Appendix H.1

Preliminary Drainage Study
E-Group PS Solar Project

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January 2025

Preliminary Drainage Study

E-Group PS Solar Project

JANUARY 2025

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Executive Summary

The E-Group PS Solar Project (Project or project) has been determined, by the City of Twentynine Palms (City), acting as lead agency, to require preparation of an environmental impact report pursuant to the California Environmental Quality Act, based on their experience with other comparable projects. This drainage study (Preliminary Study) has been prepared to support the Conditional Use Permit, Zone Change, General Plan Amendment, and other associated applications for the project in accordance with City and San Bernardino County (County) requirements. E-Group PS LLC (E-Group) proposes to entitle, construct, operate, and maintain the project, which would consist of up to 50 megawatts of photovoltaic solar generation and would connect via a generation interconnection line to the nearby Southern California Edison Carodean Substation. The approximately 184-acre project site is located in the northwestern portion of the City. This Preliminary Study was prepared under the supervision of Kipp Vilker, a licensed professional engineer (CA PE No. 90011), and Sharllyn Pimentel.

This Preliminary Study has found that the project site is not identified in a Federal Emergency Management Agency (FEMA) Special Flood Hazard Area. Based on FEMA flood insurance maps (FEMA 2016), the project is partially located in Flood Zone X, defined as an area to be outside the 0.2% (500-year) annual chance floodplain, and flood zone D, defined as an area in which flood hazards are undetermined, but possible.

The California Department of Water Resources Best Available Maps (DWR 2023a) displays a Department of Water Resources Awareness 100-year floodplain around the intermittent stream in the northwest corner of the project parcel, which is defined as a flood-prone zone, without providing flood depths and velocities. The surrounding ephemeral streams within the project site flow towards the north/northwest into the flood-prone intermittent stream.

The peak flows for the delineated watersheds within the project area were established using the regressive peak flow estimates from the California StreamStats tool, developed by the U.S. Army Corp Engineers, U.S. Forest Service, and FEMA.

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Table of Contents

SECTION **PAGE NO.**

Executive Summary i

Acronyms and Abbreviations v

1 Introduction 1
- 1.1 Background 1
- 1.2 Project Description 1

2 Environmental Setting 3
- 2.1 Regional Watersheds 3
- 2.2 Topography and Drainage Patterns 4
- 2.3 Flood Hazards 4
  - 2.3.1 Federal Emergency Management Agency Special Flood Hazard Areas 4
  - 2.3.2 Sea-Level Rise, Tsunami Inundation, and Seiche 5
- 2.4 Groundwater Resources 5
- 2.5 Water Quality 5
  - 2.5.1 Beneficial Uses for Surface and Groundwater 5
  - 2.5.2 303 (d) Listed Impaired Water Bodies 7

3 Regulatory Setting 8
- 3.1 Federal 8
  - 3.1.1 Clean Water Act 8
  - 3.1.2 National Flood Insurance Act 9
- 3.2 State 9
  - 3.2.1 Porter–Cologne Water Quality Control Act 9
  - 3.2.2 California Department of Water Resources 10
  - 3.2.3 Small MS4 Permit 10
  - 3.2.4 Streambed Alteration Agreement (California Fish and Game Code) 10
- 3.3 Local 11
  - 3.3.1 Water Quality Control Plan for the Colorado River Basin 11
  - 3.3.2 San Bernadino County Policy Plan 11
  - 3.3.3 City of Twentynine Palms Floodplain Management Regulations (19.62) 11

4 Hydrology Analysis 12

5 Impact Analysis 14
5.1 Method of Analysis 14
5.2 Thresholds of Significance 14
5.3 Impact Analysis 15
6 References 20

TABLES

Table 1. Project Contribution to Hydrologic Subarea 3
Table 2. Surface Water Beneficial Uses 6
Table 3. Groundwater Water Beneficial Uses – Lucerne Valley Planning Area 6
Table 4. Project Site Drainages 12

FIGURES

Figure 1 Project Location 22
Figure 2 RWQCB Hydrologic Setting 24
Figure 3 USGS Hydrologic Setting 26
Figure 4 Surface Water Features 28
Figure 5 Flood Hazard 30
Figure 6 Project Basins 32

APPENDICES

A Site Plan
B FEMA FIRM Panel
C State Well 01N08E12G001S

Acronyms and Abbreviations

Acronym/Abbreviation	Definition
BAM	Best Available Maps
CEQA	California Environmental Quality Act
CWA	federal Clean Water Act
CWC	California Water Code
DWR	California Department of Water Resources
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
NHD	National Hydrography Dataset
NPDES	National Pollutant Discharge Elimination System
NWI	National Wetlands Inventory
RWQCB	Regional Water Quality Control Board

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1 Introduction

1.1 Background

Initial evaluation of the 184-acre project is provided in this report (Preliminary Study). The Preliminary Study was prepared for the project to identify agency requirements needed to support the Conditional Use Permit, Zone Change, General Plan Amendment, and other associated applications and satisfy California Environmental Quality Act (CEQA) requirements. The Preliminary Study was prepared under the supervision of Kipp Vilker, a licensed professional engineer (CA PE No. 90011), and Sharllyn Pimentel.

1.2 Project Description

The project site is located within the City of Twentynine Palms (City) boundary in the southern portion of San Bernadino County, California (Figure 1, Project Location). The project is situated within portions of Section 23 of Township 1 North, Range 8 East, San Bernardino Base and Meridian. The project would include up to 50 megawatts of photovoltaic solar generation facility located on approximately 184 acres of two undeveloped parcels (APNs 0615-201-05 and 0615-201-01). The project would primarily consist of photovoltaic panels on a fixed tilt foundation, inverters and transformers, electrical cabling and communication lines, on-site switchgear, generation interconnection (gen-tie) line, access roads, and security fence (Appendix A). The project would connect with the existing Southern California Edison Carodean Substation, a transmission network located southwest from the project site, from Two Mile Road.

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2 Environmental Setting

The project site is located on the western side of the City of Twentynine Palms within the Mojave Desert, located approximately 6 miles north of Joshua Tree National Park. The project site is generally bordered by an unmarked dirt road to the south, ephemeral streams, undeveloped vacant desert land to the east and west, and undeveloped public lands to the north, some of which is owned by the Bureau of Land Management.

2.1 Regional Watersheds

According to the Colorado River Basin Regional Water Quality Control Board (RWQCB), the project site falls within the Twentynine Palms Hydrologic Area (HA 709.10), which is located within the Dale Hydrologic Unit (HU 709) of the Colorado River Basin Region (RWQCB 2019). These watersheds are used to identify beneficial uses and associated water quality objectives in the Water Quality Control Plan for the Colorado River Basin (Colorado River Basin Plan; RWQCB 2019). Figure 2, RWQCB Hydrologic Setting, shows the project site within the context of the RWQCB hydrologic unit and hydrologic area. The project area is approximately 0.16% of the area encompassed by the affected hydrologic area.

The U.S. Geological Survey Watershed Boundary Dataset indicates the project site is encompassed by one subwatershed within the 99-square-mile Mesquite Lake watershed within the Southern Mojave subbasin. The subbasin, watershed, and subwatershed, which are identified by a Hydrologic Unit Code, are listed in Table 1 along with the estimated project area contribution to the drainage feature, based on size. Figure 3, USGS Hydrologic Setting, shows the project site within the context of the U.S. Geological Survey Watershed Boundary Dataset (USGS 2023a).

Table 1. Project Contribution to Hydrologic Subarea

HUC Digit / HUC	Name	Analysis Scale	Area (sq mi)	Approximate Proposed Project Area (sq mi)	Estimated Project Contribution (percent)
8/18100100	Southern Mojave	Subbasin	8,866	0.29	0.003%
10/1810010018	Mesquite Lake	Watershed	99	0.29	0.29%
12/181001001802	Indian Cove-Rattlesnake Canyon	Subwatershed	41	0.29	0.71%

Source: USGS 2023a.
Note: HUC = Hydrologic Unit Code; sq mi = square miles.

According to the Colorado River Basin Plan, the project site falls within the Lucerne Valley Planning Area, which comprises many small internal drainage basins that cover 6,500 square miles. In the upper desert, which contains Twentynine Palms, precipitation is higher, and frost occurs. Precipitation mostly occurs as rainfall, with some

snowfall in the San Bernardino Mountains. Rainfall is sporadic, and amounts vary widely with locations. The average annual rainfall over the entire planning area is 5 inches. Little of the rainwater percolates into the groundwater table, and most is lost by evaporation and evapotranspiration. Arrastre and Crystal Creeks are the most significant streams in the planning area (RWQCB 2019).

2.2 Topography and Drainage Patterns

The topography of the project site is characterized by an overall downward slope to the north. The maximum elevation is approximately 2,240 feet above mean sea level at the southern border of the site, and the minimum elevation is approximately 2,060 feet above mean sea level in the northeastern portion of the site (Figure 4, Surface Water Features). The project site and surrounding properties are currently rural undeveloped land.

The National Hydrography Dataset (NHD) is maintained by the U.S. Geological Service (USGS 2023a) for the purpose of portraying surface waters on a national scale. The NHD is maintained at a broad nationwide level to represent features such as rivers, streams, canals, lakes, ponds, coastlines, dams, and stream gages. Due to its scale, the NHD provides only an estimate of the waterbodies, is not comprehensive, and may not be accurate. The U.S. Fish and Wildlife Service maintains the National Wetlands Inventory (NWI) and the NWI Wetlands Mapper, which provide access to wetland data on a national scale. The U.S. Fish and Wildlife Service created NWI maps by analyzing remote-sensing data and aerial imagery and by drawing polygons around areas that appear to have wetland signatures. Similar to the NHD, the NWI maps are reconnaissance-level information and not a comprehensive database of wetlands. The U.S. Fish and Wildlife Service NWI Mapper shows a series of riverine features flowing from south to north and west to east throughout the site, while the NHD displays one intermittent stream flowing from south to north through the site and one intermittent stream flowing from west to east through the site (Figure 4). These are intermittent streams that flow approximately 3.5 miles towards the east, terminating near Mesquite Lake, which is a dry lake bed. They do not flow to any downstream tributaries. An aquatic resources delineation report completed by Dudek (Dudek 2025), identified five ephemeral drainages through the project site, all of which correlated with the mapped NHD drainage locations.

2.3 Flood Hazards

2.3.1 Federal Emergency Management Agency Special Flood Hazard Areas

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) identify Special Flood Hazard Areas that are susceptible to 100-year floods; these areas are labeled as Zone A, AE, AH, AO, AR, A99, V, or VE. The project site is encompassed by FEMA flood zones X and D, as identified in FIRM panel 06071C8190J (FEMA 2016, [Appendix B]). Flood zone X is described as outside of the 0.2% annual chance floodplain. Flood zone D is an area of possible yet undetermined flood hazards. Flood zones X and D in this location have no detailed hydraulic analysis and no base flood elevation information available. Flood zone D does not mandate flood insurance.

The California Department of Water Resources (DWR) developed the Best Available Maps (BAM; DWR 2023a), which displays floodplains and designated floodway data. The BAM does not replace existing FEMA regulatory floodplains shown on FIRMs. According to the BAM, a 100-year DWR Awareness floodplain is present in the northwest portion of the project site (Figure 5, Flood Hazard). A 100-year DWR Awareness floodplain is an area with

potential exposure to flooding for a storm flow that has a 1% chance of being equaled or exceeded in any year (100-year). There is no information regarding flood depth and velocity for the designated area.

2.3.2 Sea-Level Rise, Tsunami Inundation, and Seiche

The project site is not subject to sea-level rise, tsunami inundation, or seiche waves. The preconditions necessary for a project to be at risk of such hazards are that it be located within a reasonable distance and elevation relative to a coastline (for sea-level rise or tsunami) or large body of water (for seiche waves). The project site is located at a minimum elevation of 2,060 feet above mean sea level and is not next to a large water body subject to seiche.

2.4 Groundwater Resources

Groundwater in the Lucerne Planning Area is stored principally in the unconsolidated alluvium. Except for areas near some of the dry lakes, groundwater is unconfined. The depth of the water-bearing deposits is not known, but the basins have accumulated hundreds of feet of sediments (1,200 feet of sediments have been measured in the Dale Hydrologic Subunit).

The project site is within the Twentynine Palms Valley Groundwater Basin (DWR Basin No. 7-010, as designated by DWR; DWR 2023b). According to the Sustainable Groundwater Management Act Prioritization Dashboard, the Twentynine Palms Valley Groundwater Basin is designated as very low priority (DWR 2023c) and is not subject to the statewide requirements of the 2014 Sustainable Groundwater Management Act.

Groundwater level data collected at one well of unknown use type close to the project site was reviewed to characterize long-term water level trends (DWR 2023d). A hydrograph of the well is presented in Appendix C. State Well 01N08E12G001S, which is approximately 2 miles northeast of the service area, shows groundwater levels between 1940 and 2013 with an overall declining trend. Water levels range from 1,772 feet above mean sea level (amsl) to 1,761 feet amsl, which ranges from 194 feet below ground surface to 205 feet below ground surface (DWR 2023d).

2.5 Water Quality

2.5.1 Beneficial Uses for Surface and Groundwater

California Water Code (CWC) Section 13050(f) describes the beneficial uses of surface and groundwaters that may be designated by the State Water Resources Control Board or RWQCB for protection as follows:

> Beneficial uses of the waters of the state that may be protected against quality degradation include, but are not necessarily limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves.

To comply with the CWC and the federal Clean Water Act (CWA), all surface waters within the Colorado River Basin have been assigned the following beneficial uses per the Basin Plan, as shown in Table 2. As discussed in Section

2.2, there are no downstream tributaries of the project site and no connectivity between the intermittent drainages flowing through the site and downstream water bodies.

Table 2. Surface Water Beneficial Uses

Stream	Beneficial Use							
	MUN	FRSH	GWR	REC-1	REC-2	WARM	WILD	RARE
Unlisted perennial and intermittent streams	○[a]	●[b]	● □	● □ ○	● □	● □	● □	●[c] □

Source: RWQCB 2019.
Notes:
● Existing uses.
○ Potential uses.
□ Intermittent uses.
[a] Potential use designations will be determined on a case-by-case basis as necessary in accordance with the "Sources of Drinking Water Policy" in this chapter.
[b] Applies only to tributaries to Salton Sea.
[c] Responsibility for substantiation of the rare, endangered, or threatened wildlife in these waterways is determined on a case-by-case basis by the California Department of Fish and Wildlife.

According to the Colorado River Basin Plan, the project site lies within the Dale Hydrologic Unit within the Lucerne Valley Planning Area. To comply with the CWC and the federal CWA, groundwater within the project area has been assigned the following beneficial uses in the Colorado River Basin Plan, as shown in Table 3.

Table 3. Groundwater Water Beneficial Uses – Lucerne Valley Planning Area

Hydrologic Unit	Area Code	Beneficial Use		
		MUN	AGR	IND
Dale	709	●	●	●

Source: RWQCB 2019.
Notes:
● Existing beneficial uses.

Definitions of the beneficial uses mentioned in Tables 2 and 3 are as follows:

Municipal and Domestic Supply (MUN) –Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.

Agricultural Supply (AGR) – Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support vegetation for range grazing.

Industrial Service Supply (IND) – Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well repressurization.

Water Contact Recreation (REC-1) – Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.

Non-contact Water Recreation (REC-2) – Uses of water for recreational activities involving proximity to water, but where there is generally no body contact with water, nor any likelihood of ingestion of water. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Warm Freshwater Habitat (WARM) – Uses of water that support reproduction and early development of warm water fish.

Wildlife Habitat (WILD) – Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats or wetlands, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Rare, Threatened, or Endangered Species (RARE) – Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal laws as rare, threatened, or endangered.

2.5.2 303 (d) Listed Impaired Water Bodies

As discussed in Section 2.2, there are no downstream tributaries of the project site, hence no impaired water bodies downstream of the site.

3 Regulatory Setting

3.1 Federal

3.1.1 Clean Water Act

The CWA (33 U.S. Code Section 1251 et seq.), formerly the Federal Water Pollution Control Act of 1972, was enacted with the intent of restoring and maintaining the chemical, physical, and biological integrity of waters of the United States. The CWA required states to set standards to protect, maintain, and restore water quality through the regulation of point-source and certain nonpoint-source discharges to surface water. Those discharges are regulated by the National Pollutant Discharge Elimination System (NPDES) permit process (CWA Section 402). In California, NPDES permitting authority is delegated to, and administered by, the nine RWQCBs.

Section 401, Water Quality Certification. Section 401 of the CWA requires that, prior to issuance of any federal permit or license, any activity, including river or stream crossings during road, pipeline, or transmission line construction, that may result in discharges into waters of the United States must be certified by the state, as administered by the RWQCB. This certification ensures that the proposed activity does not violate state and/or federal water quality standards.

Section 402, National Pollutant Discharge Elimination System. Section 402 of the CWA authorizes the State Water Resources Control Board to issue a NPDES General Construction Storm Water Permit (Water Quality Order 2009-0009-DWQ), referred to as the "Construction General Permit." On September 8, 2022, the State Water Resources Control Board adopted a new Construction General Permit (Water Quality Order 2022-0057-DWQ), which became effective on September 1, 2023. Depending on the construction timelines, construction activities can comply with and be covered under the applicable Construction General Permit if they do the following:

1. Develop and implement a stormwater pollution prevention plan (SWPPP) that specifies best management practices (BMPs) that will prevent all construction pollutants from contacting stormwater and with the intent of keeping all products of erosion from moving off site into receiving waters.
2. Eliminate or reduce non-stormwater discharges to storm sewer systems and other waters of the United States.
3. Perform inspections of all BMPs.

NPDES regulations are administered by the RWQCB. Projects that disturb 1 or more acres, including the proposed project, are required to obtain NPDES coverage under the Construction General Permit.

Section 404, Discharge of Dredged or Fill Materials. Section 404 of the CWA establishes programs to regulate the discharge of dredged and fill material in waters of the United States, including wetlands. For purposes of Section 404 of the CWA, the limits of non-tidal waters extend to the ordinary high water mark, defined as the line on the shore established by the fluctuation of water and indicated by physical characteristics, such as a natural line

impressed on the bank, changes in the character of the soil, and presence of debris. When an application for a Section 404 permit is made, the applicant must show it has done the following:

- Taken steps to avoid impacts to wetlands or waters of the United States, where practicable
- Minimized unavoidable impacts to waters of the United States and wetlands
- Provided mitigation for unavoidable impacts

Section 404 of the CWA requires a permit for construction activities involving placement of any kind of fill material into waters of the United States or wetlands. A water quality certification pursuant to Section 401 of the CWA is required for Section 404 permit actions. If applicable, construction would also require a request for water quality certification (or waiver thereof) from the Colorado River RWQCB. Project activities would adhere to state and federal water quality standards and would be in compliance with Sections 401 and 404 of the CWA.

3.1.2 National Flood Insurance Act

FEMA is responsible for managing the National Flood Insurance Program, which makes federally backed flood insurance available for communities that agree to adopt and enforce floodplain management ordinances to reduce future flood damage. The National Flood Insurance Program, established in 1968 under the National Flood Insurance Act, requires that participating communities adopt certain minimum floodplain management standards, including restrictions on new development in designated floodways, a requirement that new structures in the 100-year flood zone be elevated to or above the 100-year flood level (known as base flood elevation), and a requirement that subdivisions be designed to minimize exposure to flood hazards.

To facilitate identifying areas with flood potential, FEMA has developed FIRMs that can be used for planning purposes, including floodplain management, flood insurance, and enforcement of mandatory flood insurance purchase requirements. The County is a participating jurisdiction in the National Flood Insurance Program; therefore, all new development must comply with the minimum requirements of the National Flood Insurance Program set forth in Title 44 Code of Regulations Part 60, Criteria for Land Management and Use and implemented via the City's Floodplain Management Ordinance (19.62).

3.2 State

3.2.1 Porter–Cologne Water Quality Control Act

The Porter–Cologne Water Quality Control Act (Porter–Cologne Act) established the principal California legal and regulatory framework for water quality control. The Porter–Cologne Act is embodied in the CWC, which authorizes California's nine RWQCBs to implement the provisions of the federal CWA (see Section 3.1.1) and the CWC. The Colorado River Basin RWQCB implements and enforces provisions of the CWC and CWA in the Colorado River Basin. The act requires a "report of water discharge" for any discharge of water (liquid, solid, or otherwise) to land, surface waters, or groundwaters that may impair a beneficial use of any groundwater or surface water in the state and authorizes the RWQCBs to impose waste discharge requirements. The Porter–Cologne Act also provides for the development and periodic review of basin-specific water quality control plans (basin plans) that designate beneficial uses of California's major rivers and groundwater basins and establish water quality objectives for those waters.

3.2.2 California Department of Water Resources

The major responsibilities of DWR include preparing and updating the California Water Plan to guide development and management of the state's water resources; planning, designing, constructing, operating, and maintaining the State Water Resources Development System; regulating dams; providing flood protection; assisting in emergency management to safeguard life and property; educating the public; and serving local water needs by providing technical assistance. In addition, DWR cooperates with local agencies on water resources investigations; supports watershed and river restoration programs; encourages water conservation; explores conjunctive use of groundwater and surface water; facilitates voluntary water transfers; and, when needed, operates a state drought water bank.

3.2.3 Small MS4 Permit

This region of San Bernardino County is not regulated under a Small MS4 Permit. The only stormwater discharge requirements associated with work in this region fall under the Section 402 Construction General Permit (see Section 3.1.1).

3.2.4 Streambed Alteration Agreement (California Fish and Game Code)

Section 1602 of the California Fish and Game Code protects the natural flow, bed, channel, and bank of any river, stream, or lake designated by the California Department of Fish and Wildlife in which there is, at any time, any existing fish or wildlife resources, or benefit for the resources. Section 1602 applies to all perennial, intermittent, and ephemeral rivers, streams, and lakes in the state, and requires any person, state or local governmental agency, or public utility to notify the California Department of Fish and Wildlife before beginning any activity that will do any of the following:

- Substantially divert or obstruct the natural flow of any river, stream, or lake
- Substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake
- Deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake

During final engineering and design of a project, if it is determined that any project-related actions would have the potential to necessitate a Streambed Alteration Agreement, such an agreement would be prepared and implemented prior to construction of the project, thus maintaining compliance with Section 1602 of the California Fish and Game Code. A Streambed Alteration Agreement is required if the California Department of Fish and Wildlife determines that the activity could substantially adversely affect an existing fish and wildlife resource. The agreement includes measures to protect fish and wildlife resources while conducting the project.

3.3 Local

3.3.1 Water Quality Control Plan for the Colorado River Basin

The Colorado River Basin covers approximately 13 million acres (20,000 square miles) in the southeastern portion of California and includes all of Imperial County and portions of San Bernardino, Riverside, and San Diego Counties. The Colorado River Basin Plan contains the water quality regulations for the Colorado River Basin Region and programs to implement those regulations. The Colorado River Basin Plan is designed to preserve and enhance water quality in the region and to protect the beneficial uses of all regional waters for the benefit of present and future generations (SWRCB 2019).

3.3.2 San Bernadino County Policy Plan

The San Bernardino County Policy Plan (San Bernadino County 2023) contains the long-term goals and policies that will guide County decisions, investments, and improvements toward achieving the countywide vision. The Policy Plan represents a unique approach to county planning. It serves as the County's General Plan for the unincorporated areas, which is mandated by state law, but it also includes policy direction for adult and child supportive services, healthcare, public safety, and other regional services the County administers in both incorporated and unincorporated areas, as well as implementation measures that are more general in nature and not specific to solar development in the County, such as the project.

3.3.3 City of Twentynine Palms Floodplain Management Regulations (19.62)

The Floodplain Management Ordinance applies to all areas of special flood hazards within the City's jurisdiction. Special consideration and development standards shall be applied to properties that are located within FEMA's 100-year Floodplain Overlay. A special flood hazard area is defined as an area shown on a flood hazard boundary map or FIRM as Zone A, AO, or AE. A development permit shall be obtained before any construction or other development begins within any special flood hazard area. Requirements for development are listed in Section 19.62 of the City Code of Ordinances.

4 Hydrology Analysis

StreamStats is a web application that provides access to an assortment of geographic information systems analytical tools that are useful for water resources planning and management and for engineering and design purposes. The map-based user interface can be used to delineate drainage areas for selected sites on streams and then get basin characteristics and estimates of flow statistics for the selected sites (USGS 2023b). While the basins delineated by StreamStats differ with the Project jurisdictional delineation and NHD mapped drainage features (i.e., flowlines), the location of onsite ephemeral drainages were confirmed by Dudek during site visits conducted on April 28, 2023, August 9, 2023, and June 17, 2024 in support of the Project Aquatic Resources Delineation Report (Dudek 2025).

According to StreamStats, there are four ephemeral drainages flowing from south to north through the project site which are tributary to a larger ephemeral drainage flowing from west to east though the project site. StreamStats was used to delineate watersheds (also known as basins) for each of these drainages and to calculate peak flows. The basins were altered by hand to reflect topography, and all basin areas and peak flows are approximate. The drainages and associated basins are shown on Figure 6, Project Basins, and in Table 4.

Table 4. Project Site Drainages

Drainage/Basin Number	Basin Drainage Area (acres)	100-Year Peak Flow (cfs)
Basin 1	368	1,040
Basin 2*	61	<421
Basin 3	79	421
Basin 4	76	421
Basin 5	21,717	8,030

Source: USGS 2023b.
Note: cfs = cubic feet per second.
* StreamStats could not generate runoff statistic for Basin 2 due to limited basin size.

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5 Impact Analysis

5.1 Method of Analysis

Impacts with respect to hydrology and water quality are assessed by comparing conditions expected under the proposed project to the existing environmental setting described above. Preliminary project site plans and grading plans were used to evaluate post-project hydrology in this Preliminary Study, and actions required to implement the federal, state, and local policies related to hydrology and water quality (see Section 3) are considered as components of the project in the evaluation of impacts. These actions include design standards that will limit project impacts to flooding, erosion, and water quality.

5.2 Thresholds of Significance

The County uses the significance criteria in Appendix G of the CEQA Guidelines as the thresholds of significance for projects requiring environmental review under CEQA (14 California Code of Regulations 15000 et seq.). Therefore, according to Appendix G, a significant impact would occur if development of the project would:

- Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality.
- Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:
  - result in substantial erosion or siltation on or off site;
  - substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;
  - create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or
  - impede or redirect flood flows.
- In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation.
- Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

5.3 Impact Analysis

Impact HYD-1: Would the project violate water quality standards or waste discharge requirements or degrade surface or ground water quality?

Construction

Approximately 113 acres would be graded to accommodate the solar facility. Earthwork would be nearly balanced, with 501,500 cubic yards of cut required and 501,100 cubic yards of fill required. While site preparation and grading is occurring, soil erosion may result in discharges of sediment-laden stormwater runoff downstream of the site. Construction could temporarily concentrate flows from storms and construction water usage, thus resulting in increased sedimentation and erosion of existing soils. Ground disturbance in drainage areas has a higher likelihood of resulting in erosion and sedimentation because water flow is more concentrated in these areas and has greater erosive potential.

BMPs such as fiber rolls and gravel bag barriers would limit the increase in sedimentation/siltation from construction activities on the project site which could otherwise temporarily violate Colorado River Basin Plan objectives for sediment. Excessive sedimentation could impair the protection of the beneficial uses of downstream intermittent drainages discussed in Section 2.2. In addition to sediment, other pollutants associated with construction activity could include heavy metals, oil/grease, fuels, trash, and other pollutants from accidental spills or releases of refuse, paints, solvents, sanitary wastes, and concrete curing compounds. BMPs such as drip pans and proper waste management would be used during construction activities to reduce pollutant and/or sediment mobilization to ensure compliance with Colorado River Basin Plan objectives and protection of beneficial uses.

A Stormwater Pollution Prevention Plan (SWPPP) or substantive equivalent would be prepared to address potential construction-related impacts on water quality. It will specify the location, type, and maintenance requirements for BMPs necessary to prevent stormwater runoff from carrying construction-related pollutants into downstream ephemeral washes. Minimum standard BMPs include erosion and sediment controls; site management/housekeeping/waste management; management of non-stormwater discharges; run-on and runoff controls; and BMP inspection, maintenance, and repair activities. The plan will also include a construction site monitoring program that identifies specific requirements for dry weather visual observations of pollutants at all discharge locations, and any additional measures, as appropriate.

SWPPPs prepared for the purpose of obtaining coverage under California's Construction Stormwater General Permit must be developed and implemented by a Construction General Permit Qualified SWPPP Developer (QSD)/Qualified SWPPP Practitioner (QSP). If a substantive equivalent is utilized, it would be prepared by a qualified engineer or erosion control specialist.

The following list includes examples of treatment control BMPs which could be employed during construction of the project (these features would appear as notes on any final design plans):

- Silt fences installed along limits of work and/or the construction site
- Stockpile containment (e.g., visqueen, fiber rolls, gravel bags)
- Street sweeping

- Runoff control devices (e.g., drainage swales, gravel bag barriers/chevrons, velocity check dams) and slope protection
- Wind erosion (dust) controls
- Tracking controls
- Prevention of fluid leaks (inspections and drip pans) from vehicles
- Materials pollution management
- Proper waste management (e.g., concrete waste management)
- Regular inspections and maintenance of BMPs

The applicant's erosion control plan should include the placement of fiber rolls around the perimeter of disturbed areas to filter out sediment, debris, and floatable material; use of hazardous material spill kits; and stabilized construction zone ingress/egress. These plans are to be further developed through preparation of a SWPPP or substantive equivalent.

The BMPs described above are sufficient to address the project's potential to violate water quality standards or waste discharge requirements. The construction-related impact of the project on water quality would be less than significant because existing permitting requirements and conditions of approval are sufficient to avoid water quality degradation, meet water quality standards and Colorado River Basin Plan objectives, and prevent adverse effects on beneficial uses.

Operation

There would be no full-time site personnel on-site during operation and no wastewater associated with operations is anticipated to be generated onsite. Therefore, operation of the facility is not anticipated to impact water quality and impacts would be less than significant.

Impact HYD-2: Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

During construction, water use would be minimal and used primarily for dust control and soil compaction. Operational water demand would be limited to infrequent panel cleaning and water utilized for such cleaning would be trucked into the Site by a third party and will not impact regional water demand. The Project's water needs would be met a local water purveyor and trucked to the site.

With respect to groundwater recharge, the Project site is currently undeveloped, and the surface is pervious, allowing groundwater recharge of all runoff at the site. The Project would introduce new impervious surfaces from solar panels, roofs, and compacted access roads. However, the solar panels would only nominally impede infiltration of rainfall. The solar panels would be mounted on steel support posts and the intervening areas between posts would be unpaved and pervious. Solar field development would maintain sheet flow of stormwater runoff where possible, thus allowing stormwater infiltration into on-site soils. Electrical inverters and the transformer would be placed on concrete foundation structures. With regard to available area for groundwater recharge, the area of impervious surfaces created by construction of these facilities would be nominal with respect to the size of the Project. As a result, the Project would not interfere substantially with groundwater recharge.

Regarding groundwater supplies, construction and operation of the Project is anticipated to use minimal amounts of water during construction and operations. Project water demand is not anticipated to substantially deplete groundwater supplies and the Project will not use groundwater or public water supplies.

Impact HYD-3: Would the project substantially alter the existing drainage pattern of the site or area through the addition of impervious surfaces resulting in erosion or siltation on- or off-site; increasing the rate or amount of surface runoff resulting in flooding on- or off-site; contributing runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide polluted runoff; or impede or redirect flood flows?

In general, modeling has shown that solar panels themselves do not have a significant impact on runoff volumes, peaks, or time to peak if ground cover or imperviousness is not impacted (Cook and McCuen 2013). However, the energy of the flow that drains from the panels may be greater than that of rainfall, which could increase erosion at the base of the panels (Cook and McCuen 2013), though this impact is expected to be minimal.

The current site hydrology consists of a series of intermittent drainage features flowing from south to north and a larger ephemeral drainage feature flowing from west to east along the northern boundary of the site. This existing hydrologic condition would be preserved in the preliminary project design by placement of the solar facilities and other infrastructure outside of the ephemeral streams. Grading and site disturbance would not encroach onto the mapped aquatic resources or onto a 20-foot buffer zone around these resources.

The Project includes a 20-foot wide compacted gravel access road connecting the Project site to Two Mile Road and several 20-foot wide compacted gravel interior fire access roads throughout the Project site. In total, there would be 9.6-acres of compacted gravel access roads, which are considered impervious surfaces. Several 20 to 40-foot wide steel bridges along the proposed access road and interior fire access roads would allow ephemeral streams to flow naturally from south to north. This additional 9.6-acres of impervious surface would be in Project Basins 1 through 4 (see Section 4) and constitutes 1.6% of that area. This increase of impervious surface can be considered minimal and would result in negligible increases in runoff rates and erosion and siltation. The project's impact to surface hydrology, as it would affect erosion, siltation, runoff, or flooding, would be less than significant.

Impact HYD-4: Would the project release pollutants during flooding?

Construction

There are no known hazardous materials or other sources of pollution that currently exist on or near the project site that could be subject to disturbance through excavation, grading, and construction activities. Construction of the proposed project would likely involve the use of small amounts of hazardous materials, such as fuels and greases to fuel and service construction equipment. Improper handling and storage of these hazardous materials could result in accidental release if not managed appropriately. As hazardous materials are expected be stored in quantities less than reportable quantities, releases from these containers would likely be negligible. Materials would be stored in appropriate containers in enclosed and secured locations to prevent accidental releases. Adherence to these procedures would ensure that impacts during construction would be less than significant.

Operation

Excluding fencing, solar panel posts, graded features such as roads and basins, and underground utilities lines, Project infrastructure located within the 100-year DWR Awareness floodplain may have specific freeboard requirements. This freeboard requirement, and the placement of inverters/transformers on concrete pads or foundations, will make sure that any such equipment proposed within these areas will be sufficiently elevated above floodwaters and will not release pollutants during flooding. Additional hydrologic and hydraulic modeling and a final drainage study may be required to demonstrate that proposed fencing within the designated floodway will not impede debris carried in flood waters (e.g., logs) and serve as a blockage to flow; this additional analysis will be used to guide the project's final design such that it preserves the drainages' natural flow patterns, minimizing scour within the project site (which would result in increased sediment transport downstream), and complies with the Floodplain Management Ordinance.

The project will produce a small amount of solid waste associated with maintenance activities. Photovoltaic plant wastes may include broken and rusted metal, defective or malfunctioning modules, electrical hardware, empty containers, and other miscellaneous solid wastes, including the typical refuse generated by workers. These materials will be collected and separated for recycling where available. Any defective or broken solar modules will be returned to the manufacturer for recycling. E-Group anticipates the level of hazardous materials used or waste generated on the site to be negligible.

Used biodegradable dielectric fluid and mineral oil from the transformers and miscellaneous electrical equipment are potentially hazardous materials. The spent oil would be collected and delivered to a recycling company at the time it is removed from the equipment. This material would not be stored on-site. Any pollutants that are kept on-site will be contained, properly stored, elevated above freeboard requirements and comply with the Floodplain Management Ordinance. New facilities that use or store hazardous materials in quantities that would place them in the state's Toxic Release Inventory or small quantity generator database must comply with standards of elevation, anchoring, and floodproofing to the satisfaction of the City's building department and the Twentyniine Palms Fire Department. Lastly, with implementation of Mitigation Measure HYD-1, a Spill Prevention Control and Countermeasure Plan would be prepared for the Project, which would discuss measures of proper containment and inspections to prevent spills of oils and fuels.

With the measures discussed above and incorporation of Mitigation Measure HYD-1, the project's impact to pollutants during flooding would be less than significant.

Mitigation Measure HYD-1: The Applicant shall prepare a Spill Prevention, Control, and Countermeasure Plan (SPCCP) that shall clearly state measures to stop the source of a spill, contain the spill, clean up the spill, dispose of contaminated materials, and train personnel to prevent and control future spills. The SPCCP shall identify sources of oil or hazardous wastes that may be stored or used on site. If oil or hazardous wastes would be stored on site during operations, the SPCCP shall identify the location of storage, anticipated volumes of materials to be stored, method of storage, and countermeasures to address potential spill or accidental release of materials. In addition, the SPCCP shall include step-by-step instructions for the response to spills at a facility. In addition, the spill response plan should:

- Identify individuals responsible for implementing the plan

- Define safety measures to be taken with each kind of waste
- Specify how to notify appropriate authorities, such as police and fire departments, hospitals, or municipal sewage treatment facilities for assistance
- State procedures for containing, diverting, isolating, and cleaning up the spill
- Describe spill response equipment to be used, including safety and cleanup equipment

The SPCCP shall be submitted to San Bernardino County Public Works – Environmental Management Division for review and approval prior to occupation/operations and shall be maintained over the operational life of the Project.

Impact HYD-5: Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

The Project site is not managed under an MS4 permit and therefore not subject to a water quality management plan. Regarding groundwater, please refer to the analysis presented above under Impact HYD-2. As discussed therein, construction and operation of the Project is anticipated to require minimal amounts of water during construction and operations, which is not proposed to be sourced from groundwater wells or public water supply. Project water demand is therefore not anticipated to conflict with or obstruct implementation of a sustainable groundwater management plan.

6 References

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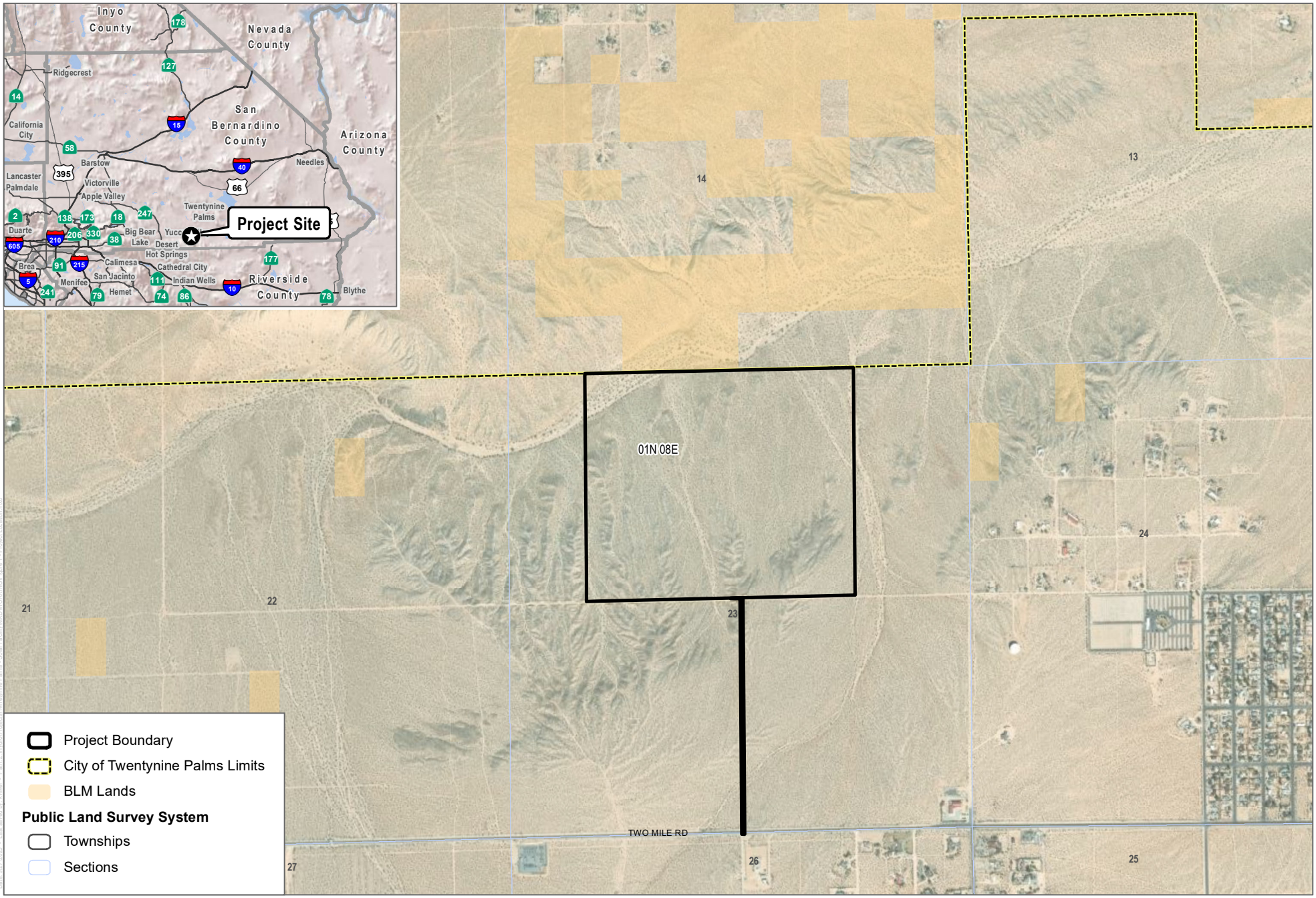
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SOURCE: Esri World Imagery Basemap (accessed 2022); San Bernardino County

DUDEK

0 0.175 0.35 Miles

FIGURE 1

Project Location

E-Group PS Solar Project

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SOURCE: Esri World Imagery Basemap; SWRQCB

DUDEK

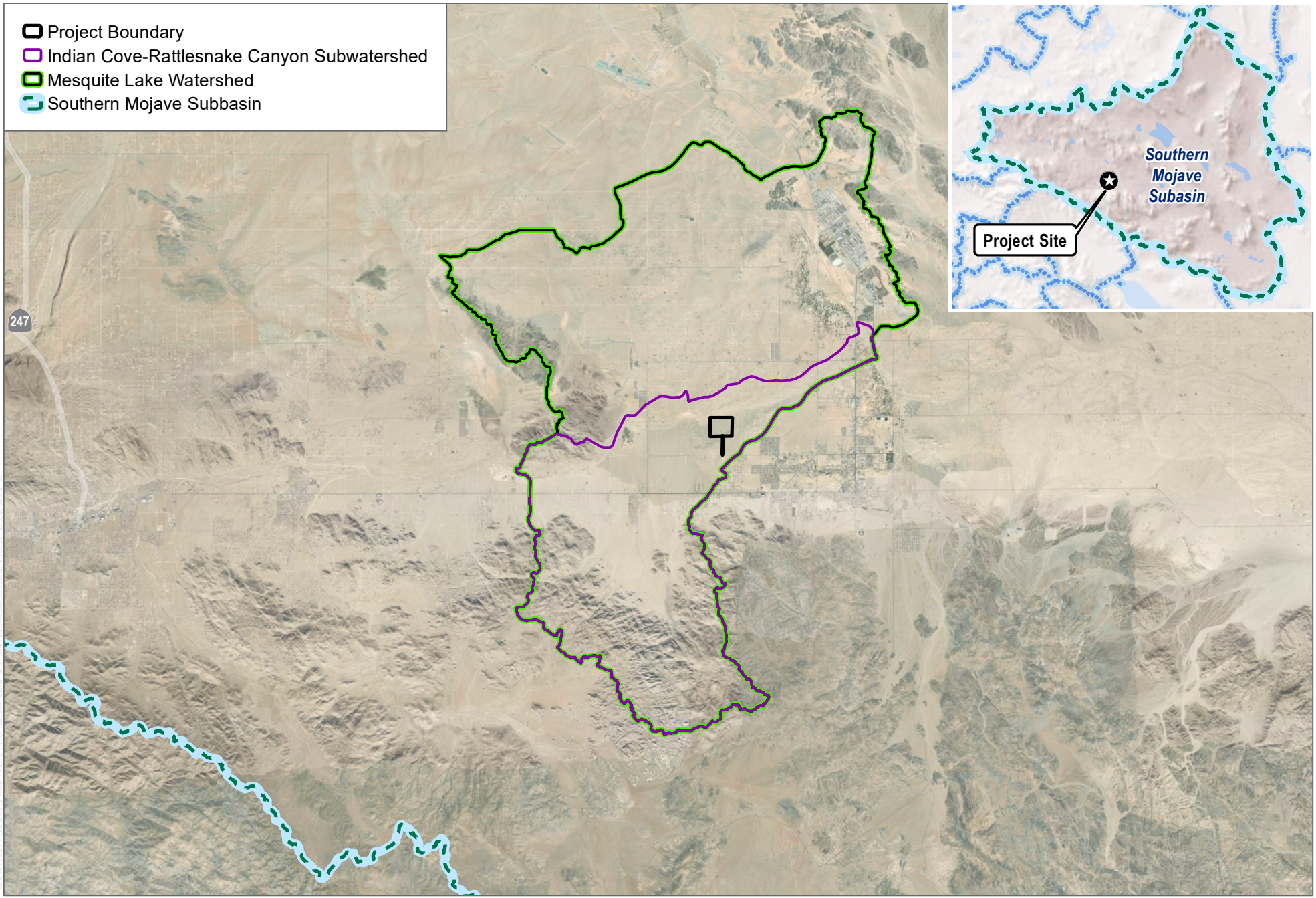
0 2.5 5 Miles

FIGURE 2

RWQCB Hydrologic Setting

E-Group PS Solar Project

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SOURCE: Esri World Imagery Basemap; USGS NHD 2022

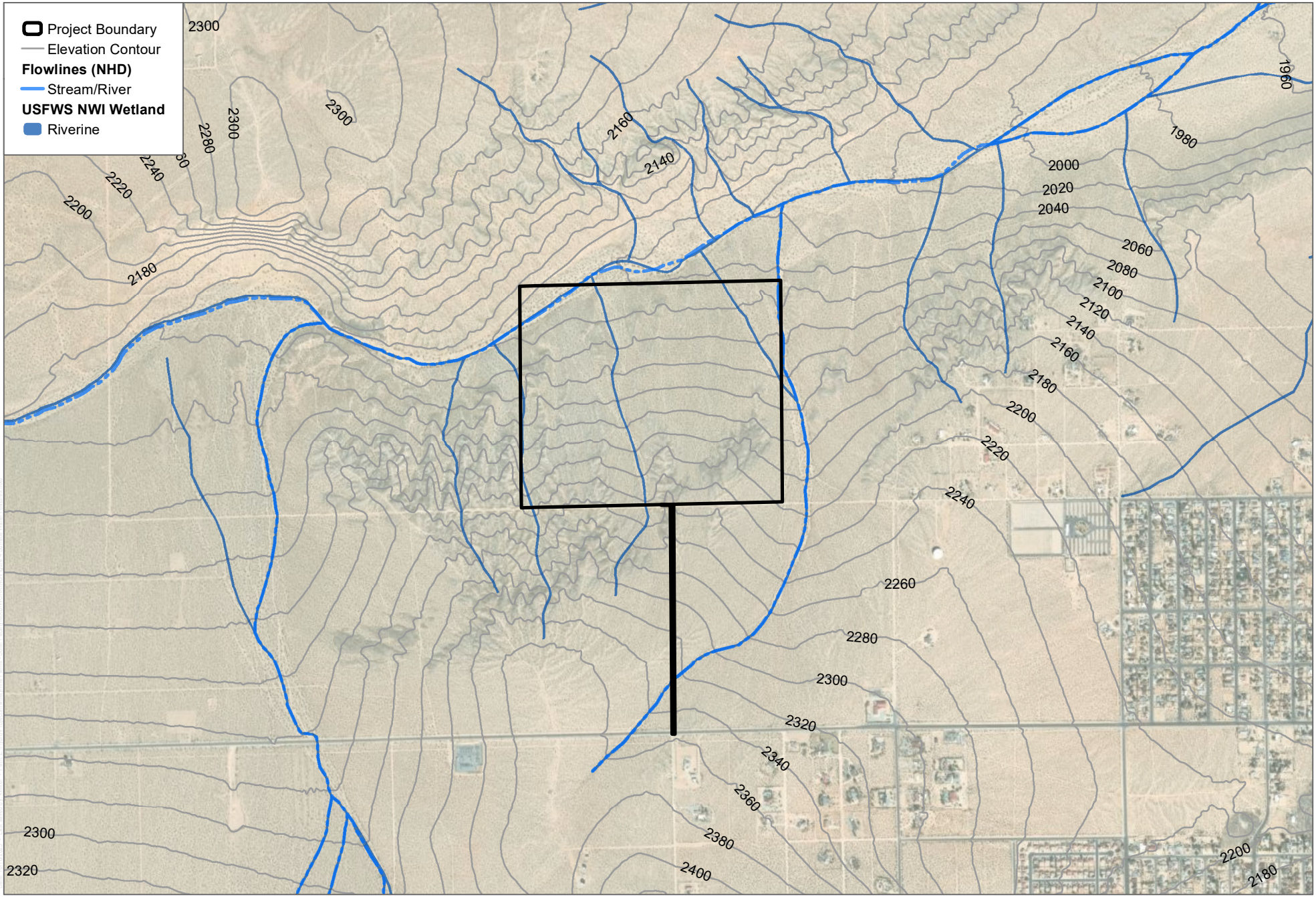
DUDEK

FIGURE 3

USGS Hydrologic Setting

E-Group PS Solar Project

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SOURCE: Esri World Imagery Basemap; USGS NHD 2023; USFWS 2023

DUDEK

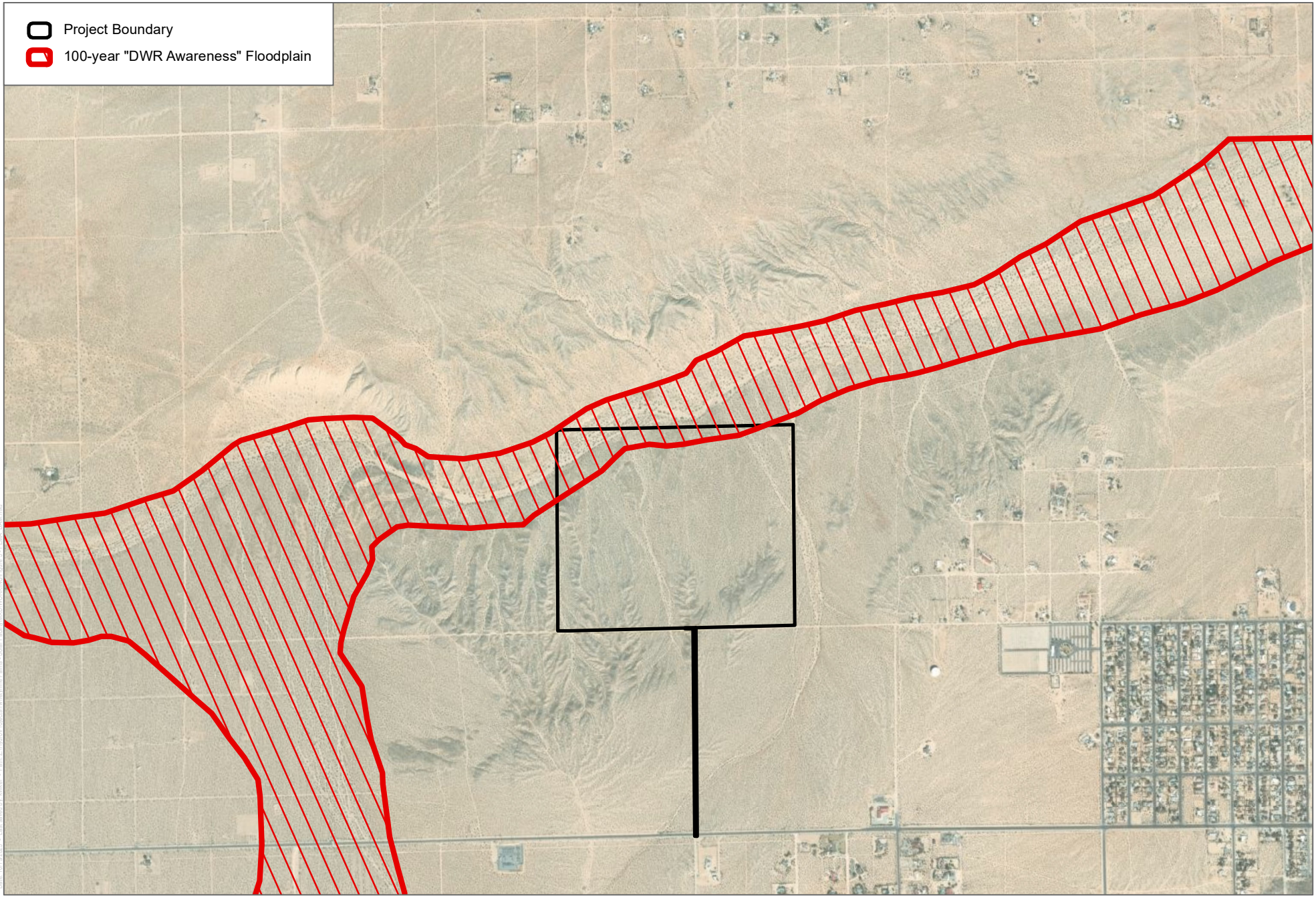
0 0.25 0.5 Miles

FIGURE 4

Surface Water Features

E-Group PS Solar Project

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SOURCE: Esri World Imagery Basemap (accessed 2022); San Bernardino County; CA DWR BAM

DUDEK

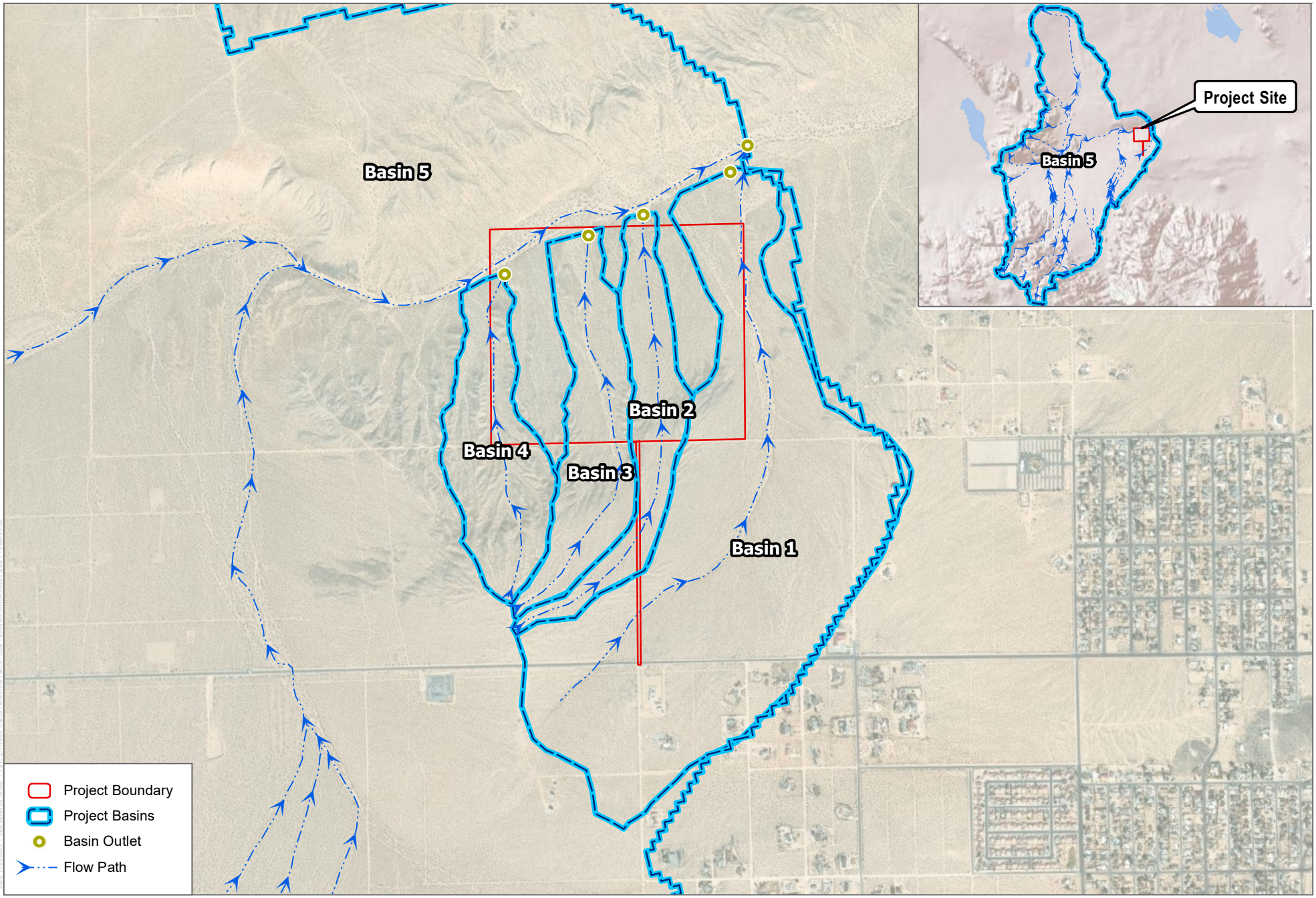
0 0.2 0.4 Miles

FIGURE 5

Flood Hazard

E-Group PS Solar Project

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SOURCE: Esri World Imagery Basemap (accessed 2022); StreamStats

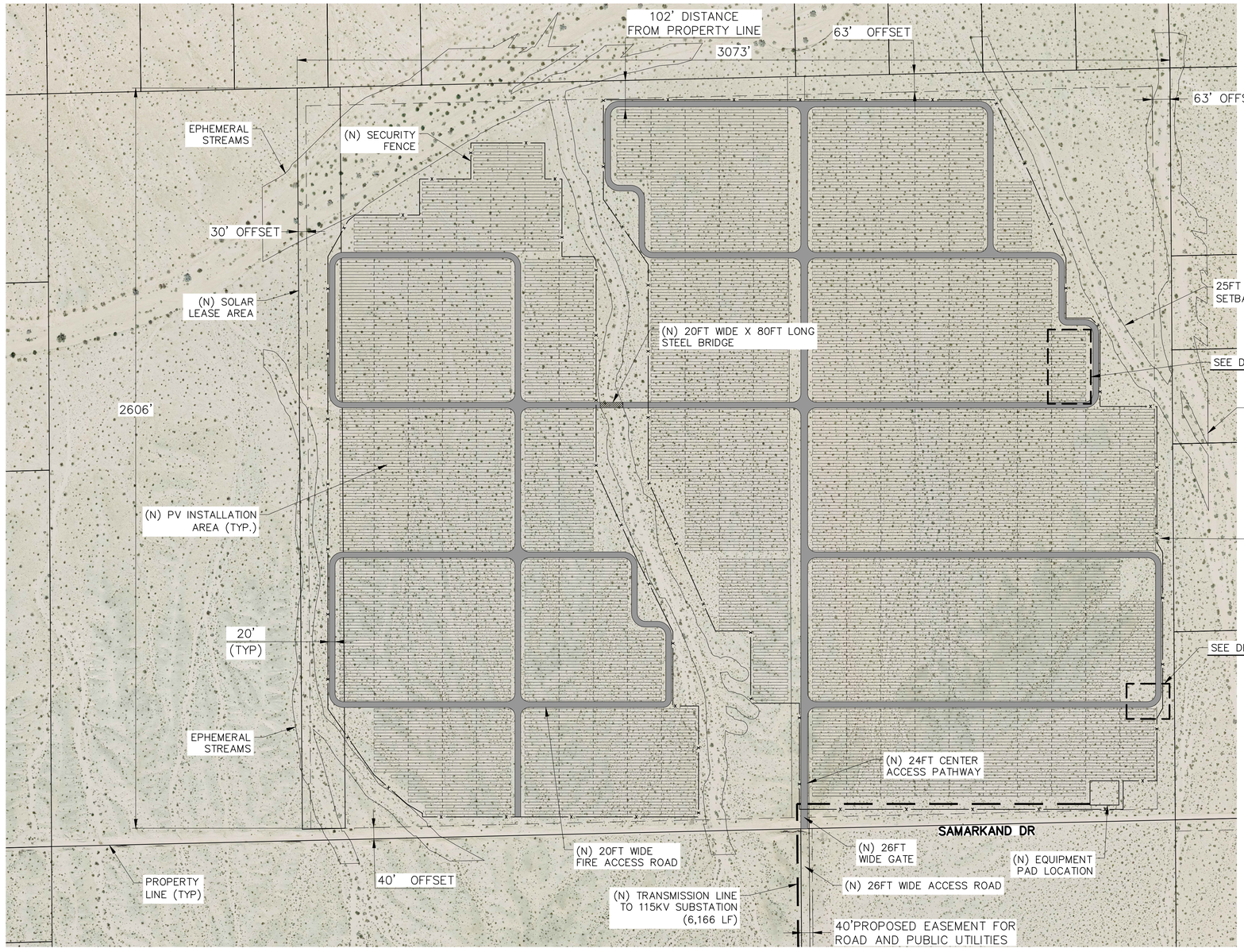
DUDEK

0 0.2 0.4 Miles

FIGURE 6
Poject Basins
E-Group PS Solar Project

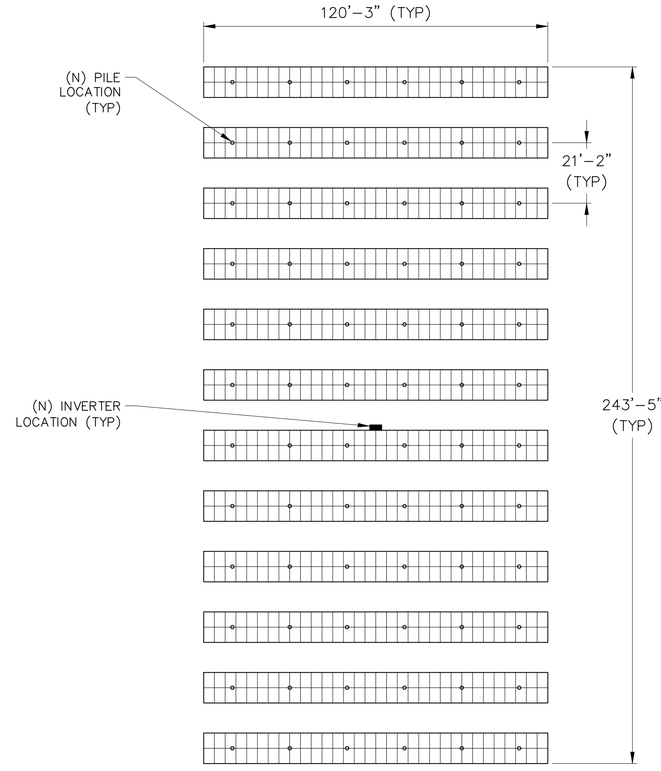
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Appendix A
Site Plan

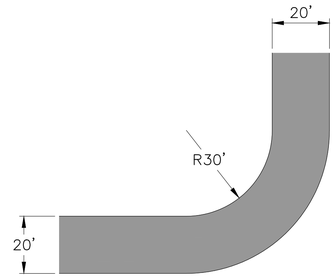


PLAN
SCALE: 1"=200'

GRAPHIC SCALE
0 200' 400'
SCALE: 1" = 200'



DETAIL 1
SCALE: 1"=25'



DETAIL 2
SCALE: 1"=25'

PRELIMINARY SITE PLAN
FOR PLANNING PURPOSES ONLY. SITE PLAN WILL BE REVISED PER ENVIRONMENTAL CONSIDERATIONS AND FURTHER ENGINEERING DESIGN.

REV	DESCRIPTION	APPD	DATE

SCALE AS SHOWN

DATE MAY 2023

PLANS PREPARED BY:
DUDEK
605 Third Street Encinitas, CA 92024
760.942.5147 Fax 760.632.0164

APPLICANT:
E-GROUP PS LLC
40764 WINCHESTER RD. SUITE 590
TEMECULA, CA 92591
(949) 763-9555

E-GROUP

29 PALMS SOLAR FACILITY

ENLARGED PLAN AND DETAILS

PROJECT NO. 14392

DRAWING NO. C-2

3 OF 5 SHEETS

P:\14392 Engineering\Cad_Data\Energy CAD Projects\29 Palms 14392\CAD\Update 12-18-24\14392_29 Palms_Site.dwg, 12/19/24 8:39am

Appendix B
FEMA FIRM Panel

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11 North. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by the San Bernardino County ISD.GIS Department, United States Geological Survey, the Bureau of Land Management, the United States Department of Agriculture, and the National Geodetic Survey. The imagery was flown by U.S. Department of Agriculture Farm Sevice Agency in 2012 and was produced with a 1-meter ground sampling distance.

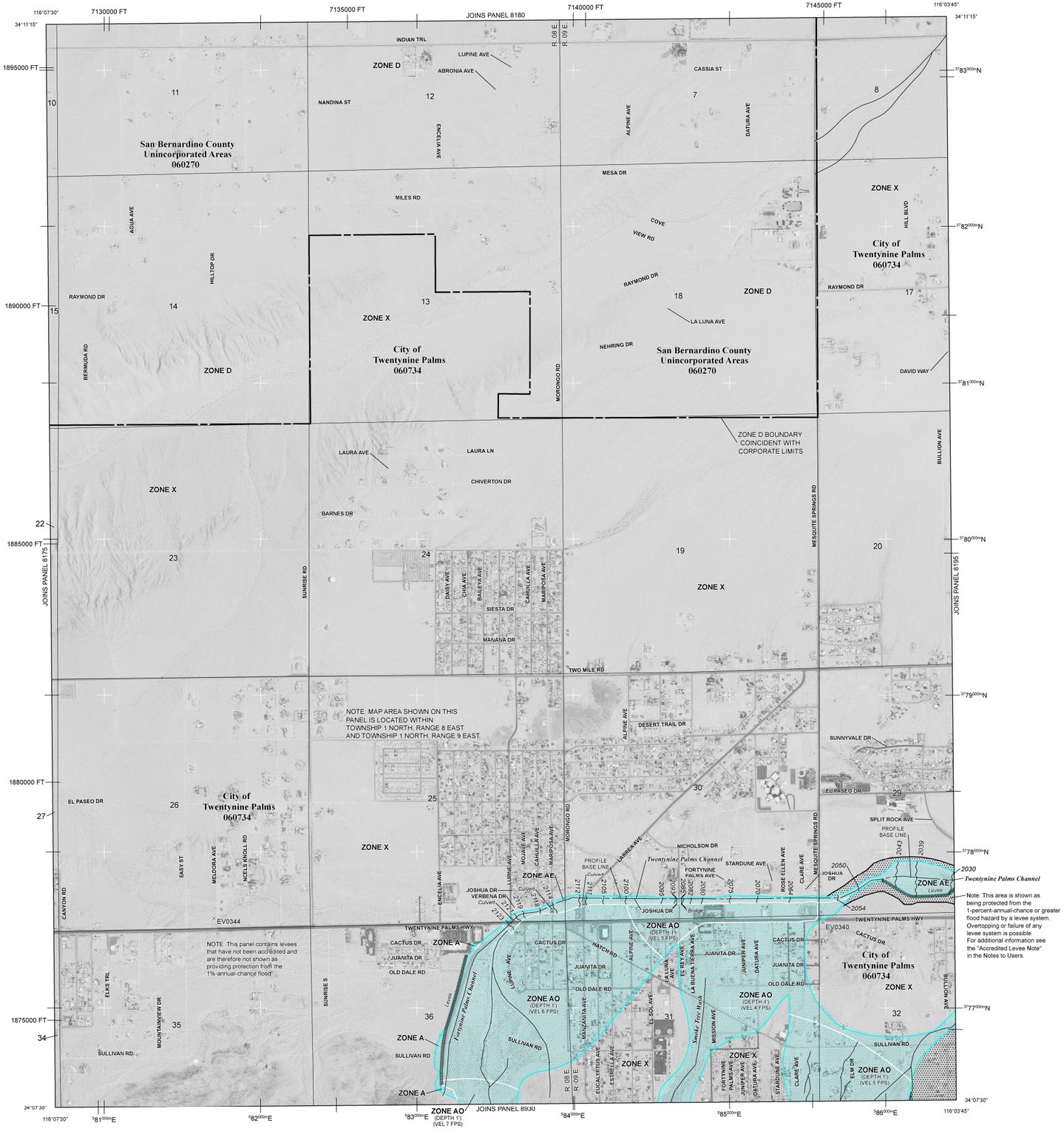
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

ACCREDITED LEVEE NOTES TO USERS: Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA website at http://www.fema.gov/business/nfip/index.shtm.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*
* Referenced to the North American Vertical Datum of 1988
A — A — Cross section line
23 — 23 — Transect line
97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4775000mE — 1000-meter Universal Transverse Mercator grid values, zone 11
6000000 FT — 5000-foot grid ticks: California State Plane coordinate system, Zone V (FIPSZONE = 405), Lambert projection
DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories List on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
August 28, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
September 2, 2016 – to change Base Flood Elevations, to add Base Flood Elevations, to change Special Flood Hazard Areas, to add Special Flood Hazard Areas, to change zone designations, to incorporate previously issued Letters of Map Revision, and to reflect updated topographic information.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 500 1,000 1,500 2,000 FEET
300 0 300 600 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 8190J

FIRM

FLOOD INSURANCE RATE MAP

SAN BERNARDINO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 8190 OF 9400

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SAN BERNARDINO COUNTY	060270	8190	J
TWENTYNINE PALMS, CITY OF	060734	8190	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

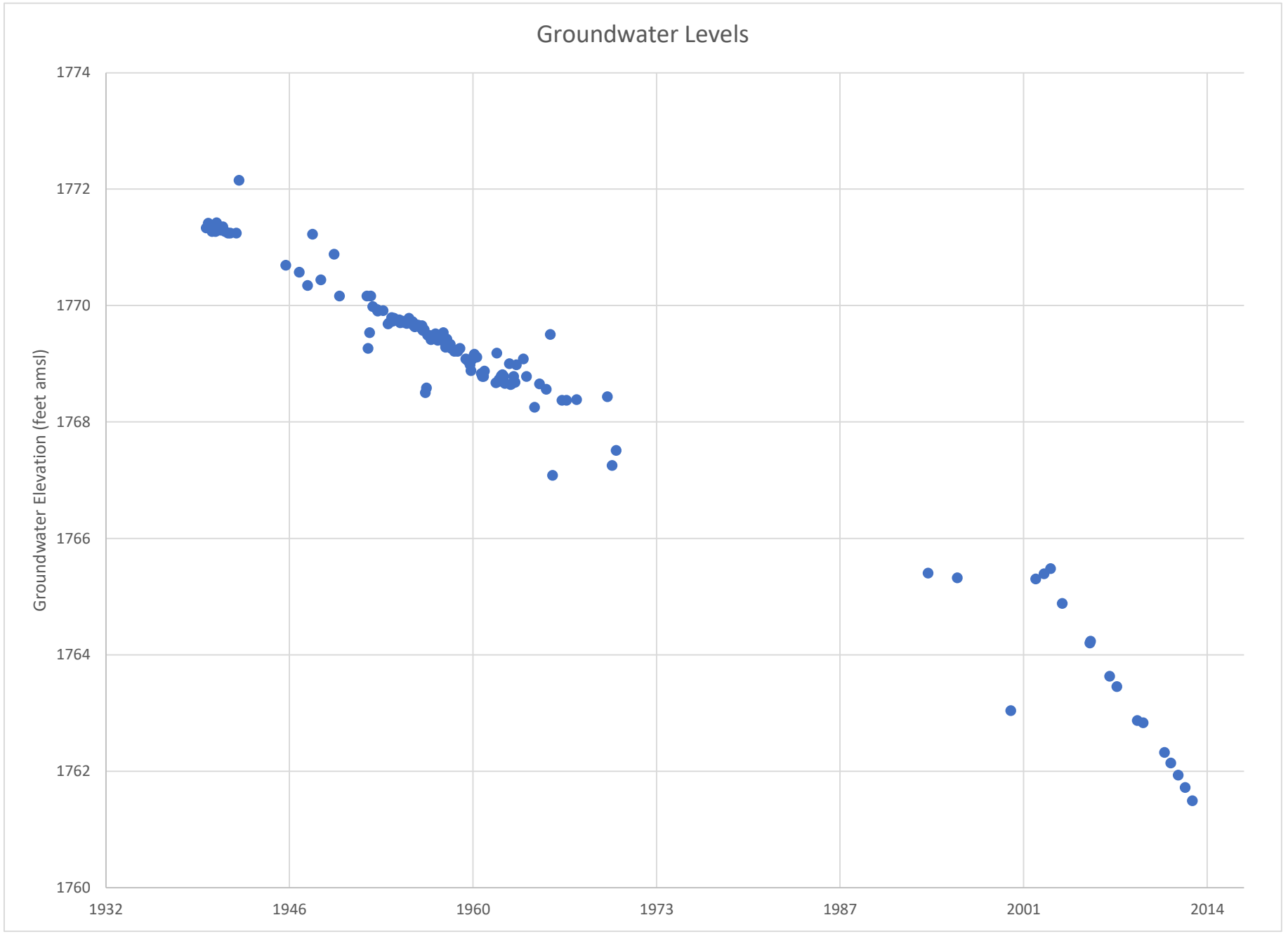
MAP NUMBER
06071C8190J

MAP REVISED
SEPTEMBER 2, 2016

Federal Emergency Management Agency

Appendix C

State Well 01N08E12G001S Hydrograph


Groundwater Levels
Groundwater Elevation (feet amsl)
1774
1772
1770
1768
1766
1764
1762
1760
1932
1946
1960
1973
1987
2001
2014