Year								
Supply Totals		130,800	135,300	137,700	140,200	142,900	145,500	147,801
Demand Totals		130,800	135,300	137,700	140,200	142,900	145,500	147,801
Difference		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Multiple Dry Years								
First Year	Supply Totals	139,234	141,492	142,759	144,033	145,444	146,719	147,875
	Demand Totals	130,800	135,300	137,700	140,200	142,900	145,500	147,801
	Difference	**8,434**	**6,192**	**5,059**	**3,833**	**2,544**	**1,219**	**75**
Second Year	Supply Totals	130,800	135,300	137,700	140,200	142,900	145,500	147,801
	Demand Totals	130,800	135,300	137,700	140,200	142,900	145,500	147,801
	Difference	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Third Year	Supply Totals	130,800	135,300	137,700	140,200	142,900	145,500	147,801
	Demand Totals	130,800	135,300	137,700	140,200	142,900	145,500	147,801
	Difference	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Fourth Year	Supply Totals	130,800	135,300	137,700	140,200	142,900	145,500	147,801
	Demand Totals	130,800	135,300	137,700	140,200	142,900	145,500	147,801
	Difference	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Fifth Year	Supply Totals	139,234	141,492	142,759	144,033	145,444	146,719	147,875
	Demand Totals	130,800	135,300	137,700	140,200	142,900	145,500	147,800
	Difference	**8,434**	**6,192**	**5,059**	**3,833**	**2,544**	**1,219**	**75**

[1] Supply includes natural supply, imported wastewater, imported SWP water, and return flows

Units in acre-feet

Source: MWA 2020

The data in Table 6 indicate that under all considered drought scenarios, including normal water year, single-dry water year, and multiple-dry year conditions, water supplies are sufficient to meet projected demands. Under normal (non-drought) conditions, MWA banks water for later use, and anticipates an increase in available supply that will meet the projected demand increases shown above. Under single-year drought conditions, MWA anticipates a reduction in supply from reduced SWP allocations, and MWA has sufficient storage reserves available to meet the projected demands. Under multiple-year drought conditions, MWA would ramp down water banking activities to provide additional supply. Water banking activities would cease during consecutive years of multiple-year drought conditions until year five, at which time MWA anticipates utilizing SWP water again to continue water banking at a reduced rate.

MWA's drought analysis is based upon examination of historical drought data and consideration of multiple possible drought scenarios, as well as potential non-drought events that could interrupt water supply. The planning horizon defined by MWA in its UWMP extends to 2055, which is longer than the 20-year projection required for a WSA; as such, the projections provided in MWA's UWMP are sufficient to inform the projections discussed herein for compliance with SB 610. The following Sections 5.2.1 and 5.2.2 provide further information regarding the reliability of MWA's primary water supply sources, including groundwater (natural and managed), and imported SWP supply.

5.2.1 Groundwater Supply and Banking

As discussed throughout this WSA, groundwater in the Mojave Basin Area is managed in accordance with an Adjudication Judgement administered by MWA as the Watermaster. In this role, MWA assigns an FPA allowance to each non-minimal producer within the Mojave Basin Area, including the 27 parcels within the proposed Project area. As shown in Table 5, several of the parcels within the proposed Project area comprise 27.9 percent of the total BAP rights assigned to the Este Subarea under the Adjudication Judgement for the Mojave Basin Area. Under the proposed Project, these parcels would be utilized for solar energy development, which generally required far less water than the agricultural activities which have historically characterized these parcels.

As the Mojave Basin Area has historically been over-utilized, MWA has been reducing BAP and FPA allowances steadily since adjudication. FPA allowances are also adjusted yearly based on current and projected hydrological conditions, with the goal of bringing BAP within five percent of the Production Safe Yield (PSY). When a Subarea's total BAP is within five percent of the PSY amount, further BAP reductions will no longer be needed for compliance with the Adjudication Judgement. The Este Subarea is currently in balance and has had stable water levels for several years; however, its total BAP is not within five percent of its PSY and BAP therefore continues to be ramped down annually. (MWA 2020; MBAW 2021)

As discussed in Section 4.3, MWA's managed groundwater supply consists of natural supply, wastewater imports, imported water, and return flows. Table 7 shows MWA's anticipated managed groundwater supplies, not including SWP imports, through 2055.

Table 7 MWA Managed Groundwater Supplies Through 2055

Total Supply[1]	2025	2030	2035	2040	2045	2050	2055
Normal	107,804	110,062	111,329	112,603	114,014	115,289	116,445
Single Dry Year	107,804	110,062	111,329	112,603	114,014	115,289	116,445
Multi-Year Drought							
Year 1	107,804	110,062	111,329	112,603	114,014	115,289	116,445
Year 2	107,804	110,062	111,329	112,603	114,014	115,289	116,445
Year 3	107,804	110,062	111,329	112,603	114,014	115,289	116,445
Year 4	107,804	110,062	111,329	112,603	114,014	115,289	116,445
Year 5	107,804	110,062	111,329	112,603	114,014	115,289	116,445

[1] Sources include natural supply, imported wastewater, and return flows.
Units are in acre-feet.
Source: MWA 2020

As shown in the table above, which is informed by MWA's current UWMP, MWA does not anticipate natural supply or wastewater imports to change during conditions of drought; rather, it expects increased return flow due to increased conservation efforts. MWA anticipates providing 8,641 AFY more groundwater supply by 2055 than it does in 2025 under any drought scenario, primarily through increases in return flow from conservation, improved wastewater and stormwater retention, and utilization of stored resources during dry years. In addition, MWA addresses drought conditions and SWP allocation reductions through management of its extensive water banking and storage activities. MWA stores unused carryover water from SWP allocations and unused Subarea FPA. SWP carryover water is stored in San Luis Reservoir, which is utilized to store carryover supplies from multiple SWP contractors. MWA maintains a large Carryover balance due to its continued reduction in utilization of its allocation amounts and increasing self-reliance. In 2020 MWA had a total of 40,424 acre-feet available in SWP Carryover water (MWA 2020).

MWA also has water banking and storage programs within the Subareas. These storage banks are filled with unused FPA within the respective Subarea or with imported SWP water and Carryover water. The storage amounts have a maximum amount for each Subarea, and MWA is required under the Mojave Basin Area Adjudication Judgement to utilize the stored water by 2035; however, MWA can use some of the water and continue to replenish it, in order to extend that timeline. The Este Subarea has reached its storage capacity of 1,320 acre-feet under the Adjudication Judgement. This storage supply would be drawn upon in the event of drought-related water shortages severe enough to reduce MWA's ability to import SWP water to meet demand in the Este Subarea, which is already balanced with a large portion of its BAP unutilized each year (MWA 2020). MWA has a total of 191,915 acre-feet in storage within the Mojave Basin Area, the majority of which is in the Alto Subarea (MWA 2020).

5.2.2 Imported SWP Supply

MWA obtains imported surface water supplies from the SWP, which is the largest state-built water project in the country. SWP water is allocated according to service contracts between water purveyors and the California DWR; MWA is one of 29 water agencies that have a SWP contract with DWR. Each contract contains a "Table A Annual Amount" which lists the maximum amount of water a SWP contractor may receive under its SWP contract. MWA's current Table A Contract Allocation is 89,800 AFY (MWA 2020). In conditions of reduced water availability, the DWR reduces SWP allocations that can be significantly less than the Table A amount for each contractor. The last year that 100 percent allocation occurred was 2006. During the 2010-2020 period, SWP allocations to MWA ranged from 85 percent to as low as five percent of the Table A amount, with an average of approximately 53 percent. MWA adjusts to these fluctuations through groundwater management and stored supply projects to maintain supply during drought years.

MWA has developed anticipated future allocations based on DWR's planning and the *Final State Water Project Delivery Capability Report* (DCR) published by DWR in 2020. According to the 2020 DCR, average SWP reliability has shown a downward trend from 62 percent historically to 58 percent in 2019. With consideration of the effects of climate change and sea level rise scenarios discussed in the 2020 DCR, long-term reliability further reduces to 52 percent. Therefore, MWA characterizes SWP reliability as declining from 58 percent to 52 percent by 2040, and maintains a 52 percent reliability throughout its 2065 planning horizon (DWR 2020, MWA 2020). In an abundance of caution, MWA projects multi-year drought conditions to be characterized by critical long-term droughts with extreme drought years embedded in them. As such, MWA's multi-year drought planning includes two full years of SWP allocation being five percent, which is the lowest amount ever on record. MWA also plans for a single-year drought to be an extreme drought and uses the five percent SWP allocation amount for single-year drought planning. Table 8 shows MWA's future anticipated SWP allocations under these various drought scenarios.

Table 8 Future SWP Allocations by Year Type

Year	SWP Contract Table A Amount (AFY)	Percent Allocation	Allocation Amount (AFY)
Normal	89,800	58	52,084
Single Dry Year	89,800	5	4,490
Multi-Year Drought			
Year 1	89,800	35	31,430
Year 2	89,800	5	4,490
Year 3	89,800	5	4,490
Year 4	89,800	20	17,960
Year 5	89,800	35	31,430

Source: MWA 2020

As shown above, MWA anticipates the worst-case drought conditions to result in multiple years of a Table A allocation reduced to 4,490 acre-feet. For perspective, in 2019 MWA imported 9,397 acre-feet of water from SWP for use in groundwater recharge. This indicates that under normal conditions, or even extended drought conditions, MWA would be able to access water from its SWP contract amounts except in cases of extreme drought. MWA plans for such conditions through its use of water banking and storage, discussed above.

6 Conclusions

In accordance with the California Water Code, as amended by SB 610, this WSA identifies and characterizes all known and potential water demands of the Project, in comparison to the water supplies available over the Project's operational lifespan, and with consideration to varying drought conditions and ongoing long-term supply management activities. Water supply sources considered for the purposes of this WSA include groundwater pumped from the Lucerne Valley Subbasin via an on- or off-site groundwater well, and water purchased from a local purveyor and trucked to the site. Surface water in the Mojave Basin Area consists of imported SWP water which is conveyed from northern California via the California Aqueduct, and distributed locally via the MWA.

The Project's amortized annual water demand is 61.28 AFY; this is the Project's total maximum water demand averaged over all phases of the Project, accounting for 32 years to capture one year of construction, 30 years of operation and maintenance, and one year of decommissioning or repowering. The Project area consists of numerous parcels, as shown on Figure 2, some of which are designated, zoned, and used for agricultural purposes, including irrigated crops. Any conversion of land from irrigated agriculture to solar energy development is assumed to result in a decreased water demand on the affected parcel(s), because irrigated agriculture is generally more water intensive than solar energy development.

Several of the parcels within the Project area currently account for a sizeable portion of the total amount of water consumed in the Este Subarea. Because the Project would replace existing uses with less water-intensive uses, and the water demand projections in the MWA's UWMP are based upon the current, more water-intensive uses, it can be inferred that the Project's water demands are fully accounted for in the UWMP. Furthermore, MWA's UWMP projects a surplus water supply under normal water year conditions and some drought scenarios, and sufficient supply availability to meet projected demand under multiple-year drought scenarios. Therefore, sufficient water supply is available in the Project area to meet the demands of the proposed Project. This reliability of the available water supply is largely due to MWA's management of groundwater resources throughout the Mojave Basin Area, including responding to water shortages by pumping banked groundwater that is actively managed for this purpose.

As discussed above, if the Project pumps water on-site, utilizing purchased or leased FPA rights, the Project's demand would be less than the current or projected future BAP amounts of the parcels. If the Project's water supply is obtained by purchasing water from a local purveyor, that water would come from the respective purveyor's FPA allowances and thus be regulated and managed by the MWA in accordance with the Adjudication Judgement. This WSA concludes that sufficient water supply is available to meet the Project's potential water demands under normal-year, single-dry-year, and multiple-dry-year conditions.

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Appendix A

DWR Guidebook for Implementation of Senate Bill 610

DWR Guidebook for Implementation of Senate Bill 610

The Water Supply Assessment (WSA) for the proposed Sienna Solar and Storage Project ("proposed project") was prepared using guidance contained in the California Department of Water Resources' (DWR) Guidebook for Implementation of Senate Bill (SB) 610 and SB 221 of 2001 (DWR Guidebook). The California DWR prepared the Guidebook to assist water suppliers in preparation of the water assessments and the written verification of water supply availability required by SB 610 and SB 221; the DWR has no regulatory or permitting approval authority concerning water assessments or verifications of sufficient water supply, and provides the Guidebook purely as an assistance tool (DWR 2003). The following table provides a detailed description of how the DWR Guidebook was used in preparing the Project's WSA.

Table A-1 Sienna Solar and Storage Project – WSA Consistency with DWR Guidelines

Guidelines Section Number and Title (DWR 2003)	Guidelines Direction	Relevant WSA Section and Response
Section 1 (page 2). Does SB 610 or SB 221 apply to the proposed development?	Is the Project subject to SB 610? Is the Project subject to CEQA (Water Code §10910(a))? If yes, continue.	Yes, the Project subject to CEQA.
	Is it a "project" as defined by Water Code §10912(a) or (b)? If yes, to comply with SB 610 go to Section 2, page 4.	Yes, the Project is considered to meet the definition of "project" per Water Code §10912(a) or (b).
	Is the project subject to SB 221? Does the tentative map include a "subdivision" as defined by Government Code §66473.7(a)(1)? If no, stop.	No, the Project does not include a "subdivision;" SB 221 does not apply to the Project, and no further action relevant to SB 221 is required.
Section 2 (page 4). Who will prepare the SB 610 analysis?	Is there a public water system ("water supplier") for the project (Water Code § 10910(b))? If no, go to Section 3, page 6.	No, there is no public water system for the Project.
Section 3 (page 6). Has an assessment already been prepared that includes this project?	Has this project already been the subject of an assessment (Water Code §10910(h))? If no, go to Section 4, page 8.	No, the Project has not been the subject of an assessment.
Section 4 (page 8). Is there a current Urban Water Management Plan?	Is there an adopted urban water management plan (UWMP) (Water Code §10910(c))? If yes, continue. If yes, information from the UWMP related to the proposed water demand for the project may also be used for carrying out Section 5, Steps 1 and 2, and Section 7; proceed to Section 5, page 10 of the Guidelines.	Mojave Water Agency (MWA), the water wholesaler that provides imported SWP water to the Project area, has an adopted UWMP. Information from the UWMP was used to inform this WSA.
	Is the projected water demand for the project accounted for in the most recent UWMP (Water Code §10910(c)(2))? If no, go to Section 5, page 10.	The MWA's UWMP does not specifically reference the proposed Project; however, the UWMP assumes the Project area land uses consist of agricultural uses, which are generally higher in water demand than solar energy development. As such, the proposed Project would reduce water demands on the Project area from those

Guidelines Section Number and Title (DWR 2003)	Guidelines Direction	Relevant WSA Section and Response
		assumed in the MWA's UWMP for the area.
Section five (page 10). What information should be included in an assessment?	Step One (page 13). Documenting wholesale water supplies.	MWA provides water to the Project area, and has an adopted UWMP. Information from the UWMP was used for this WSA.
	Step Two (page 17). Documenting Supply if Groundwater is a Source*.	The Project's water demands may be met with groundwater supplies from the Lucerne Valley Subbasin.
	Specify if a groundwater management plan or any other specific authorization for groundwater management for the basin has been adopted and how it affects the water supplier's use of the basin.	The proposed Project area is underlain by the Lucerne Valley Subbasin, which is within the adjudicated Mojave Basin Area and therefore subject to the Adjudication Judgement, under the management direction of MWA as the Watermaster.
	The description of the groundwater basin may be excerpted from the groundwater management plan, from DWR Bulletin 118, California's Ground Water, or from some other document that has been published and that discusses the basin boundaries, type of rock that constitutes the aquifer, variability of the aquifer material, and total groundwater in storage (average specific yield times the volume of the aquifer).	WSA Sections 2.1 and 4.1 provide description of the groundwater basin characteristics using available resources, including DWR Bulletin 118.
	In an adjudicated basin the amount of water the urban supplier has the legal right to pump should be enumerated in the court decision.	The Project is located in an adjudicated groundwater area; see WSA Section 4.2.1.
	The Department of Water Resources has projected estimates of overdraft, or "water shortage," based on projected amounts of water supply and demand (basin management), at the hydrologic region level in Bulletin 160, California Water Plan Update. Estimates at the basin or subbasin level will be projected for some basins in Bulletin 118. If the basin has not been evaluated by DWR, data that indicate groundwater level trends over a period of time should be collected and evaluated.	WSA Section 4.1.2 discusses groundwater level trends.
	If the evaluation indicates an overdraft due to existing groundwater extraction, or projected increases in groundwater extraction, describe actions and/or program designed to eliminate the long-term overdraft condition.	The evaluation does not indicate an overdraft due to existing groundwater extraction.
	If water supplier wells are plotted on a map, or are available from a geographic information system, the amount of water extracted by the water supplier for the past five years can be obtained from the Department of Health Services, Office of Drinking Water and Environmental	Water pumping for the Project would not initiate until the onset of construction activities; site-specific historical records are not available.

Guidelines Section Number and Title (DWR 2003)	Guidelines Direction	Relevant WSA Section and Response
	Management.	
	Description and analysis of the amount and location of groundwater pumped by the water supplier for the past five years. Include information on proposed pumping locations and quantities. The description and analysis is to be based on information that is reasonably available, including, but not limited to, historic use records from DWR.	Section 4 addresses available historical groundwater pumping data.
	Analysis of the location, amount, and sufficiency of groundwater that is projected to be pumped by the water supplier.	WSA Sections 4 and 5 discuss location, amount, and sufficiency of groundwater supplies from the Lucerne Valley Subbasin.
	Step 3 (page 21). Documenting project demand (Project Demand Analysis).	WSA Section 2.3 details the Project demand analysis.
	Step 4 (page 26). Documenting dry year(s) supply.	WSA Section 5 discusses water supply reliability including during dry year scenarios.
	Step five (page 31). Documenting dry year(s) demand.	WSA Section 5 discusses water supply reliability including during dry year scenarios.
Section 6 (page 33). Is the projected water supply sufficient or insufficient for the proposed project?		WSA Section 5 summarizes why the identified water supply/supplies are considered sufficient for the Project.
Section 7 (page 35). If the projected supply is determined to be insufficient.	Does the assessment conclude that supply is “sufficient”? If no, continue.	WSA Section 6. It is reasonably anticipated that sufficient water supplies are available for the Project.
Section 8 (page 38). Final SB 610 assessment actions by lead agencies.	The lead agency shall review the WSA and must decide whether additional water supply information is needed for its consideration of the proposed project. The lead agency “shall determine, based on the entire record, whether projected water supplies will be sufficient to satisfy the demands of the project, in addition to existing and planned future uses.”	The WSA for the Project will be included as part of the CEQA document for the Project. Per SB 610, the lead agency will approve or disapprove a project based on a number of factors, including but not limited to the water supply assessment.

Source: DWR (Department of Water Resources). 2003. Guidebook for Implementation of Senate Bill 610 and Senate Bill 221 of 2001. October 8.

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