PALMDALE

a place to call home

NOTICE OF INTENT TO ADOPT A MITIGATED NEGATIVE DECLARATION

Pursuant to Title 14 of the California Code of Regulations, Sections 15072 and 15073, as amended to date, this is to advise that the City of Palmdale, which is the lead agency overseeing this project, has completed a Mitigated Negative Declaration for the proposed project described below.

Project No.: Site Plan Review 20-009

Project Location: Two parcels totaling approximately 140 acres located on the northwest corner of Avenue P and 15th Street East in the Lockheed Specific Plan (APN's: 3022-027-016 and -017), City of Palmdale, County of Los Angeles

Project Description: A proposal to develop a utility scale solar power generating facility.

Public Review Period: The Mitigated Negative Declaration is available for public review and comment pursuant to California Code of Regulations, Title 14, Sections 15072 and 15073 (California Environmental Quality Act). All comments must be submitted in writing to the address below. Please refer to this project by the file/index number listed above. If you have no comment, no reply is necessary. The City of Palmdale does not limit public comments to only the circulation period. Comments can be submitted for consideration up until final action is taken by a vote of the approving authority. The review period has not been shortened pursuant to Section 15105 of the California Environmental Quality Act (CEQA) Guidelines. The comment period during which the City will receive comments on the Mitigated Negative Declaration is:

Starting Date: December 17, 2020 **Ending Date: January 3, 2021**

Public Hearing: The City of Palmdale Hearing Officer is tentatively scheduled to make a decision regarding this project and the associated Mitigated Negative Declaration on January 28, 2021, in the City Hall Council Chamber at 38300 Sierra Highway, Suite B, Palmdale, California, at 3:00 p.m.

Responses and Comments: Please send your written comments to:

Justin Sauder, Associate Planner
City of Palmdale, Economic and Community Development Department
38250 Sierra Highway
Palmdale, California 93550
Phone (661) 267-5372, FAX (661) 267-5233
Email: jsauder@cityofpalmdale.org

Document Availability: Copies of the application, maps, plans, environmental documents, and other pertinent materials related to this application are available for public review by appointment at the Planning Division (38250 Sierra Highway) from 7:30 am to 6:00 pm Monday through Thursday. Additional information is also available on the City website at www.cityofpalmdale.org.

Megan Taggart

Megan Taggart
Acting Planning Manager

12/17/20

Date

CITY OF PALMDALE

Site Plan Review (SPR) 20-009

INITIAL STUDY /
MITIGATED NEGATIVE DECLARATION

Prepared for:

CITY OF PALMDALE
38250 SIERRA HIGHWAY
PALMDALE, CA 93550

Prepared by:

Tetra Tech, Inc.
301 E. Vanderbilt Way, Suite 450
San Bernardino, California 92408

December 2020

DISTRIBUTION LIST

The distribution list for this Initial Study/Mitigated Negative Declaration includes relevant federal, state, and local agencies, and individuals and organizations with an interest in the project.

Applicant: Lockheed Martin Aeronautics
1011 Lockheed Way
Palmdale, California 93599

Applicant's Representative: Tetra Tech, Inc.
301 E. Vanderbilt Way, Suite 450
San Bernardino, California 92408
Attn: Stephanie Pacheco

CITY DEPARTMENTS

- Case Planner
- City Engineer, Bill Padilla (PDF copy)
- City Hall Counter Copy
- City Website
- Director of Recreation and Culture
- Director of Public Works
- Library Counter Copy
- Planning Counter Copy
- Department of Recreation and Culture Counter Copy

FEDERAL AGENCIES

- Department of the Air Force (Plant 42)

STATE AGENCIES

- California Air Resources Board
- California Department of Fish and Wildlife
- Lahontan Regional Water Quality Control Board
- Native American Heritage Commission
- State Office of Historic Preservation

COUNTY OF LOS ANGELES

- Los Angeles County Dept. of Public Works (4 copies)
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- Los Angeles County Fire Department (3 copies)
- Los Angeles County Sheriff's Department

UTILITIES/SERVICES

- Palmdale Water District
- AT&T Local Service (email only)
- AT&T Long Distance (email only)
- Southern California Edison (2 copies)
- Southern California Gas

OTHER ORGANIZATIONS

- Antelope Valley Air Quality Management District
- Antelope Valley Archaeological Society

ADDITIONAL DISTRIBUTION

Lozeau Drury LLP
1939 Harrison Street, Suite 150
Oakland, California 94612

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Appendices

1. INTRODUCTION

A. Purpose and Background of the Initial Study

Pursuant to Section 15063 of the California Environmental Quality Act (CEQA) Guidelines (Title 14, California Code of Regulations, Section 15000 et seq.), this Initial Study is a preliminary environmental analysis prepared by Tetra Tech for use by the CEQA Lead Agency (City of Palmdale) as a basis for determining whether an Environmental Impact Report (EIR), a Negative Declaration (ND), or a Mitigated Negative Declaration (MND) is required for the project. The State CEQA Guidelines require that an Initial Study contain a project description of environmental setting, identification of environmental effects by checklist or other similar form, explanation of environmental effects, discussion of mitigation for significant environmental effects, evaluation of the project's consistency with existing, applicable land use controls, and the name of persons who prepared the study.

Based on the analysis contained in this Initial Study, it has been determined that the proposed project would not result in any significant impacts that cannot be mitigated to less than significant levels. Therefore, preparation of an MND is appropriate for the project.

B. Lead Agency

City of Palmdale
Economic and Community Development Department
Planning Division
38250 Sierra Highway
Palmdale, California 93550

C. Technical Studies

The following technical studies were prepared in support of the proposed solar project at the Lockheed Palmdale facility, and are provided as appendices to this Initial Study as noted:

- BSK Associates
  - 2019 Geotechnical Engineering Investigation Report. Lockheed Martin Palmdale Solar Project, Palmdale, California. August 15, 2019.
- Burns & McDonnell
  - 2020a Palmdale Solar Expansion Glare Analysis. May 4, 2020.

2020b Preliminary Drainage Study, Lockheed Martin Solar Development. April 17, 2020.

- Paleo Solutions, Inc.

- Sunrise Consulting
  2019 Lockheed Martin Aeronautics Palmdale Facility Biological Resources Technical Report. August 2019.]

- Tetra Tech, Inc.
  2019 Jurisdictional Delineation of Wetlands/Waters Subject to Regulatory Authority, Proposed Alternative Energy Project Site, Lockheed Martin Aeronautics Company, Plant 10, Palmdale, California. July 2019.

2. PROJECT DESCRIPTION

A. Project Location

The 140-acre project site is located between Blackbird Lane and East Avenue P, and between 10th Street East and 15th Street East, on Assessor Parcel Numbers 3022-027-016, and 3022-027-017 (Figure 1). The project site is located at Lockheed Martin's Plant 10, with the U.S. Air Force Plant 42 to the north and east, undeveloped land to the west, and industrial development to the south within the City of Palmdale.

B. Project Setting

The project area is currently undeveloped Mojave Desert habitat with basin big sage (*Artemisia tridentata*), rabbit brush (*Ericamaria nauseosa*), with Joshua trees (*Yucca brevifolia*) scattered across the landscape. In the northwestern corner of the project site, there is a drainage that bisects the property from northeast to southwest. The site is characterized as generally level terrain with a gentle gradient trending from the south to the north.

C. Project Characteristics

The proposed project is the construction, operation and eventual decommissioning of a 25-Megawatt (MW) alternative energy solar project (Figure 2). The solar project and its related components would be constructed within the 140-acre site and would tie into the existing Southern California Edison (SCE) grid associated with the adjacent Plant 10 complex to the north of the site.

The proposed solar alternative energy project would be a single-axis tracker project with a total system size of 25 MW. A single-axis tracker system allows the solar panels one axis of movement that is usually aligned north and south, allowing the panels to arc east to west and track the sun as it rises and sets. Associated infrastructure would include paved and unpaved roads to allow access to the solar panels, a chain link perimeter security fence, a new switchyard, and an underground distribution line to the point of interconnection at the on-site SCE substation (Figure 2). The distribution line would be bored under the unnamed drainage to a depth of four feet beneath the bed of the drainage to prevent scour from stormwater flow. The distribution line would be buried in a trench and connect the solar project to the SCE substation located at Plant 10. As identified in the preliminary drainage study completed for the project, two retention-type basins for on-site stormwater management would also be constructed on site in the northeastern and northwest corners of the site (Figure 2). The northwestern retention basin may not be required based on final project design characteristics.

Construction of the project is estimated to begin in December 2020. Table 1 provides a summary of construction activities and their duration, as well as equipment and personnel needed. Construction activities would be scheduled between 7:00 a.m. and 5:00 p.m., Monday through Friday.

Table 1: Summary of Construction Activities

Construction Activities	Duration (Days)	Equipment Type and Number	Personnel
Site Grubbing and Preparation	50	Backhoe (1), Skid steer (1), Motor grader (1), Dump truck (1), Bulldozer (1), Roller (1)	10
Construction			
Site Fences	30	Forklift (1), Flatbed truck (1), Auger (1)	6
Structures	75	Backhoe (1), Forklift (4), PD10 Pile driver (4)	25
Electrical	52	Trencher (1), Backhoe (2), Crane (1), Forklift (3)	60

Table 2 provides an estimate of electricity output during the projected 20-year lifespan of the project. The facility would be constructed such that output could be monitored remotely. Normal preventative maintenance and routing inspections would occur on a monthly or semi-monthly basis. Grading and drainage of the site access roads would be maintained on an as-needed basis. The entire site would be inspected for signs of deterioration or repair needs on an annual basis. Emergency maintenance and repairs would occur immediately after the failure occurs.

Table 2: Summary of Energy Production During the Estimated Life Span of the Project

Year	Energy Production (Kilowatt hour)
1	57,700,000
2	57,411,500
3	57,124,443
4	56,838,820
5	56,554.626
6	56,271,853
7	55,990,494
8	55,710,541
9	55,431,989
10	55,154,829
11	54.879,055
12	54,604,659
13	54,331,636
14	54,059,978
15	53,789,678
16	53,520,730
17	53,253,126
18	52,986,860
19	52,721,926
20	52,458,316

The estimated lifespan of the solar project is 20 years. If it is determined that the facility is no longer needed, the site would be decommissioned, and all equipment would be removed in compliance with the Conditions of Approval for the project and in accordance with applicable local and state regulations. Grading of the site will be minimized to the greatest extent practical. Existing site vegetation will be cut and crushed to preserve the root ball (Burns and McDonald 2020). The site would be restored to preconstruction conditions where feasible. A Construction Waste Management Plan would be required at the time of decommissioning that would include recycling and/or reuse measures to reduce the amount of waste materials sent to the landfill. The solar panel provider has a recycling program that recovers 80 percent of panel materials. The site would be restored in compliance with the City of Palmdale requirements.

D. Regulatory Requirements, Permits, and Approvals

The following permits and approvals will be required from the City of Palmdale;

- A Site Plan Review requesting to develop the 140-acre site as a solar farm;
- Permit issued by the City of Palmdale for Encroachment on Avenue O-12;
- A Native Desert Preservation Plan related to the Joshua trees present within the project area;

- A Dust Plan to be reviewed and approved by the City of Palmdale and the Antelope Valley Air Quality Management District (AVAQMD)
- A Grading Permit; and
- A Building Permit.

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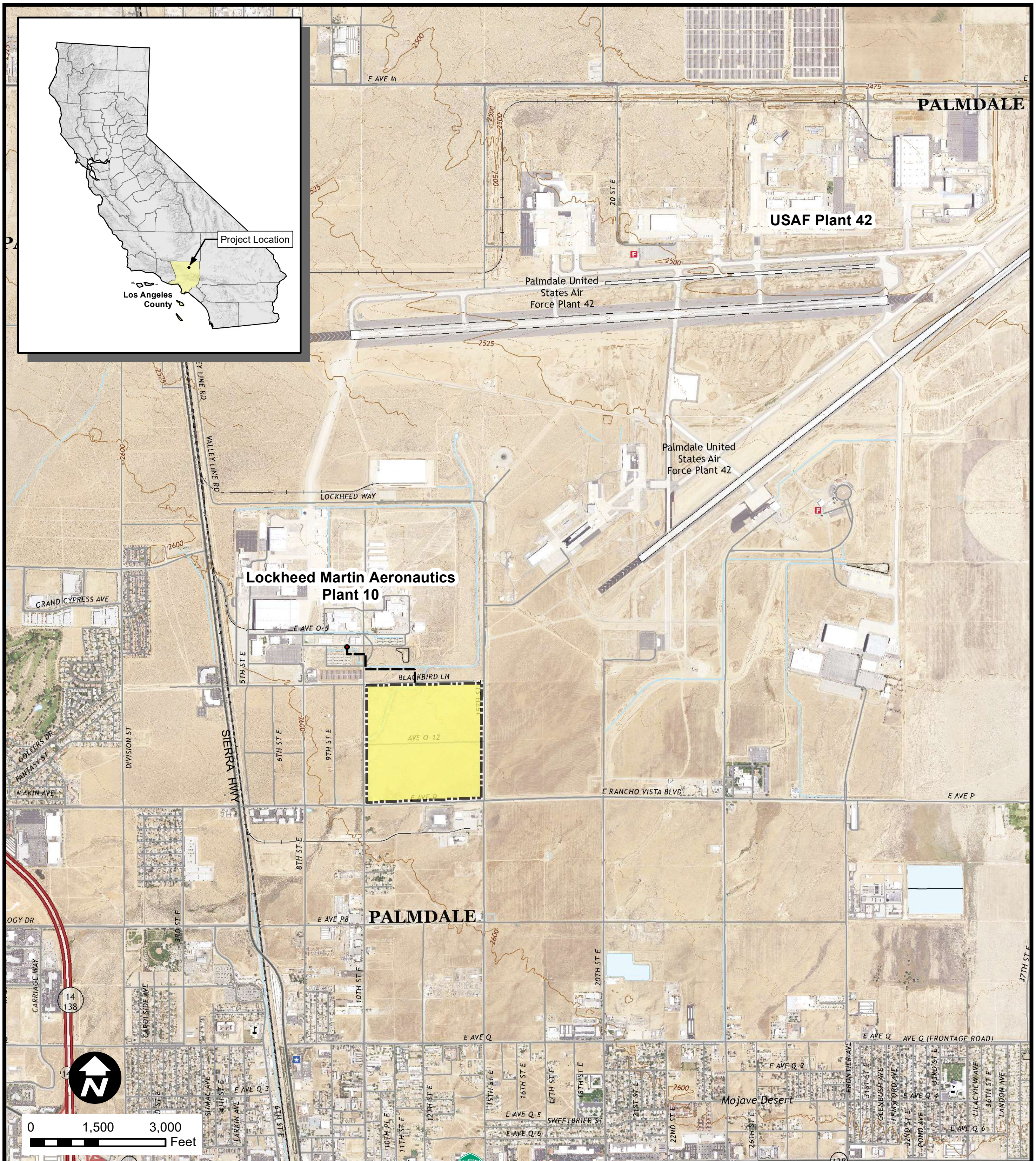

Alternative Energy Project Site

LOCKHEED MARTIN AERONAUTICS
PALMDALE PLANT 10

Figure 1
Location Map-
Alternative Energy
Project Site

TETRA TECH

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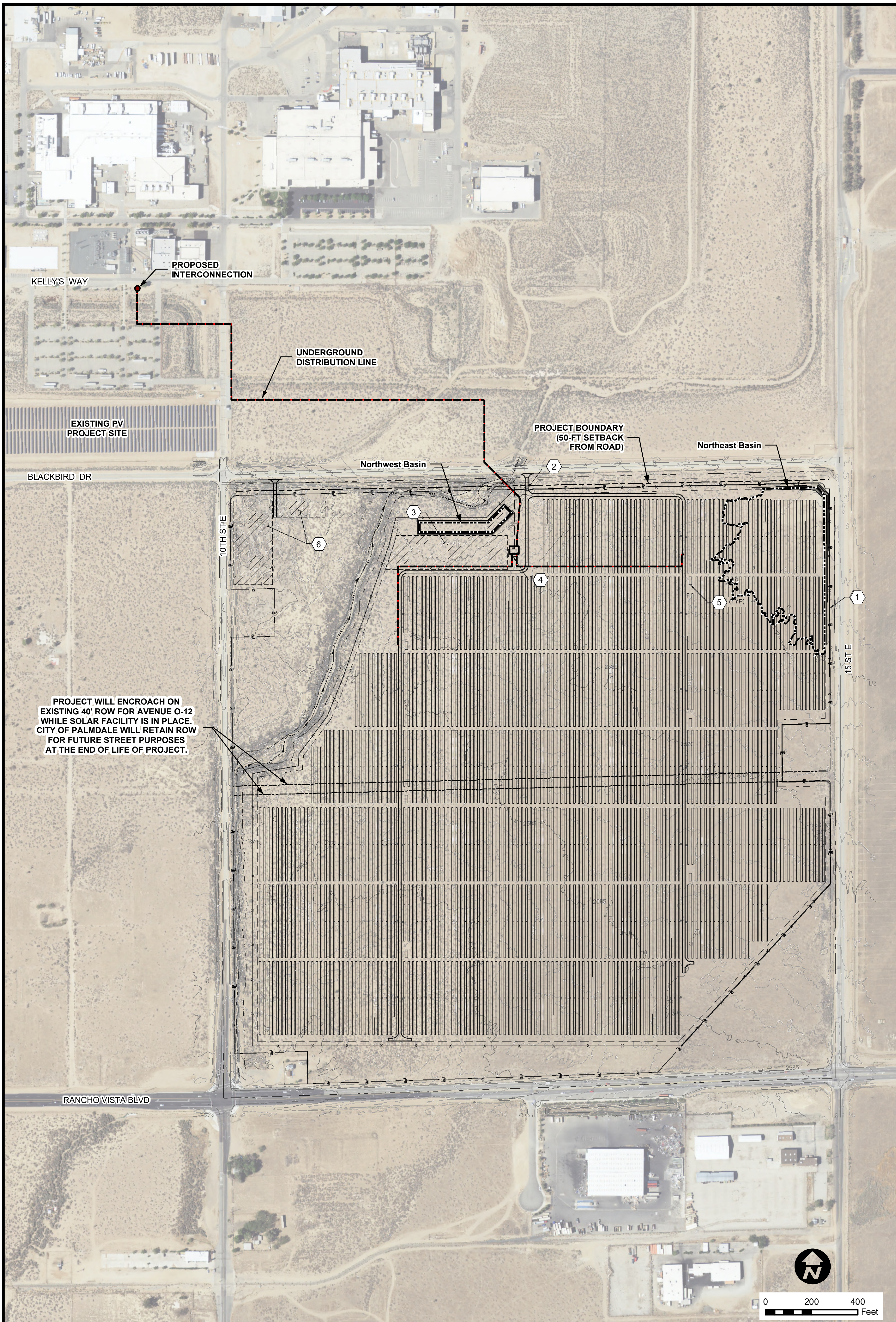

Key Notes:

1. Chain Link Fence
2. Swing Gate
3. Staging Area
4. 15 KV Switchgear
5. Inverter
6. Construction Trailer and Parking

Adapted from:
Burns McDonnel drawing PLM-SOLR-C003

LOCKHEED MARTIN AERONAUTICS
PLANT 10, PALMDALE, CALIFORNIA

Figure 2

Site Plan

TETRA TECH

3. ENVIRONMENTAL CHECKLIST

A. Background

1. **Project Title:**
   SPR 20-009, Initial Study/Mitigated Negative Declaration, Palmdale, California

2. **Lead Agency Name and Address:**

   City of Palmdale
   Economic and Community Development Department
   Planning Division
   38250 Sierra Highway
   Palmdale, CA 93550

3. **Contact Person and Phone Number:**

   Justin Sauder, Associate Planner
   City of Palmdale
   Economic and Community Development Department
   Planning Division
   38250 Sierra Highway
   Palmdale, CA 93550
   (661) 267-5372

4. **Project Location:**

   The 140-acre project site is located between Blackbird Lane and East Avenue P, and between 10^{th} Street East and 15^{th} Street East, on Assessor Parcel Numbers 3022-027-016, and 3022-027-017. The project site is located at Lockheed Martin Aeronautics Plant 10, with the U.S. Air Force Plant 42 to the north and east, undeveloped land to the west, and industrial development to the south within the City of Palmdale.

5. **Project Applicant's Name and Address:**

   Lockheed Martin Aeronautics
   1011 Lockheed Way
   Palmdale, California 93599

6. **Existing Land Use / Zoning / General Plan:**

	CURRENT LAND USE	ZONING[1]	GENERAL PLAN DESIGNATION[2]
SITE	Undeveloped	SP(Lockheed)	SP (Specific Plan-Lockheed)
NORTH	Industrial	SP(Lockheed)	Specific Plan-Lockheed (SP)
SOUTH	Industrial Development	M-2(General Industrial)	IND (Industrial)
EAST	Undeveloped	M-3 (Airport Industrial)	AR (Airport and Related Uses)
WEST	Undeveloped	M-2(General Industrial)	IND (Industrial)

[1]City of Palmdale Zoning Map. Adopted by the City Council 12/14/94
[2]City of Palmdale General Plan Land Use Map. Adopted by the City Council 1/25.93

7. **Description of Project:**

The proposed project is the construction, operation and eventual decommissioning of a 25-Megawatt (MW) alternative energy solar project. The solar project and its related components would be constructed within the 140-acre site and would tie into the existing Southern California Edison (SCE) grid.

8. **Surrounding Land Uses and Setting:**

The project site is located at Lockheed Martin Aeronautics Plant 10 (south of the industrial development associated with Plant 10), with the U.S. Air Force Plant 42 to the north and east, undeveloped land to the west, and industrial development to the south within the City of Palmdale

B. Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a “Potentially Significant Impact”, as indicated by the checklist on the following pages. Potentially significant impacts that are mitigated to “Less Than Significant” are not shown here.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☐ Air Quality ☐ Energy
☐ Biological Resources	☐ Cultural Resources	☐ Geology and Soils
☐ Greenhouse Gas Emissions	☐ Hazards and Hazardous Materials	☐ Hydrology and Water Quality
☐ Land Use and Planning	☐ Mineral Resources	☐ Noise
☐ Population and Housing	☐ Public Services	☐ Recreation
☐ Transportation ☐ Tribal Cultural Resource	☐ Utilities and Service Systems ☐ Wildfire	☐ Mandatory Findings of Significance

C. Determination

On the basis of this initial evaluation: (Select one)

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☒ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described on an attached sheet have been added to the project. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a significant effect(s) on the environment, but at least one effect: 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards; and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets, if the effect is a "potentially significant impact" or "potentially significant unless mitigated". An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, there WILL NOT be a significant effect in this case because all potentially significant effects (a) have been analyzed adequately in an earlier EIR pursuant to applicable standards and (b) have been avoided or mitigated pursuant to that earlier EIR, including revisions or mitigation measures that are imposed upon the proposed project.

____________________	_________________________
Date	Megan Taggart Acting Planning Manager

D. Evaluation of Environmental Impacts

Each of the responses in the following environmental checklist considers the whole action involved, including project-level, cumulative, on-site, off-site, indirect, construction, and operational impacts. A brief explanation is provided for all answers and supported by the information sources cited.

1. A “No Impact” answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone).

2. A “Less Than Significant Impact” applies when the proposed project would not result in a substantial and adverse change in the environment. This impact level does not require mitigation measures.

3. A “Less Than Significant Impact With Mitigation Incorporated” applies when the proposed project would not result in a substantial and adverse change in the environment after additional mitigation measures are applied.

4. “Potentially Significant Impact” is appropriate if there is substantial evidence that an effect is significant. If there are one or more “Potentially Significant” entries when the determination is made, an EIR is required.

4. ENVIRONMENTAL ANALYSIS

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
I	AESTHETICS. Except as provided in Public Resources Code Section 21099, would the Project:				
a)	Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b)	Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☒	☐
c)	In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐
d)	Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?	☐	☐	☒	☐

Project Impacts and Mitigation Measures

a) **No Impact.** Except as provided in Public Resources Code Section 21099, would the project have a substantial adverse effect on a scenic vista? Scenic vistas and view corridors in the City of Palmdale are identified in the Community Design Element and Environmental Resources Element of the City's General Plan. The General Plan identifies the following Scenic Routes: Barrel Springs Road, Tierra Subida Avenue, Sierra Highway south of Avenue S, Elizabeth Lake Road, Pearblossom Highway, Bouquet Canyon Road, Godde Hill Road, and the Antelope Valley Freeway south of Rayburn Road (Exhibit ER-1 of the City of Palmdale General Plan). The closest scenic route (Antelope Valley Freeway south of Rayburn Road) is more than 2.5-miles to the west of the project. The project is not visible from any of these scenic routes. The location of the project site to the north of East Avenue P, with Blackbird Way to the north, 10th Street East to the west, and 15th Street East to the east has not been identified as a scenic vista or view corridor in the City's General Plan. Views of the open mountains surrounding the Antelope Valley are available from the project site and roadways in the vicinity. These views would generally continue to be available following construction of the proposed project due to the low profile of the solar panels. Furthermore, the proposed project would be subject to City review to ensure conformance with existing design regulations (project setbacks, height, scale, landscaping, etc.) and compatibility with surrounding land uses. Therefore, no impacts would occur.

Mitigation Measures: No mitigation measures are necessary.

b) **Less than Significant Impact.** Except as provided in Public Resources Code Section 21099, Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway? The project site does not contain any rock outcroppings, trees or buildings (historic or otherwise) and is not located along a scenic highway. The project site is characterized as desert scrub habitat and while much of the surrounding areas are largely undeveloped, it is associated with industrial development associated with Lockheed Martin Aeronautics and the United States Air Force Plant 42. Therefore, a less than significant impact would occur

Mitigation Measures: No mitigation measures are necessary.

c) **Less than Significant Impact.** Except as provided in Public Resources Code Section 21099, in non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality? The visual character of the project site would be altered as it would change relatively undisturbed desert habitat to an alternative energy project. The project area has been identified as part of the Lockheed Martin Specific Plan as an industrial development and has a General Plan Land Use as Specific Plan (SP), Public Facility (PF) and Industrial. The solar panels will be required to conform with existing design regulations such as setbacks, height, scale and landscaping, and is compatible with surrounding land uses. Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

d) **Less than Significant Impact.** Except as provided in Public Resources Code Section 21099, Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area? The project would not require nighttime lighting. Solar projects have the potential for generating glare and glint that may cause impacts to members of the viewing public and to pilots. A glare analysis for possible glare and glint impacts from the project was completed (Burns and McDonnell Consultants, Inc. 2020b). The study included an analysis of potential impacts from the proposed project. Several observational points surrounding the site were reviewed and evaluated for potential glare and glint impacts from the proposed project. Glint, a momentary flash of light, and glare, a more continuous source of excessive brightness relative to the ambient light, have the potential for being generated by solar panels. Glare and glint have the potential to create hazards to pilots and the driving public. A series of observational points included nearby intersections, adjacent roads and the approach paths and airport traffic control for the adjacent United States Air Force (USAF) Plant 42 airport were established as part of the study. Using a Solar Glare Hazard Analysis Tool developed by Sandia National Laboratories plus guidelines provided by the Federal Aviation Administration, the study concluded that no glare or glint hazards would occur from the proposed solar project. The glare analysis is provided as Appendix A. Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
II	AGRICULTURE AND FORESTRY RESOURCES. In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997), prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the Project:				
a)	Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use?	☐	☐	☐	☒
b)	Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c)	Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d)	Result in the loss of forestland or conversion of forestland to non-forest use?	☐	☐	☐	☒
e)	Involve other changes in the existing environment, which due to their location or nature, could result in conversion of Farmland to nonagricultural use or conversion of forestland to non-forest use?	☐	☐	☐	☒

Project Impacts and Mitigation Measures

a) **No Impact.** Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use? Land is designated by the California Department of Conservation, Division of Land Resource Protection, Farmland Mapping and Monitoring Program (FMMP) as one of the following as it relates to agriculture: Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, Grazing Land, Urban and Built-Up

Land, and Other Land. A review of the Farmland Map for Los Angeles County has designated the project site "Other Land" (California Department of Conservation 2017). This designation has been defined by the California Department of Conservation as "land not included in any other mapping category". Therefore, the proposed project would not convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to a non-agricultural use, and no impact would occur.

Mitigation Measures: No mitigation measures are necessary.

b) **No Impact.** Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract? The project site is not zoned for agricultural use and is not under a Williamson Act contract. No impact would occur.

Mitigation Measures: No mitigation measures are necessary.

c-d) **No Impact.** Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))? Result in the loss of forestland or conversion of forestland to non-forest use? As there are no forests or timberlands located within the City of Palmdale, the proposed project would not result in the rezoning of forest or timberland. No loss of forest land or the conversion of forest land to non-forest land would occur. Therefore, no impact would occur.

Mitigation Measures: No mitigation measures are necessary.

e) **No Impact.** Involve other changes in the existing environment, which due to their location or nature, could result in conversion of Farmland to nonagricultural use or conversion of forestland to non-forest use? As previously indicated, a review of the Farmland Map for Los Angeles County has designated the project site "Other Land" (California Department of Conservation 2017). This designation has been defined by the California Department of Conservation as "land not included in any other mapping category". Therefore, the proposed project would not convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to a non-agricultural use, and no impact would occur.

Mitigation Measures: No mitigation measures are necessary.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
III	AIR QUALITY. Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the Project:				
a)	Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b)	Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	☐	☒	☐
c)	Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
d)	Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

Environmental Setting

Pursuant to the Clean Air Act Amendments of 1990 (CAA), the USEPA established National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The NAAQS are classified as primary and secondary standards. Primary standards prescribe the maximum permissible concentration in the ambient air and are required to protect public health. Secondary standards specify levels of air quality required to protect public welfare, including materials, soils, vegetation, and wildlife, from any known or anticipated adverse effects. NAAQS are established for six pollutants (known as criteria pollutants): ozone (O_3), particle pollution (i.e., respirable particulate matter less than 10 microns in diameter [PM_{10}] and respirable particulate matter less than 2.5 microns in diameter [$PM_{2.5}$]), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead (Pb). The California Air Resources Board (CARB) has also established air quality standards, known as the California Ambient Air Quality Standards (CAAQS). The CAAQS are generally more stringent than the NAAQS and include standards for all the criteria pollutants listed under NAAQS plus sulfates (SO_4), hydrogen sulfide (H_2S), vinyl chloride, and visibility-reducing particulate matter.

The USEPA classifies the air quality within an area with regard to its attainment of the NAAQS. An area with air quality better than the NAAQS for a specific pollutant is designated as being in attainment for that pollutant. Any area not meeting the NAAQS is classified as a nonattainment area. Where there is a lack of data for the USEPA to make an attainment determination, the area is designated as unclassified and is treated as an attainment area until proven otherwise. Similarly, the CARB classifies attainment in California based on the CAAQS.

The proposed project is within the Los Angeles County portion that is subject to the Antelope Valley Air Quality Management District (AVAQMD) regulations. This portion of Los Angeles County is in attainment/unclassified for all NAAQS except O_3, and all CAAQS, except O_3, and PM_{10} (CARB 2020a). Applicable AVAQMD rules include, but are not limited to, those presented in Table 3.

Table 3: Applicable Rules

Rule/ Regulation	Title
401	Visible Emissions
402	Nuisance
403	Fugitive Dust
404	Particulate Matter – Concentration

The project applicant will be required to prepare a Dust Plan for review by both the City of Palmdale and the AVAQMD that details how dust generated during construction will be controlled.

a) **No Impact.** Would the project conflict with or obstruct implementation of the applicable air quality plan? The federal CAA requires states to develop State Implementation Plans (SIPs) to state how they will attain or maintain NAAQS. SIPs are a compilation of new and previously approved plans, programs, district rules, state regulations and federal controls. States and local air quality management agencies prepare SIPs for approval by the USEPA. SIPs are in part, based on regional population, housing, and employment projections reflected in local general plans.

The proposed project would be constructed in an area of the site that is part of the Lockheed Martin Specific Plan, which allows for manufacturing/industrial types of uses that includes research, design, fabrication, testing, manufacturing and warehousing of aircraft, aeronautical and military systems and related components (Lockheed Advance Development Company 1992). The proposed project is an industrial use and while alternative energy projects were not considered in the Specific Plan for Plant 10, as such, is consistent with the Specific Plan. In addition, because the project would comply with all applicable AVAQMD rules and regulations and would be consistent with the growth forecast in the applicable air quality and local land use planning documents, it is considered consistent with the

State SIP. Therefore, the project would not conflict with or obstruct implementation of the attainment plan.

Mitigation Measures: No mitigation measures are necessary.

b) **Less than Significant Impact**. Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard? CEQA defines cumulative impacts as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" (14 CCR Section 15355).

The proposed project would generate temporary emissions of criteria pollutants during its construction stage but would not add significant emissions during its construction or operation. Activities and emissions occurring during construction would stop once construction of the proposed project is completed.

Operation emissions would be minimal and result from normal preventative maintenance and routine inspections. Preventative maintenance would consist of a vehicle trip and power washing occurring twice monthly. Routine inspections would occur twice a month.

Air emissions resulting from construction were calculated based on a scenario where each equipment piece in each phase runs simultaneously. This approach assumes maximum daily operating time for all equipment assigned in each construction phase (e.g., Site Preparation, Grading, and Paving). Construction emissions were calculated using the California Emissions Estimator Model (CalEEMod). CalEEMod is widely accepted to provide a uniform platform to estimate potential emissions resulting from construction and operation activities of land use projects. The model uses pre-programed algorithms to calculate emissions based on data entered. The algorithms are designed to take information such as project size; construction length; vehicle and equipment types; number of vehicle trips and trip lengths; and equipment operating hours to calculate emissions of criteria pollutants and greenhouse gases. Emission calculations provided in this document factor dust control measures such as those prescribed in AVAQMD Rule 403 and off-road vehicles using on average Tier 3 engines. Operational emissions are estimated based on two vendor trips per month for panel washing and or maintenance purposes and two inspection trips per month. Operational emissions were estimated using CalEEMod.

CalEEMod input values and calculated air emission results for the proposed project are provided as Appendix B and summarized in Table 4.

Table 4: Project Construction Emissions of Criteria Pollutants

Project Phase	VOCs	NOx	CO	SOx	PM10	PM2.5
Construction 2020 Annual (tons)/Daily (lbs)	0.02/ 3.9	0.20/ 37.0	0.11/ 29.4	0.00/ 0.0	0.10/ 3.3	0.04/ 1.8
Construction 2021 Annual (tons)/ Daily (lbs)	0.20/ 5.7	1.60/ 57.3	1.43/ 40.8	0.00/ 0.1	0.35/ 8.2	0.18/ 3.4
Operational Emissions Annual (tons)/Daily (lbs)	0.00/ 0.1	0.04/ 3.2	0.05/ 4.2	0.00/ 0.0	0.00/ 0.2	0.00/ 0.2
Threshold of Significance Annual (tons)/ Daily (lbs)	25/ 137	25/ 137	100/ 548	25/ 137	15/ 82	12/ 65
Significant?	No	No	No	No	No	No

Notes:
CO carbon monoxide
lbs pounds
N/A not applicable
NOx oxides of nitrogen (nitric oxide and nitrogen dioxide)
PM10 respirable particulate matter less than 10 microns in diameter
PM2.5 respirable particulate matter less than 2.5 microns in diameter
SOx oxides of sulfur (sulfur dioxide and sulfur trioxide)
VOC volatile organic compounds

As shown in Table 4, construction emissions of the proposed project do not exceed the AVAQMD established daily thresholds. With a single vehicle trip to the facility that would occur once or twice a month, operation of the facility will not exceed AVAQMD established daily thresholds.

Construction and operation emissions from the proposed project would contribute to overall emissions from construction and operation of other projects in the area. However, the project contributions would not exceed AVAQMD established thresholds. Therefore, the prosed project would have a less than significant impact.

Mitigation Measures: No mitigation measures are necessary

c) **Less than Significant Impact**. Would the project expose sensitive receptors to substantial pollutant concentrations? The proposed project is not expected to expose sensitive receptors to substantial pollutant concentration during neither its construction nor its operation. The closest sensitive receptor to the project area is Palmdale Elementary School located at 39139 10th Street E, Palmdale, California 93550 approximately 0.95 miles southwest from the project site. During construction, emissions from off-road vehicles would be generated but are temporary and not anticipated to impact workers in nearby buildings. Criterial pollutant emissions from construction equipment would not exceed threshold limits (Tale 4). Operation of the proposed project would generate minimal emissions resulting from normal preventative maintenance and routing inspections.. Two preventative maintenance trips and two inspection related trips would occur monthly. Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

d) **Less than Significant Impact**. Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people? The proposed project would generate odors resulting from diesel combustion by on-road and off-road vehicles during the construction phase. Odors from construction sources would be significant if they were to become a nuisance pursuant to Rule 402. To become a nuisance, odors resulting from the project would need to generate multiple valid odor complaints. As adjacent areas to the site are undeveloped and the closest sensitive receptor is almost one mile away, perception of construction related odors are anticipated to be less than significant.

Mitigation Measures: No mitigation measures are necessary.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
IV	BIOLOGICAL RESOURCES. Would the Project:				
a)	Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b)	Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies or regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☐	☒
c)	Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☒	☐
d)	Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nesting sites?	☐	☐	☒	☐
e)	Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☒	☐	☐
f)	Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

Project Impacts and Mitigation Measures

a) **Less than Significant with Mitigation Incorporated.** Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife (CDFW) or U.S. Fish and Wildlife Service? A Biological Resources Technical Report (BRTR) was prepared for the Lockheed Martin Aeronautics Palmdale Facility (Sunrise Consulting 2019) and is provided in Appendix C. A habitat assessment was conducted in March 2019 and, because the proposed project site is undeveloped and contains scattered western Joshua tree (WJT) (*Yucca brevifolia*)-in creosote (*Larrea tridentata*) scrub habitat, a series of species-specific focused surveys were conducted to determine if the project area could support the following sensitive species: desert tortoise, burrowing owl, and Mohave ground squirrel. The surveys were completed by qualified biologists with relevant

Memorandum of Understanding permits issued by the California Department of Fish and Wildlife (CDFW). The surveys by species and dates are summarized in Table 5.

Table 5: Focused Species-Specific Surveys, Solar Project

Resource	Protocol/Guidance	Dates of Surveys
Desert tortoise (DT) *Gopherus agassizii*	*Preparing for Any Action that may Occur within the Range of the Mojave Desert Tortoise* (*Gopherus agassizii*); October 26, 2018	5/18/19
Burrowing owl (BUOW) *Athene cunicularia*	*Staff Report on Burrowing Owl Mitigation*, State of California Natural Resources Agency Department of Fish and Game; March 7, 2012	4/14/19 5/18/19 6/22/19 7/12/19
Mohave ground squirrel (MGS) *Xerospermophilus mohavensis*	*Mohave Ground Squirrel Survey Guidelines*, California Department of Fish and Game; (January 2003; Minor Process and Contact Changes in July 2010)	4/11/19 – 4/15/19 5/16/19 – 5/20/19 6/21/19 – 6/25/19 6/26/19 – 6/30/19

No Mohave ground squirrels, burrowing owls, or desert tortoise were observed during these surveys. No sign (tracks, vocalizations, burrows, etc.) of any of these species was recorded. No other sensitive species were observed or recorded by sign during these surveys. It is unlikely any of these species inhabits the project areas. Therefore, the likelihood of harassment, injury or other take of these species is very unlikely during development of the site. Permits for these species are not recommended or required.

On October 21, 2019, the Fish and Game Commission (Commission) received a petition from the Center for Biological Diversity to list the WJT as threatened under the California Endangered Species Act (CESA). California Fish and Game Code (F&G Code) Section 2073.5 requires that the CDFW evaluate the petition and submit a written evaluation with a recommendation to the Commission, which was received at the Commission's April 2020 meeting.

Based upon the information contained in the petition and other relevant information, the Department determined in its 90-day evaluation that there was sufficient scientific information available to indicate that the petitioned action may be warranted. On September 22, 2020, the Commission determined that listing of WJT may be warranted pursuant to F&G Code Section 2074.2. As a result, WJT has been designated as a candidate species under CESA. The Department will undertake a one-year status review of the listing of WJT. After it receives the CDFW's status review, the Commission will make a final decision on listing.

Candidate species are protected under CESA pursuant to F&G Code Section 2085 during the remainder of the CESA listing. The proposed project will require removal of western Joshua trees from the project area. Consultation with the CDFW will be undertaken and a CESA Incidental Take Permit (ITP) (pursuant to Fish & Game Code, § 2080 *et seq.*) between the applicant and the CDFW will be sought. During consultation and development of the ITP, the applicant and CDFW may identify the following measures (or similar measures, as required by CDFW):

- Prepare an Avoidance Plan by a qualified botanist that would include measures that are effective, enforceable and feasible to avoid impacts to WJT. The Avoidance Plan would be fully developed prior to implementing project-related ground disturbance activities that includes site preparation, equipment staging and mobilization.
- If WJT cannot be avoided during project implementation, implement measures required in the ITP to minimize and fully mitigate the impacts of the proposed taking of WJT. Prepare a plan to monitor compliance with minimization and mitigation measures and to identify criteria to evaluate the effectiveness of the mitigation measures and reporting responsibilities.

With incorporation of **Mitigation Measure BIO-1**, potential significant impacts to Candidate Species WJT would be reduced to less than significant. The City of Palmdale also requires compliance with Development Code Chapter 14.04 for Joshua trees and native vegetation preservation. This is discussed under item e) below.

Mitigation Measure:

BIO-1: If “take” or adverse impacts to western Joshua tree cannot be avoided during project implementation, consultation with the CDFW will be undertaken and a CESA Incidental Take Permit (ITP) (pursuant to Fish & Game Code, § 2080 *et seq.*) will be sought. During the consultation process, if take of WJT is necessary for project to be constructed, compensatory mitigation will be required in the ITP and may include in-kind and/or in-lieu mitigations as per Fish and Game Code 2081 to offset impacts. The ITP will also specify minimization and avoidance measures and fully mitigate any impacts to WJT. No take of WJT will occur until the ITP has been issued to and accepted by the applicant. In addition, the City of Palmdale will not issue a development permit until the ITP has been issued and required mitigation completed.

b) **No Impact.** Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies or regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service? As indicated in the BRTR, the project site does not contain any riparian habitat or other sensitive natural communities identified in local or regional plans, policies, regulations, or by CDFW or the U.S. Fish and Wildlife Service. Therefore, no impact would occur.

Mitigation Measures: No mitigation measures are necessary.

c) **Less than Significant Impact.** Would the project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means? An unnamed drainage is located on the northwestern and western sides of the site (Figure 2). A delineation of the drainage to determine regulatory status was completed in 2019 (Tetra Tech, 2019), the results of which are provided in a report as Appendix D. Using vegetation indicators, soils and hydrology criteria for a wetland, no jurisdictional wetlands are found within the unnamed drainage. The unnamed drainage was determined to be a riverine streambed habitat that is characterized by intermittent streamflow that occurs only part of the year. Intermittent flooding may result in surface water flow within the drainage, but this condition has not resulted in the formation of hydric soils or the ability to support hydrophytic plants associated with wetlands. The delineation concluded that the drainage is not a Water of the United States subject to regulation by the U.S. Army Corps of Engineers but is a Water of the State subject to regulation by the Regional Water Quality Control Board and CDFW. The proposed project would be constructed in the upland areas of the site and the distribution line would be bored under the unnamed drainage to a depth of four feet beneath the bed of the drainage to prevent scour from stormwater flow and to avoid affecting jurisdictional waters associated with the drainage and, therefore, a less than significant impact to the drainage would occur (Figures 2 and 3). Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

d) **Less than Significant Impact.** Would the project Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nesting sites? The project site is not part of an established migratory wildlife corridor. Vegetation at the project site could be used by nesting migratory birds and the site has habitat that is suitable for occupation by burrowing owl. As a result, removing vegetation during the nesting season may cause a significant impact. If project construction activities were to occur during nesting bird season, which typically ranges from February 15 to June 15 with some variance based on annual rainfall and temperatures, a nesting bird survey should be conducted. Avoidance plans for nesting birds Implementation of **Mitigation Measures BIO-2, BIO-3 and BIO-4** would reduce impacts to nesting birds to a less than significant.

Mitigation Measures: .

BIO-2: An Avoidance Plan for burrowing owl will be prepared by a qualified biologist that would include measures that are effective, enforceable and feasible to avoid impacts to burrowing owl. The Avoidance Plan would be fully developed prior to implementing project-related ground disturbance activities that includes site preparation, equipment staging and mobilization. A pre-construction presence/absence survey for burrowing owl shall be conducted within 30 days prior to any on-site ground disturbing activity. The survey shall be conducted pursuant to the recommendations and guidelines established by the California Department of Fish and Wildlife (CDFW). In the event these species are not identified within the project limits, no further mitigation is required. If, during the pre-construction survey, the burrowing owl is found to occupy the site, Mitigation Measure **BIO-2** shall be required.

BIO-3: If burrowing owls are identified during the survey period, the City shall require the project applicant to take the following actions to offset impacts prior to ground disturbance. Active nests within the areas scheduled for disturbance or degradation shall be avoided from February 1 through September 15, and a minimum 250-foot buffer shall be provided until fledging has occurred. Following fledging, owls may be passively relocated by a qualified biologist. If impacts on occupied burrows in the non-nesting period are unavoidable, on-site passive relocation techniques may be used if approved by the CDFW to encourage owls to move to alternate burrows outside of the impact areas.

If relocation of the owls is approved for the site by the CDFW, the City shall require the developer to hire a qualified biologist to prepare a plan for relocating the owls to a suitable site. The relocation plan shall include all of the following:

- The location of the nest and owls proposed for relocation;
- The number of owls involved and the time of the year when the relocation is proposed to take place;
- The name and credentials of the biologist who will be retained to supervise the relocation;
- The proposed method of capture and transport for the owls to the new site.
- A description of the site preparation at the relocation site (e.g., enhancement of existing burrows, creation of artificial burrow, one-time or long-term vegetation control); and
- A description of efforts and funding support proposed to monitor the relocation.

BIO-4: If Project grading/construction activities are scheduled to occur during the nesting season for breeding birds (typically January 15th through September 30th), the following measures shall be implemented:

- An Avoidance Plan for nesting birds will be prepared by a qualified biologist that would include measures that are effective, enforceable and feasible to avoid impacts to nesting birds. The Avoidance Plan would be fully developed prior to implementing project-related ground disturbance activities that includes site preparation, equipment staging and mobilization.

- Within seven days prior to commencement of grading/construction activities, a qualified biologist shall perform a pre-construction survey of all proposed work limits and within 500 feet of the proposed work limits.
- If active avian nest(s) of non-special status species are discovered within or 500 feet from the work limits, a buffer shall be delineated around the active nest(s) measuring 300 feet for passerines and 500 feet for raptors. A qualified biologist shall monitor the nest(s) weekly after commencement of grading/construction to ensure that nesting behavior is not adversely affected by such activities.

If the qualified biologist determines that nesting behavior of non-special-status species is adversely affected by grading/construction activities, then a noise mitigation program [i.e., within 10 calendar days prior to the start of construction activities (including removal of vegetation), a qualified biologist conducts a pre-construction survey to determine the presence or absence of nesting birds on the proposed area of disturbance; if nesting birds are detected, the biologist prepares a letter report and mitigation plan in conformance with applicable federal and State laws (e.g., appropriate follow-up surveys, monitoring schedules, construction and noise barriers/buffers) to ensure that take of birds or eggs or disturbance of breeding activities is avoided; the report/mitigation plan is submitted to the City for review/approval and implemented to the satisfaction of the City; and the biologist verifies in a report to the City that all measures identified in the mitigation plan are in place prior to and/or during construction] shall be implemented in consultation with CDFW, to allow such activities to proceed. Once the young have fledged and left the nest(s), then grading/construction activities may proceed within 300 feet (500 feet for raptor species) of the fledged nest(s).

e) **Less than Significant Impact with Mitigation Incorporated.** Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance? The project area was noted as moderately and highly disturbed creosote bush scrub with some areas of undisturbed creosote scrub with scattered Joshua trees (Sunrise Consulting 2019). The project will require the removal of Joshua trees that are scattered through the project area, which requires compliance with California Endangered Species Act for WJT and City of Palmdale Development Code Chapter 14.04 for Joshua trees and native vegetation preservation. Implementation of **Mitigation Measures BIO-1 – plus BIO-5 and BIO-6** would reduce impacts to a less than significant level.

Mitigation Measure:

BIO 5: The applicant shall submit a native desert vegetation plan prepared by a desert native plant specialist. The plan shall, at minimum, include the following:

- A written report and a site plan which depicts the location of each Joshua tree and California juniper, discusses their age and health, identifies and locates all trees and shrubs which can be saved in place or relocated.
- A site landscaping plan showing the proposed location of those Joshua trees, California junipers, and any other native desert vegetation that will remain on-site.
- A long-term maintenance program for any desert vegetation preserved on the site. The minimum term of any maintenance program shall be two growing seasons, unless a shorter length of time is approved by the City.

BIO-6: Two years following Joshua tree transplanting, a written report shall be submitted to the City. This report shall indicate the number of Joshua trees transplanted, the date(s) of transplanting, the method of transplanting, dates Joshua trees are watered, and the number of Joshua trees surviving

With implementation of **Mitigation Measures BIO-1 plus BIO-5 and BIO-6**, impacts to Joshua trees would be less than significant.

f) **No Impact.** Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan? The project area is not located within or near lands that are governed by a habitat conservation plan, a natural community conservation plan or other approved, local, regional or state habitat conservation plan. Therefore, no impacts would occur.

<u>Mitigation Measures</u>: No mitigation measures are necessary.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
V	CULTURAL RESOURCES. Would the Project:				
a)	Cause a substantial adverse change in the significance of a historical resource pursuant to in §15064.5?	☐	☐	☒	☐
b)	Cause a substantial adverse change in the significance of an archaeological resource as defined in Public Resources Code Section 21083.2 and 21084.1, and CEQA Guidelines Section 15064.5, respectively?	☐	☒	☐	☐
c)	Disturb any Native American tribal cultural resources or human remains, including those interred outside of dedicated cemeteries?	☐	☒	☐	☐

Project Impacts and Mitigation Measures

a) **Less than Significant Impact.** Would the project cause a substantial adverse change in the significance of a historical resource pursuant to in §15064.5? A cultural resources records search and intensive pedestrian survey of the project area was conducted in November of 2019 (Paleo Solutions, Inc. 2019a). No significant resources were observed or recorded within the project area. Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

b) **Less than Significant with Mitigation Incorporated.** Would the project cause a substantial adverse change in the significance of an archaeological resource as defined in Public Resources Code Section 21083.2 and 21084.1, and CEQA Guidelines Section 15064.5, respectively? There is a possibility that during grubbing and grading at the site, buried cultural resources may be discovered. If this occurs, the project proponent is required to comply with City of Palmdale regulations and California Public Resources Code Section 21083.2. In the event that cultural resources are encountered during the course of construction activities, all work must cease until a qualified archaeologist determines the proper disposition of the resource. With implementation of the **Mitigation Measures CUL-1** through **CUL-3**, impacts would be less than significant.

Mitigation Measure:

CUL-1: In the event that cultural resources are discovered during project activities, all work in the immediate vicinity of the find (within a 60-foot buffer) shall cease and a qualified archaeologist meeting Secretary of Interior standards shall be hired to assess the find. Work on the other portions of the project outside of the buffered area may continue during this assessment period. Additionally, the San Manuel Band of Mission Indians Cultural Resources Department (SMBMI) and the Fernandeño Tataviam Band of Mission Indians (FTBMI) shall be contacted, as detailed within **Mitigation Measures TCR-1**, regarding any pre-contact and/or post-contact finds and be provided information after the archaeologist makes his/her initial assessment of the nature of the find, so as to provide Tribal input with regards to significance and treatment.

CUL-2: If significant pre-contact and/or post-contact cultural resources, as defined by CEQA (as amended, 2015), are discovered and avoidance cannot be ensured, the archaeologist shall develop a Monitoring and Treatment Plan, the drafts of which shall be provided to SMBMI and FTBMI for review and comment, as detailed within **Mitigation Measure TCR-1**. The archaeologist shall monitor the remainder of the project and implement the Plan accordingly.

CUL-3: If human remains or funerary objects are encountered during any activities associated with the project, work in the immediate vicinity (within a 100-foot buffer of the find) shall cease and the County Coroner shall be contacted pursuant to State Health and Safety Code §7050.5 and that code enforced for the duration of the project.

c) **Less than Significant with Mitigation Incorporated.** Would the project disturb any Native American tribal cultural resources or human remains, including those interred outside of dedicated cemeteries? No human remains, including those interred outside of a formal cemetery were observed during the cultural resources survey. In the event that previously unknown human remains are discovered during construction of the project, implementation of **Mitigation Measure TCR-2**, impacts would be less than significant.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
VI	ENERGY. Would the Project:				
a)	Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☒	☐
b)	Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒

Project Impacts and Mitigation Measures

a) **Less than Significant Impact.** Energy consumption during construction would have a nominal effect on the local and regional energy supplies. There are no unusual project characteristics that would necessitate the use of construction equipment that would be less energy-efficient than at comparable construction sites in the region or State. Construction would be temporary and in compliance with AVAQMD regulations, and equipment would be maintained to optimal performance to reduce use of fuels. Once operational, the project would be generating clean electricity, thereby reducing the use of fossil fuels for electricity in the area. A Less Than Significant Impact to the consumption of energy would occur.

Mitigation Measures: No mitigation measures are necessary.

b) **No Impact.** The proposed project is an alternative energy project that is consistent with the City of Palmdale's Energy Action Plan (EAP). The proposed project alternative energy project will assist the City of Palmdale to meet its green energy goals. Therefore, no impacts would occur.

Mitigation Measures: No mitigation measures are necessary.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
VII	GREENHOUSE GAS EMISSIONS. Would the Project:				
a)	Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b)	Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

Project Impacts and Mitigation Measures

a) **Less than Significant Impact.** The significant changes in global climate patterns have recently been associated with global warming, an average increase in the temperature of the atmosphere near the Earth's surface, attributed to accumulation of greenhouse gas (GHG) emissions in the atmosphere. Regulated GHGs consist of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3) (California Health and Safety Code 38505). GHGs are commonly quantified in the equivalent mass of CO_2, denoted CO_2e, which takes into account the global warming potential of each individual GHG compound.

The proposed project would create local GHGs during its construction phase, and at its operational phase, it would generate small amounts of GHG emissions from vendor vehicle trips associated with periodic cleaning of the solar panels and inspections. However, the proposed solar project would create clean and renewable electricity thereby displacing GHGs that are produced in the process of generating electricity from fossil fuels and/or coal.

The AVAQMD has established thresholds of GHG emissions (presented in Table 5) which if exceeded would render a project as having a significant adverse impact. The proposed project would generate GHGs during construction and operation activities but not in significant quantities.

Construction and operation GHGs emissions from the proposed project were calculated using CalEEMod and are summarized in Table 5. Detailed CalEEMod input values and calculated GHG results are included as Appendix B. Operation emissions were estimated based on two vendor trips per month for the purpose of cleaning and maintaining the panels and two inspection-related trips per month..

Table 6: Project Construction and Operation Emissions of GHGs

Project Phase	**CO_2e Annual (MT)/Daily (lbs)**
Project Construction 2020	17/4831
Project Construction 2020	230/7622
Project Operation	8/710
Threshold of Significance	90,718/584,000
Significant?	No

Notes: CO_2e carbon dioxide equivalent
lbs pounds
MT metric tons

Since the construction and operation emissions would be significantly lower than the thresholds, the proposed project would have a less than significant impact and no mitigation would be required.

Additionally, the proposed project would displace GHG emissions that would otherwise be emitted in the process of generating electricity using traditional measures such as burning of fossil fuels at the power plant level. Displaced emissions of GHGs by the proposed project were calculated based on projected annual power production and CalEEMod intensity factors for the production of electricity for Southern California Edison. Table 6 provides a summary of the calculated displaced GHG emissions. Detailed calculations are included in Appendix B.

Table 7: Displaced GHG Emissions

Operational Year	**CO_2e (MT)**
1	19,696
2	19,597
3	19,499
4	19,402
5	19,305
6	19,208
7	19,112
8	19,017
9	18,922

Operational Year	CO_2e (MT)
10	18,827
11	18,733
12	18,639
13	18,546
14	18,453
15	18,361
16	18,269
17	18,178
18	18,087
19	17,997
20	17,907

Notes: CO_2e carbon dioxide equivalent
lbs pounds
MT metric tons

<u>Mitigation Measures</u>: No mitigation measures are necessary.

b) **Less than Significant Impact.** The proposed project would not result in an increase of either population or emissions sources beyond what has been planned for in the City of Palmdale's General Plan through the Specific Plan for Plant 10. As detailed earlier, the project would be sited on lands zoned as the Lockheed Specific Plan. Portions of the site zoned as General Industrial (M-3) are not part of the project and an easement for Avenue 0-12 (Public Facility) will be sought from the City of Palmdale by the applicant.

The proposed project is consistent with the City of Palmdale's EAP, which promotes the establishment of large-scale solar facilities to supply regional energy needs. The EAP is consistent with the State of California GHG reduction goals prescribed under Executive Order S-3-05 and Assembly Bill 32 (City of Palmdale 2011).

Since the proposed project would be consistent with the Specific Plan for Plant 10, the City of Palmdale's EAP, and State GHG reduction goals, it would have less than significant impact. Therefore, no impacts would occur.

<u>Mitigation Measures</u>: No mitigation measures are necessary.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
VIII	GEOLOGY AND SOILS. Would the Project:				
a)	Directly or indirectly cause potential substantial adverse effects, including the risk of injury, damage or death involving?	☐	☐	☒	☐
	i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Map issued by the State Geologist for the area or based upon on other substantial evidence of a known fault?	☐	☐	☒	☐
	ii) Strong seismic ground shaking?	☐	☐	☒	☐
	iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
	iv) Landslides?	☐	☐	☐	☒
b)	Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c)	Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☒	☐
d)	Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☐	☒
e)	Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒
f)	Directly or indirectly destroy a unique paleontological resource or site or unique geological feature?	☐	☒	☐	☐

Project Impacts and Mitigation Measures

a) **Less than Significant Impact.** Would the project directly or indirectly cause potential substantial adverse effects, including the risk of injury, damage or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Map issued by the State Geologist for the area or based upon on other substantial evidence of a known fault? The San Andreas fault is located within two and one-half miles to the south of the project area. Rupture of the San Andreas within the City of Palmdale planning area would cause impacts to some degree to the region including the project. A Geotechnical Engineering Investigation Report was prepared for the proposed project (BSK Associates 2019) and is provided in Appendix E. According to the investigation, the project site is not located within a Fault-Rupture Hazard Zone. Therefore, no impacts would occur.

Mitigation Measures: No mitigation measures are necessary.

ii) **Less than Significant Impact.** Would the project directly or indirectly cause potential substantial adverse effects, including the risk of injury, damage or death involving strong seismic ground shaking? The project area is located in a region that is subject to seismic events. The nearest fault is a portion of the San Andreas Fault located approximately two and one-half miles south of the project site. The solar facility would be unmanned and, therefore, a rupture of the San Andreas fault in the City of Palmdale planning area would not likely expose people to seismic rupture hazards. A less than significant impact would occur.

Mitigation Measures: No mitigation measures are necessary.

iii) **No Impact.** Would the project directly or indirectly cause potential substantial adverse effects, including the risk of injury, damage or death involving seismic-related ground failure, including liquefaction? The highest potential for liquefaction occurs in saturated, loosely consolidated sands and silts below the water table when the water table is within approximately 50 feet of the surface. According to the Geotechnical Engineering Investigation conducted for the proposed project, the soils in the boreholes drilled as part of the investigation vary in texture from gravelly silty sand, clayey silty sand and silty clayey sand. Based on the depth to groundwater at the project area that is estimated to be around 290 below ground surface, the potential for liquefaction was determined to be low. Therefore, no impacts would occur.

Mitigation Measures: No mitigation measures are necessary.

iv) **No Impact.** Would the project directly or indirectly cause potential substantial adverse effects, including the risk of injury, damage or death involving landslides? The topographic relief at the site is relatively flat. Site preparation for the solar project will create a flat surface for the solar panels. There will be no slopes that may fail in a seismic event and cause adverse effects from a landslide. The potential for an earthquake-induced landslide at the project area is very low. Therefore, no impacts would occur.

Mitigation Measures: No mitigation measures are necessary.

b) **Less than Significant Impact.** Would the project result in substantial soil erosion or the loss of topsoil? Site preparation would require grubbing and clearing of all vegetation present at the site. This would expose soils to erosion from wind and rain events. As more than one acre will be graded, the project would be required to comply with the State of California National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges of Storm Water Associated with Construction Activity. A site-specific Storm Water Pollution Prevention Plan

(SWPPP) would also need to be developed and implemented. The SWPPP will identify Best Management Practices (BMPs) that would control on-site and off-site erosion from storm events and wind. The SWPPP will also identify BMPs for accidental spills of hazardous materials. Oversight by the City of Palmdale will ensure compliance with any permit-related measures to control erosion generated by the project. Therefore, a less than significant impact would occur.

Mitigation Measures: No mitigation measures are necessary.

c) **Less than Significant Impact.** Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse? Lateral spreading occurs when large blocks of intact, non-liquefied soil move down slope on a liquefied soil layer. Lateral spreading is often a regional event. For lateral spreading to occur, the liquefiable soil zone must be unconstrained laterally and free to move along sloping ground. As stated earlier the project site does not have the potential for liquefaction resulting in a low potential for lateral spreading at the project area. The potential for subsidence, liquefaction and collapse are also unlikely. Therefore, a less than significant impact would occur.

Mitigation Measures: No mitigation measures are necessary.

d) **No Impact.** Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property? Soils at the site were noted in the geotechnical study to vary from gravelly silty sand, clayey silty sand and silty clayey sand which are non-expansive soils. Construction of the unmanned solar project will not create a substantial direct or indirect risk to life or property from expansive soils. No impact would occur

Mitigation Measures: No mitigation measures are necessary.

e) **No Impact.** Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater? During construction, portable toilet/wash station facilities would be used by on-site workers. During routine or emergency repairs, portable toilet/wash station facilities would be mobilized to the site, if necessary. No septic system would be included as part of project construction. No impact would occur.

Mitigation Measures: No mitigation measures are necessary.

f) **Less than Significant with Mitigation Incorporated.** Would the project directly or indirectly destroy a unique paleontological resource or site or unique geological feature? The paleontological potential of the project area was evaluated based on an analysis of existing paleontological data. The three components of the analysis of existing data included a geologic map review, a literature search, and an institutional record search. Geologic mapping indicates that the project area is entirely underlain by Holocene-age younger alluvium (Qa). While not mapped at the surface, Pleistocene-age older alluvium often occurs beneath Holocene-age younger alluvium at various depths (Paleo Solutions, Inc. 2019).

The Potential Fossil Yield Classification (PFYC) system was applied to the results of the analysis of existing data. Pleistocene-age older alluvium has a moderate paleontological potential (PFYC 3). Holocene-age younger alluvium (Qa) is estimated to be less than 11,000 years old and has a low paleontological potential (PFYC 2), because these deposits are too young to contain in-situ fossils. However, these younger deposits often overlie older geologic units with higher paleontological potential, which may be impacted at depth.

Based on the ground disturbance necessary to complete the Project, there is potential for adverse impacts to scientifically significant paleontological resources within Pleistocene-age older alluvium if encountered in the subsurface beneath the Holocene-age younger alluvium (Qa). With implementation of **Mitigation Measure GEO-1,** impacts would be less than significant.

<u>Mitigation Measure</u>:

GEO-1: In the event that paleontological resources are encountered all work shall stop at the discovery site. At that time, a qualified paleontological monitor shall be consulted to evaluate the find. Construction activities shall be temporarily redirected to another location on-site (minimum of 100 feet from the location of the find) so that the monitor can recover any specimens encountered during excavation. All fossils/specimens collected during this work shall be deposited in a City approved museum repository for curation and storage.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
IX	HAZARDS AND HAZARDOUS MATERIALS. Would the Project:				
a)	Create a significant hazard to the public or the environment through the routine transport, use, emission or disposal of hazardous materials?	☐	☐	☒	☐
b)	Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c)	Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d)	Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☒	☐
e)	For a project located within an airport land use plan area or, where such a plan has not been adopted, within 2 miles of a public airport or a public use airport, result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☒	☐
f)	Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
g)	Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☒	☐

Project Impacts and Mitigation Measures

a-b) **Less than Significant Impact.** Would the project create a significant hazard to the public or the environment through the routine transport, use, emission or disposal of hazardous materials and create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment? During construction, equipment would require small amounts of potentially hazardous materials such as fuels and lubricants on a regular basis. Some of these materials would be transported to the site by permitted vendors who would be required to obtain permits and are subject to inspection to ensure compliance with all relevant state and federal regulations governing the transportation of hazardous materials. Standard best management practices (BMPs) for storage and minor spills or leaks would be used to ensure any accidental hazardous materials releases will be cleaned up and disposed of as appropriate. When not in use, equipment will be parked in identified parking areas to prevent accidental leaks from entering the unnamed drainage found to the west and northwest of the project or the two retention-type basins located in the northeast and northwest corners of the site. The northwest retention-type basin may not be required based on final project design. Therefore, impacts would be less than significant. No mitigations are required.

Mitigation Measures: No mitigation measures are necessary.

c) **No Impact.** Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school? The project area is not within a quarter mile of an existing school and the proposed project would not be a source of toxic air emissions. The nearest school to the project is Palmdale Elementary School which is 0.95 miles from the project area. Therefore, no impact would occur.

Mitigation Measures: No mitigation measures are necessary.

d) **Less than Significant Impact.** Would the project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment? A search of the Envirostor database maintained by the California Department of Toxic Substances Control and the Geotracker database maintained by the Regional Water Quality Control Board (RWQCB) for the address of Lockheed Martin Aeronautics Plant 10 was completed. A past investigation for leaking underground storage tank (LUST) at Buildings 603 and 617 were undertaken under the oversight by the RWQCB. Both LUST cases have been categorized as closed. The Geotracker database has additional entries for the same address as the Lockheed Martin Aeronautics Plant 10 that are related to the adjacent USAF Plant 42. Neither databases have records for the proposed project area. Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

e) **Less than Significant Impact.** Would the project for a project located within an airport land use plan area or, where such a plan has not been adopted, within 2 miles of a public airport or a public use airport, result in a safety hazard or excessive noise for people residing or working in the project area? The proposed project would be located within two miles of the USAF Plant 42 runway and airport traffic control. The solar panels have the potential for creating a glint and/or glare hazard to pilots and airport traffic control. As discussed in Section I.d)., a glare analysis for possible glare and glint impacts from the project was completed (Burns and McDonnell Consultants, Inc. 2020). The study concluded that no glare or glint hazards would occur from the proposed solar project. The glare analysis is provided in Appendix A. In addition, the applicant has conducted coordination with Plant 42 regarding potential hazards from the proposed project. A Federal Aviation Administration (FAA) 7460 Permit Application for the solar project was submitted that included 21 studied structure-location combinations across the site (permanent fence, temporary crane, temporary parking). The FAA provided a determination of no hazard to air navigation on June 29, 2020 for the proposed project. Plant 42 determined that marking and lighting are not required by the project for aviation safety. Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

f) **Less than Significant Impact.** Would the project Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan? During construction, the proposed project would generate additional traffic associated with workers mobilizing daily to the project site. Equipment would be transported to the project site. Traffic generated during construction is not expected to block the roadways. Once constructed, with the exception of workers traveling to the project site to conduct routine and/or emergency repairs, no traffic to the site would occur. The proposed project would be an unmanned solar facility and would not interfere with any adopted emergency response plan or emergency evacuation plan. Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

g) **Less than Significant Impact.** Would the project expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires? The project area is not associated with a wildland area. Once constructed, the solar facility would be maintained weed free to reduce risks from a wildfire. In the event of a wildfire, there would be a low risk for injury, or death to workers because it would be an unmanned facility. Therefore, impacts would be less than significant

Mitigation Measures: No mitigation measures are necessary.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
X	HYDROLOGY AND WATER QUALITY. Would the Project:				
a)	Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	☒	☐
b)	Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☐	☒
c)	Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course or a stream or river or through the addition of impervious surfaces, in a manner that would:	☐	☒	☐	☐
	i) Result in substantial erosion or siltation on- or off-site;	☐	☐	☒	☐
	ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	☐	☐	☒	☐
	iii) 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	☐	☐	☒	☐
	iv) impede or redirect flood flows?	☐	☐	☒	☐
d)	In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒
e)	Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☐	☒

Project Impacts and Mitigation Measures

a) **Less than Significant Impact.** Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality? During construction, BMPs identified in a project-specific SWPPP would be used to control any stormwater flow generated on site. A hydrologic analysis was completed for the proposed project (Burns & McDonnell 2020b). During site clearance and grading, water would be used for dust suppression. To prevent violations of water quality standards, the site would be graded to ensure no impacts to the existing drainage that is on the northwest and western side of the site.

The drainage study concluded that stormwater runoff generated on the site can be captured using two retention basins; the largest being in the northeast corner of the site and a smaller basin in the northwest corner (Figure 2). The northeastern basin will be formed by constructing a berm approximately two to three feet tall along the northeast site perimeter which will cause runoff to back up and pond underneath the solar arrays. The northeast berm will provide four ac-ft detention volume. The northwest basin would provide 0.69 ac-ft of pond volume. Based on other projects at Plant 10, an infiltration rate of two inches per hour has been assumed (Miller 2020a). Based on this rate, it is anticipated that the northeast basin will infiltrate in nine hours and the northwest basin would infiltrate in 18 hours. Infiltration testing will be performed for the site prior to final design to verify actual rates. As part of the final design, erosion control will be designed where flows enter the retention basin. Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

b) **No Impact.** 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? Water would be used during site grubbing and grading for dust suppression. The water purveyor for the project site is the Palmdale Water District. The City of Palmdale utilizes groundwater and surface water. Surface water is derived from either the state aqueduct or the Littlerock Reservoir (Palmdale Water District 2020). This use would be temporary and would not deplete groundwater supplies or interfere substantially with groundwater recharge that would cause a net deficit in aquifer volume or lowering of the local groundwater table. Once the project was developed, the site would remain substantially permeable to rain. The project proponent would comply with City of Palmdale ordinances and regulations related to the construction water use. Once the project is built, no water would be required. Therefore, no impacts would occur.

Mitigation Measures: No mitigation measures are necessary.

c i-iv) **Less than Significant Impact.** Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course or a stream or river or through the addition of impervious surfaces, in a manner that 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 offsite; 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? A hydrologic study of the site has been completed to describe and document drainage management of the site for development with the proposed project (Burns & McDonnell 2019). After site preparation, excess stormwater runoff would be directed to the two retention basins; the largest being in the northeast corner of the site and a smaller basin in the northwest corner (Figure 2). The northwest retention-type basin may not be required based on final project design. The existing unnamed drainage feature found on the northwestern and western side of the site would be avoided by the project because the distribution line would be bored under the drainage to a depth of at least five feet beneath the bed of the drainage to prevent scour from stormwater flow. As a result, the proposed project would not result in a substantial increase in erosion or siltation either on site or off-site. Stormwater runoff generated on site would be directed to the on-site retention basins which would reduce any risks of flooding. The project area is a relatively flat site with a slope less than one percent that would not create or contribute runoff water that would exceed the retention basin that is part of the project design (Burns & McDonnell 2019). The project site is located in an area mapped by the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), number 06037C0700F (FEMA 2008). The entire project falls within Zone X which is defined as "areas determined to be outside the 0.2% annual chance floodplain". The Zone X is not regulated by FEMA nor the local floodplain administrator. The hydrology analysis determined that the pre-development state of the site has little impervious surfaces and that the net gain of impervious areas due to construction of the project will be less than 0.5 percent which is minimal increase to the pre-development site conditions (Burns & McDonnell 2019). As a result, the proposed project would not impede stormwater sheet flow across the site. While the proposed project would not impede stormwater flow across the site, stormwater flow south of the project along 10th Street has the potential for causing stormwater damage to the proposed project area. With implementation of **Mitigation Measure HYD-1**, impacts would be less than significant.

Mitigation Measure

HYD-1: To mitigate potential off-site stormwater flow impacts to the proposed project area, 10th Street East between Avenue P and Blackbird Drive will be widening approximately 10 feet. All work for widening 10th Street East will be within the public right-of-way or within the applicant's (Lockheed Martin) private proper. The length of roadway widened will be approximately 3,600 feet and would include the following elements.

- Placement of silt fence along the eastern right of way of 10th Street East to project the regional drainage system from any debris or runoff during road widening.
- The placement of desilting basins at low points along the roadway where runoff would naturally leave the roadbed and travers the site into the regional drainage system.
- Rough grading and compaction of the roadbed.
- Import and placement of 650 cubic yards of base material.
- Placement of approximately 36,000 square feet of new roadway pavement.

- Placement of approximately 3,600 linear feet asphalt concrete berm.
- Installation of two infiltration basins each one-fourth acre in size.
- Installation of one 8-foot wide catch basin.
- Installation of 50-feet of 18-inch diameter storm drain.
- Installation of approximately 10,000 square feet of erosion control as rip-rap gravel.

Mitigation Measures: No mitigation measures are necessary.

d) **No Impact.** Would the project in flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation? As indicated in c i-iv, the project area is within FEMA mapped Zone X and outside the 0.2% annual chance floodplain and the proposed project would not be in an area at risk of flooding. The site is not within a coastal zone area so hazards from tsunamis and/or seiche would not occur. Based on a review of the City of Palmdale General Plan Exhibit S-6, the project site is not located within an inundation area. The project area is a relatively flat site with a slope less than one percent. Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

e) **No Impact.** Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan? Water would be used as a dust suppressant during site grubbing and grading. This would be a temporary impact. Once the project is built, no water would be required. Therefore, the proposed project would not obstruct implementation of a water quality control plan or a sustainable groundwater management plan. Therefore, no impacts would occur.

Mitigation Measures: No mitigation measures are necessary.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XI	LAND USE AND PLANNING. Would the Project:				
a)	Physically divide an established community?	☐	☐	☒	☐
b)	Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☒	☐

Project Impacts and Mitigation Measures

a) **No Impact.** Would the project physically divide an established community? There is no established community as the site and surrounding area is either vacant or developed with industrial uses. The proposed project is the construction of an alternative energy project. The proposed project will require an easement granted by the City of Palmdale to incorporate Avenue O-12 as part the project. Therefore, a less than significant impact would occur

Mitigation Measures: No mitigation measures are necessary.

b) **Less than Significant Impact.** Would the project Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect? With the exception of Avenue O-12, the project area is part of Lockheed Plant 10 Palmdale Specific Plan. The Specific Plan was adopted on September 10, 1992 with an update on December 9, 1994. The Specific Plan identifies the project area as manufacturing/industrial uses with related activities associated with research, design, fabrication, testing, manufacturing and warehousing of aircraft. Alternative energy projects such as the proposed project were not included in the 1992 Specific Plan. As a result, the proposed project will require review and approval or a Site Plan Review application from the City of Palmdale. However, the conversion of the site to an alternative energy project is consistent with other uses in the Specific Plan area and would not conflict with any City of Palmdale land use plan, policy or regulation, and nor would it cause a significant environmental impact. Avenue O-12 bisects the site from east to west. An easement from the City of Palmdale will be required to develop the project within the designated area for Avenue O-12. Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XII	MINERAL RESOURCES. Would the Project:				
a)	Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b)	Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

Project Impacts and Mitigation Measures

a-b) **No Impact.** Would the project Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state and result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan? The proposed project area does not contain any mineral resources nor are there any mining activities occurring at the site or in the general vicinity of the site. Review of the City of Palmdale General Plan Exhibits ER-1B and ER-1C shows that the proposed project area is not within an area containing mineral resources of value to the region or within the Quarry and Reclamation Zone as identified by the City of Palmdale. The proposed project would not result in a loss of availability of locally important mineral resources. Therefore, no impact would occur.

<u>Mitigation Measures</u>: No mitigation measures are necessary.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XIII	NOISE. Would the Project:				
a)	Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b)	Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c)	For a project located within the vicinity of a private airstrip or an airport land use plan, or where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

Project Impacts and Mitigation Measures

a-b) **Less than Significant Impact.** Would the project generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies? Grubbing and grading of the site has the potential for temporarily generating construction equipment noise, as does the trenching required to install the distribution line from the solar facility to the SCE electrical grid. In addition, during construction, groundborne vibrations and groundborne noise may be perceived by workers in the area. However, the project site is surrounded by industrial uses with undeveloped lands. The nearest school to the project is Palmdale Elementary School which is 0.95 miles from the project area. Therefore, no impacts to sensitive receptors from noise or groundborne vibration/groundborne noise during construction of the project are likely as, due to the distance, construction ambient noise is not likely to be perceived. Operation of the project would not generate any appreciable noise. Therefore, impacts would be less than significant

Mitigation Measures: No mitigation measures are necessary.

c) **No Impact.** Would the project for a project located within the vicinity of a private airstrip or an airport land use plan, or where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels? The proposed project is two miles from the USAF Plant 42 runway and airport traffic control. However, this airport is not a public use airport and, therefore, any temporary noise generated during construction of the site would not expose members of the public to excessive noise. Please see Section IX.d., for the analysis of potential impacts of the proposed project to Plant 42. The FAA has determined that the proposed project is not a hazard to air navigation. No impact would occur.

<u>Mitigation Measures</u>: No mitigation measures are necessary.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XIV	POPULATION AND HOUSING. Would the Project:				
a)	Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b)	Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Project Impacts and Mitigation Measures

a-b) **No Impact.** Would the project induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)? Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere? The proposed project is an unmanned solar facility. There would be a temporary influx of workers during the construction of the project that may use hotels for temporary housing. No new homes or business to support the proposed project would be required. The site is undeveloped and there are no existing people or housing that may be impacted by the project. No impact would occur.

Mitigation Measures: No mitigation measures are necessary.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XV	PUBLIC SERVICES. Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:				
a)	Fire protection?	☐	☐	☒	☐
b)	Police protection?	☐	☐	☐	☒
c)	Schools?	☐	☐	☐	☒
d)	Parks?	☐	☐	☐	☒
e)	Other public facilities?	☐	☐	☐	☒

Project Impacts and Mitigation Measures

a) **Less than Significant Impact.** Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public service; fire protection? The City of Palmdale is supported by the Los Angeles County Fire Department for fire, rescue, and emergency medical (paramedic) services, as well as fire prevention function. Los Angeles County Fire Station No. 37, located at 38318 9th Street East, is 1.7 miles to the southwest of the project site, and would serve as the first responder in the event of an emergency. The proposed project is not likely to cause a fire and increase demand for Fire Department. As a result, the proposed project would not necessitate the provision of new or physically altered governmental facilities, and the overall need for fire protection services is not expected to substantially increase. Impacts would be less than significant. Therefore, impacts would be less than significant.

<u>Mitigation Measures</u>: No mitigation measures are necessary

b-e) **No Impact.** Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public service; police protection, schools, parks, other public facilities? The proposed project is an unmanned solar facility that would not require an increase in police, schools, parks or other facilities. No additional governmental facilities will be required as a result of project implementation. No impacts would occur.

<u>Mitigation Measures</u>: No mitigation measures are necessary.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XVI RECREATION				
a) Would the project increase the use of existing neighborhood or regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Would the project increase the use of existing neighborhood or regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒

Project Impacts and Mitigation Measures

a,b) **No Impact.** Would the project increase the use of existing neighborhood or regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated? Would the project increase the use of existing neighborhood or regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated? The proposed project is an unmanned solar facility in an industrial area that would not require an increase in the use or cause the deterioration of existing neighborhood or regional parks or other recreational facilities. No impact would occur.

Mitigation Measures: No mitigation measures are necessary.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XVII TRANSPORTATION. **Would the Project:**					
a)	Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☒	☐
b)	Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)(1)?	☐	☐	☒	☐
c)	Substantially increase hazards due to a geometric design feature (e.g., sharp curve or dangerous intersections) or incompatible uses (e.g. farm equipment)?	☐	☐	☐	☒
d)	Result in inadequate emergency access?	☐	☐	☒	☐

Project Impacts and Mitigation Measures

a) **Less than Significant Impact.** Would the project conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities? During construction of the project, there would be a temporary increase in traffic from workers traveling to the site plus equipment and materials being delivered to the site. This minor, temporary increase in traffic to an area that is largely undeveloped would not conflict with the City of Palmdale ordinances that address transportation with the city limits. Therefore, impacts would be less than significant

Mitigation Measures: No mitigation measures are necessary

b) **Less than Significant Impact.** Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)(1)? Senate Bill 32 requires California to reduce GHG emissions below 1990 levels by 2030 and Executive Order B-16-12 provides a target rate of 80 percent below 1990 emissions levels for the transportation sector by 2050. The transportation sector has three means of reducing GHG emissions: increasing vehicle efficiency, reducing fuel carbon content, and reducing the amount of vehicle miles (Office of Planning and Research 2018). The California Air Resources Board (CARB) has provided a path forward for achieving these emissions reductions from the transportation sector in its 2016 Mobile Source Strategy. CARB determined that it will not be possible to achieve the State’s 2030 and post-2030 emissions goals without reducing Vehicle Miles Traveled (VMT) growth. It has been concluded that to achieve the State’s long-term climate goals, California needs to reduce per capita VMT (Office of Planning and Research 2018). This can occur under CEQA through VMT mitigation. Many agencies use “screening thresholds” to quickly identify when a project should be expected to cause a less-than-significant impact without conducting a detailed study. The City of Palmdale has determined to use the Los Angeles County Public Works thresholds of significance for determining if a project specific Transportation Impact Analysis is required (Los Angeles County Public Works 2020). Screening criteria for non-retail project trip generation provides that if the development project does not generate a net increase of 110 or more daily vehicle trips, then further analysis is not required.

During construction and operation of the proposed project, it is anticipated that less than 110 trips per day will be generated (M. Miller Personal Communication 2020b). Based on discussions with potential subcontractors, it is anticipated that the daily average trips during construction will be 42 with a maximum number of 92 trips on any day. There will be a total of two preventative maintenance and two inspection trips per month during operation of the solar facility for a total of four trips per month during operation. Operational trips associated with the project would be negligible and limited to occasional maintenance and servicing of the solar system. The estimated daily construction trips are summarized in Table 8.

Table 8: Estimated Daily Trips during Construction

	Daily Average Trips	**Maximum Trip Event**
Construction Personnel	40	80
Deliveries	2	12
Total	**42**	**92**

Therefore, the project will result in a less than significant impact and no mitigation is required.

Mitigation Measures: No mitigation measures are necessary

c) **No Impact.** Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curve or dangerous intersections) or incompatible uses (e.g. farm equipment)? The proposed project is a solar energy facility. Other than access roads for routine and emergency repairs, roads for the traveling project are not part of this project. No impact would occur.

Mitigation Measures: No mitigation measures are necessary.

d) **Less than Significant Impact.** Would the project result in inadequate emergency access? The proposed project would not result in inadequate emergency access. Two north-south access roads from Blackbird Drive are included as part of the project design that can be used by first responders in case of an emergency. These access roads have been designed to accommodate first responders and fire trucks. These roads are rated for the weight of a fire truck. The cul-de-sac turnabouts have been designed with an appropriate turning radius. No impact would occur.

Mitigation Measures: No mitigation measures are necessary.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XVIII	TRIBAL CULTURAL RESOURCES. Would the Project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
a)	Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k), or	☐	☒	☐	☐
b)	A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) to Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☒	☐	☐

Project Impacts and Mitigation Measures

a,b) **Less than Significant with Mitigation Incorporated.** The City of Palmdale is in consultation with two Native American tribes. **Mitigation Measures TRC-1 and TRC-2** will be implemented to reduce impacts to potential pre-historic resources located within the project area to a less than significant impact

With implementation of **Mitigation Measures TRC-1 and TRC-2,** impacts would be less than significant.

TCR -1: The San Manuel Band of Mission Indians Cultural Resources Department (SMBMI) and the Fernandeño Tataviam Band of Mission Indians (FTBMI) shall be contacted, as detailed in **CUL-1**, of any pre-contact and/or post-contact cultural resources discovered during project implementation, and be provided information regarding the nature of the find, so as to provide Tribal input with regards to significance and treatment. Should the find be deemed significant, as defined by CEQA (as amended, 2015), a cultural resources Monitoring and Treatment Plan shall be created by the archaeologist, in coordination with SMBMI and FTBMI, and all subsequent finds shall be subject to this Plan. This Plan shall allow for a monitor to be present that represents SMBMI for the remainder of the project, should SMBMI elect to place a monitor on-site.

TCR -2: Any and all archaeological/cultural documents created as a part of the project (isolate records, site records, survey reports, testing reports, etc.) shall be supplied to the applicant and Lead Agency for dissemination to SMBMI and FTBMI. The Lead

Agency and/or applicant shall, in good faith, consult with SMBMI and FTBMI throughout the life of the project.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XIX	UTILITIES AND SERVICE SYSTEMS. Would the Project:				
a)	Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities the construction or relocation of which could cause significant environmental effects?	☐	☐	☒	☐
b)	Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☒	☐
c)	Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
d)	Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐
e)	Comply with federal, state and local management and reduction statutes and regulations related to solid waste?	☐	☐	☒	☐

Project Impacts and Mitigation Measures

a, b) **Less than Significant Impact.** Would the project require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities the construction or relocation of which could cause significant environmental effects and Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years? The proposed project is an alternative energy project and would not require the relocation or expansion of utilities such as water, wastewater treatment, electrical or natural gas. Stormwater generated on site would be managed and directed to one or both retention basins that are part of the project. Water would be used as dust suppression during construction of the project and in minor amounts during solar panel cleaning but expansion of water services to the project will not be required. Other than metered water used for dust suppression, the project will not require permanent water provisions. Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

c) **No Impact.** Would the project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments? During construction and routine or emergency services at the project, portable toilets would be brought to the site for the workers and serviced by the portable toilet vendor. The project does not include a sanitary system so there would be no project-related impacts to the Palmdale Water Reclamation Plant. No impact would occur.

Mitigation Measures: No mitigation measures are necessary.

d, e) **Less than Significant Impact:** Would the project generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals and comply with federal, state and local management and reduction statutes and regulations related to solid waste? During site grubbing and clearance, green waste would be generated and disposed of in the local Class III landfill. Antelope Valley Landfill located at 1200 City Ranch Road, Palmdale, California, is the closest landfill to the project site. Trash and debris generated during construction of the project that would also be disposed of at a Class III landfill. Fees for disposing of green waste and non-hazardous waste would be paid by the project proponent. Once the project has been constructed, negligible amounts of trash may be generated when maintenance occurs. Any broken solar panels or those that need to be replaced would be either recycled or disposed of as manifested hazardous waste in a Class II or Class I landfill. This would be an infrequent occurrence. The proposed project would not generate waste that would exceed the capacity of the local trash conveyors or the local landfill. Therefore, impacts would be less than significant

Mitigation Measures: No mitigation measures are necessary.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XX	WILDFIRE: If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a)	Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
b)	Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☒	☐
c)	Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒
d)	Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒

Project Impacts and Mitigation Measures

a) **No Impact.** Would the project substantially impair an adopted emergency response plan or emergency evacuation plan? The proposed project is not located within a wildfire hazard area. Exhibit S-16 of the General Plan depicts Fire Zone 4 south and west of the proposed project area. Once constructed, operation of the unmanned solar facility would be located adjacent to undeveloped lands and not impair emergency response plans for the Lockheed Martin plant or Plant 42. The project is an unmanned solar project; as a result an emergency evacuation plan is not required. No impact would occur.

Mitigation Measures: No mitigation measures are necessary.

b) **Less than Significant Impact.** Would the project Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire? The proposed project is not located in lands classified as a wildfire hazard area and has a relatively flat topography. The proposed project would be required to comply with federal, State and City of Palmdale regulations for minimizing fire hazards. Construction and operation of the proposed project would not exacerbate wildlife risks and increase exposure to pollutant concentrations. Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

c) **No Impact.** Would the project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment? The infrastructure such as access roads among the solar arrays and retention basins-type features that are associated with the proposed project would not exacerbate fire risks at the project. No impact would occur.

Mitigation Measures: No mitigation measures are necessary.

d) **No Impact.** Would the project expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes? The proposed project area is relatively flat and the risks for flooding is very low. There is no risk for landslides at the project site. Once constructed, the solar facility would be unmanned and, therefore, would not expose people to significant risks. The project site is not located in a wildfire hazard area. No impact would occur.

Mitigation Measures: No mitigation measures are necessary.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XXI MANDATORY FINDINGS OF SIGNIFICANCE				
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☒	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☒	☐

The following are Mandatory Findings of Significance in accordance with Section 15065 of the CEQA Guidelines.

a) **Less than Significant with Mitigation Incorporated.** As described in Section III, Biological Resources, Section IV, Cultural Resources and Section VIII, Geology (for paleontological resources), once proposed mitigation measures are implemented, the proposed project does not have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of fish or wildlife species, reduce the number or restrict the range of a rare or endangered plant or animal. Incorporation of **Mitigation Measures BIO-1** through **BIO-6** would reduce possible project-related impacts to natural resources to a less than significant level. While historic and prehistoric resources observed at the project site were determined to not be significant, incorporation of **Mitigation Measures CUL-1** through **CUL-3** would reduce possible impacts to cultural resources discovered during construction. Incorporation of **Mitigation Measure GEO-1** would ensure that any discovered paleontological resources would be properly handled, and impacts would be reduced to a less than significant level .

b) **Less than Significant Impact.** The proposed project has the potential to have cumulative impacts to air quality and greenhouse gases. However, as discussed in Section III (Air Quality) and Section VII (Greenhouse Gas Emissions), these impacts would be temporary during construction and would not be significant.

c) **Less Than Significant Impact.** The proposed project may have indirect minor short-term effects on human beings during construction. However, in the long term, the project would have a beneficial impact because the project would generate clean energy. No substantial adverse effects on human beings would occur. No impacts would occur.

5. REFERENCES

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APPENDICES

APPENDIX A SOLAR GLARE ANALYSIS

Palmdale Solar Expansion Glare Analysis

Lockheed Martin

Palmdale PV Solar Expansion
Project No. 116869

Revision 0
5/4/2020

Palmdale Solar Expansion Glare Analysis

prepared for

Lockheed Martin
Palmdale PV Solar Expansion
Palmdale, California

Project No. 116869

Revision 0
5/4/2020

prepared by

Burns & McDonnell Consultants, Inc.
Phoenix, Arizona

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
ATCT	Airport Traffic Control Tower
Burns & McDonnell	Burns & McDonnell Consultants, Inc.
FAA	Federal Aviation Administration
GSD	Glare simulating device
OP	Observation Point
Project	Palmdale Solar Project
PV	Photovoltaic
SGHAT	Solar Glare Hazard Analysis Tool
SGOHP	Solar Glare Ocular Hazard Plot
W	Watt

1.0 EXECUTIVE SUMMARY

Burns & McDonnell Consultants, Inc. (Burns & McDonnell) evaluated the potential ocular hazard for the Lockheed Martin Palmdale Solar Expansion Project (Project) located in Palmdale, California. Several observation points (OP) surrounding the site were reviewed and evaluated including nearby intersections, adjacent roads, and the approach paths and airport traffic control tower (ATCT) for the Palmdale USAF Plant 42 (Airport). The study consisted of evaluating each OP and path for the ocular hazard from glare reflected and refracted from the photovoltaic (PV) modules utilizing the Solar Glare Hazard Analysis Tool (SGHAT) developed by Sandia National Laboratories. Burns & McDonnell found that the Project was in adherence with the Federal Aviation Administration's (FAA) requirements for solar projects located at or near airfields and no glare was observed for the nearby roads or intersections.

1.1 Brief Explanation of Glint and Glare

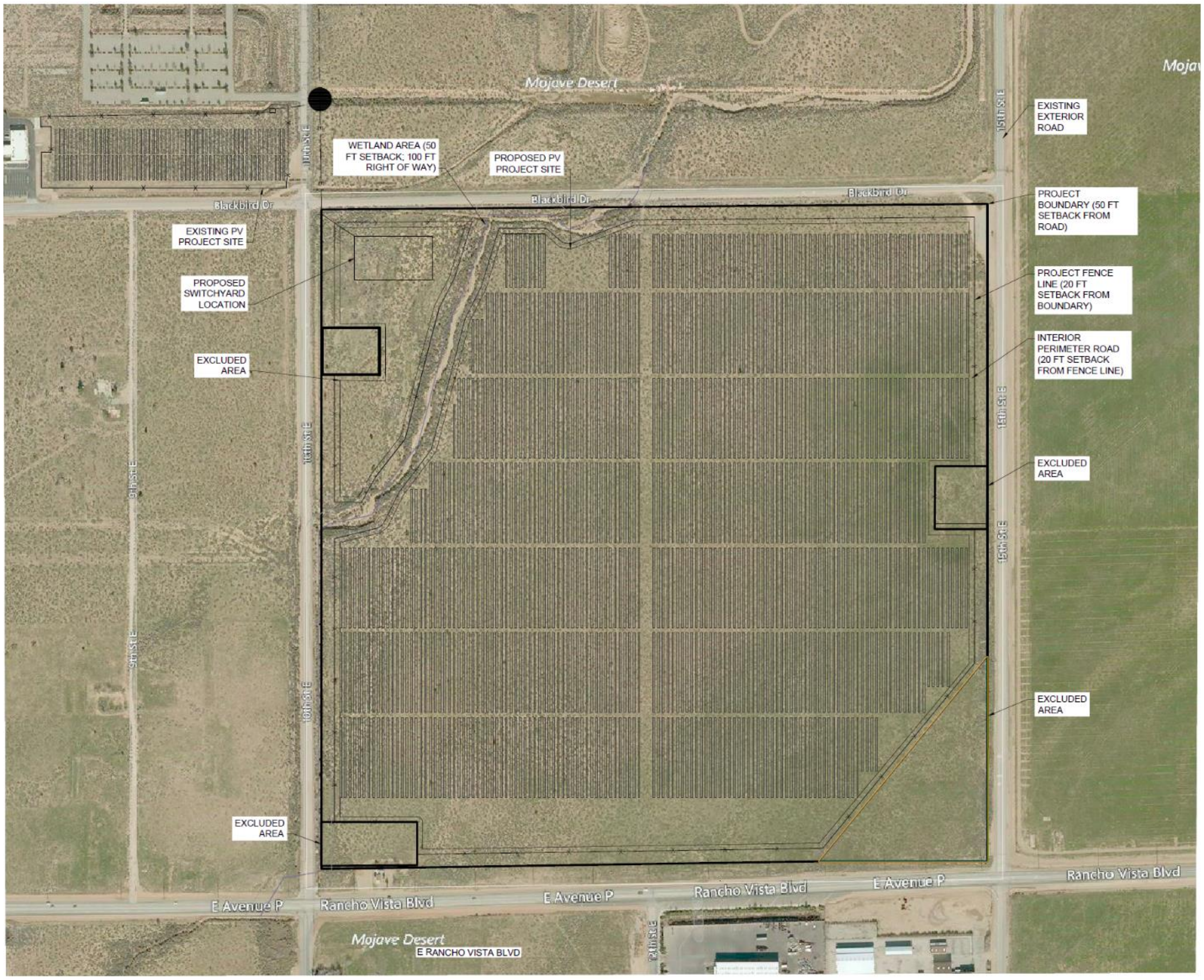
Glint (a momentary flash of light) and glare (a more continuous source of excessive brightness relative to the ambient lighting) (Ho, Relieving a Glaring Problem, 2013) were studied and for purposes of this report, glint and glare will be referred together as glare.

Glare created could be considered hazardous to pilots operating at airfields located near the project site vehicles driving near the project. Therefore, analyzing the potential for glare from a solar project is an important step in determining the impact of the Project on the surrounding area. Sandia National Laboratories developed the SGHAT which determines the risk of glare potential from solar energy facilities (Sandia National Laboratories, 2019). SGHAT was designed to predict glare for pilots or air traffic control towers to determine compliance with FAA Interim Policy 78 FR 63726. The policy defines the requirements of a solar projects located on or near an airport property to prevent glare from creating hazardous conditions for airfield operations. The interim policy is included in this report as Attachment 1.

1.2 Site Overview

The Project is located in Palmdale, CA on the northwest corner of Rancho Vista Boulevard and 15th Street. The proposed 19.4MWac capacity addition is located southeast of an existing 1MWac site and a site overview can be observed in Figure 1-1.

Figure 1-1: Site Overview



1.3 Glare Analysis

To perform the glare analysis, the Solar Glare Hazard Analysis Tool licensed to ForgeSolar for commercial use was utilized (Sandia National Laboratories, 2019). The SGHAT allows the user to specify a site location, draw an outline of the proposed photovoltaic array, and specify observer locations. Once these points are given, the properties of the arrays such as the tracking type, tilt, module surface type, and orientation can be specified for each array. Latitude, longitude, and elevation for each observation point, array vertex, and path are tracked and used for sun position and vector calculations to determine glare for that observation point (ForgeSolar, 2019).

The SGHAT output indicates if there is potential for glare at the identified OPs. If glare exists, SGHAT creates the Solar Glare Ocular Hazard Plot (SGOHP) which identifies the level of the hazard. The plot is a function of retinal irradiance and subtended angle (i.e. the size/distance of the glare source) and was developed based on studies conducted in the 1970s. See “Evaluation of Optical Radiation Hazards,” David C. Sliney & Benjamin C. Freasier, 1973, Applied Optics and “Eye Hazard and Glint Evaluation for the 5-MWt Solar Thermal Test Facility,” T.D. Brumleve, 1977, for the complete reports from the studies.

The SGHAT evaluated the potential ocular hazard at each of the OPs for every minute of a full calendar year. The SGHAT geometric analysis is based on the sun’s path through the sky in relation to the position of the PV arrays and the OPs. The path of the sun is on about a 20,000 to 100,000-year cycle known as the Milankovitch Cycles (UCAR, 2019). SGHAT uses the current cycle (i.e. values for eccentricity, precession, and axial tilt), therefore, any change in eccentricity, precession, or axial tilt year to year is immaterial and a reference to a particular calendar year is not necessary.

It should be noted that SGHAT does not account for daylight savings time, so all times of potential glare indicated from SGHAT are based on Greenwich Mean Time for that location.

2.0 TECHNICAL BACKGROUND

2.1 Definition of Glare

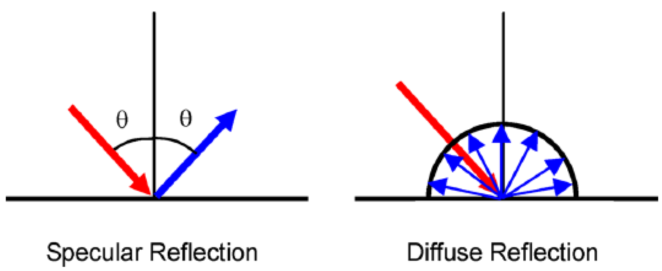
Glint is typically defined as a momentary flash of bright light, often caused by a reflection off a moving source. A typical example of glint is a momentary solar reflection from a moving car. Glare is defined as a continuous source of bright light. Glare is generally associated with stationary objects, which, due to the slow relative movement of the sun, reflect sunlight for a longer duration.

The difference between glint and glare is duration. Industry-standard glare analysis tools evaluate the occurrence of glare on a minute-by-minute basis; accordingly, they generally refer to solar hazards as 'glare' (ForgeSolar, 2019).

2.2 Reflected Light

Reflected light can be characterized as a combination of specular (mirror-like) and diffuse (scattered) reflections. See Figure 2-1 (Ho, Chanbari, & Diver, 2011).

Figure 2-1: Specular and Diffuse Reflection



Smooth surfaces such as mirrors and smooth glass produce more specular reflections with greater intensity (i.e. larger retinal irradiances/energy that reaches the retina) and tighter beams (smaller subtended angles, i.e. the size of reflection in the eye), while solar receivers, textured glass, and anti-reflective coatings produce more diffuse reflections with lower solar intensities (less energy) but greater subtended angles (larger size). See Figure 2-2 for examples.

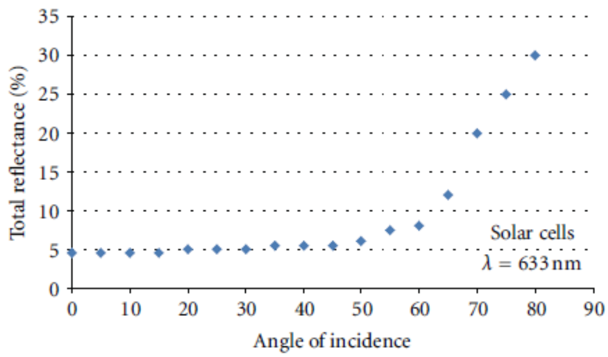
Figure 2-2: Example of Specular and Diffuse Reflections

Source: (Ho, Relieving a Glaring Problem, 2013)

Specular reflection is shown on the left demonstrating a smaller reflection (i.e. lower subtended angle/size to the eye) but higher intensity and the reflections get more diffuse moving right in the figure. The diffuse reflection has a lower intensity when viewed at nearly normal (i.e. when the angle of incidence/reflection is perpendicular to the module as shown as the vertical line in Figure 2-1). However, the intensity of the reflection from the module with the anti-reflective coating increases with an increase in the angle of incidence, angle theta in Figure 2-1 (i.e. when the sun is lower in the sky) and results in a larger subtended angle for the glare source as is observed in the center of Figure 2-2. As such, the determination of ocular hazard is a combination of intensity (retinal irradiance) and size (subtended angle).

This increased angle of incidence increases the intensity of the glare. The specular reflectance of mirrors can be greater than 90 percent, while the specular reflectance of PV glass can be as low 1 to 2 percent at near normal incidence angles (i.e. perpendicular to the PV glass). However, at higher angles of incidence, e.g. when the sun is low on the horizon, the glare from PV glass can be quite substantial. The reflectance off solar modules at these higher angles of incidence is still much less than other materials like snow, aluminum, etc. However, because of this increased level of reflectance, it is worth studying the effects of glare from solar modules. See Figure 2-3 for the relationship between reflectance and the angle of incidence.

Figure 2-3: Reflectance Per Angle of Incidence



Source: (Riley & Olson, 2011)

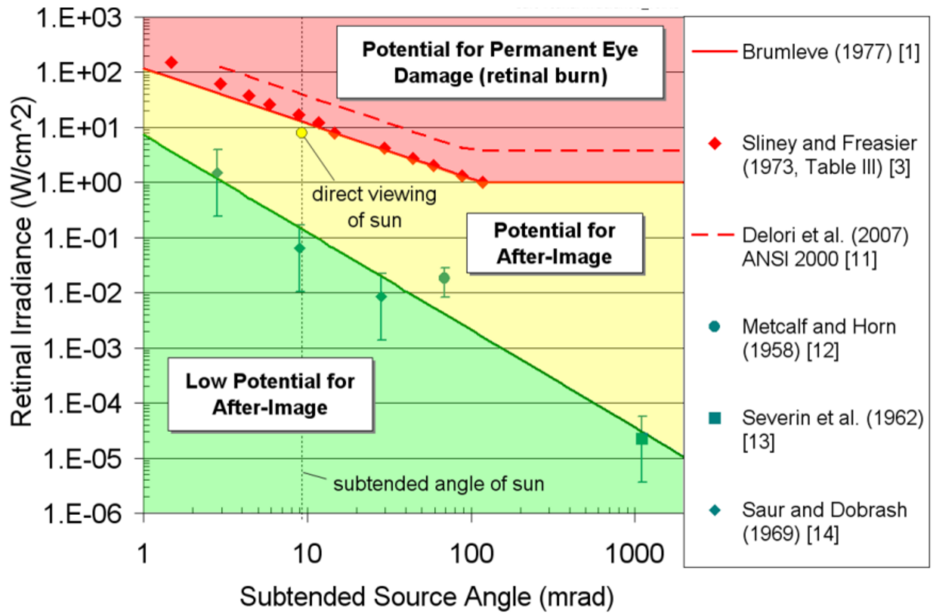
2.3 Solar Glare Hazard Analysis Tool

In order to understand and model glare in accordance with FAA standards, Sandia National Laboratories developed the Solar Glare Hazard Analysis Tool in conjunction with the FAA. The SGHAT allows the user to specify a site location, draw an outline of the proposed photovoltaic array, and specify observer locations. Once these points are given the properties of the arrays such as the tracking type, tilt, module surface type, and orientation can be specified as well for each array. Latitude, longitude, and elevation for each observation point, array vertex, and path are tracked and used for sun position and vector calculations to determine glare for that observation point or path. Additional information regarding reflectance, environment, and ocular factors can be altered, however typical values are already specified by the FAA for analysis and are required to be utilized.

The ocular impact of glare is visualized with the Solar Glare Ocular Hazard Plot. This chart displays the ocular impact as a function of glare subtended source angle and retinal irradiance. Each minute of glare is displayed on the chart as a small circle in its respective hazard zone. For convenience, a reference point is provided which illustrates the hazard from viewing the sun without filtering, i.e. staring at the sun. Each plot includes predicted glare for one PV array and one receptor (ForgeSolar, 2019).

The plot can be observed in Figure 2-4 referencing the various studies utilized to determine the different regions.

Figure 2-4: Solar Glare Ocular Hazard Plot



Source: (ForgeSolar, 2019)

If glare is found, the SGHAT calculates the retinal irradiance and subtended angle (size/distance) of the glare source, defines how many minutes of “green glare”, “yellow glare”, and “red glare” exist at each observation point, and produces the SGOHP. (Note: Subtended angle is ω in Figure 2-5.) The SGHAT assumes an unobstructed line-of-sight from the arrays to the OP, which may not be true for each OP. Any obstructions to that line of sight will have the effect of reducing the subtended angle of the glare. As can be noted in Figure 2-4, reducing the subtended angle, i.e. the amount of glare that can be seen, the effect of the glare would move the calculated point left on the SGOHP.

The “green glare”, “yellow glare”, and “red glare” correspond to instances with a low potential for afterimage, potential for afterimage, and potential for permanent eye damage, respectively. These categories assume a typical blink response in the observer. Note that retinal burn is typically not possible for PV glare since PV modules do not focus reflected sunlight as is the case with concentrated solar.

Other results from the SGHAT are a plot that specifies when glare will occur throughout the year and at what times with color codes indicating the potential ocular hazard. The SGHAT can also predict relative energy production while evaluating alternative designs, layouts, and locations to identify configurations that maximize energy production while mitigating the impacts of glare. However, for the purposes of this study only the potential ocular hazard of the installation without optimization was considered.

The SGOHP retinal burn criteria was developed based on studies utilizing rabbits and monkeys to study the effects on the retina (Brumleve, 1977). The studies calculated the energy in watts per square centimeter (W/cm^2) that would impact the retina and what the effect on the retina would be. The diagram in Figure 2-5 was used for some of the calculations. Detailed equations, assumptions, and calculations are contained in the study report (Brumleve, 1977). The criteria differentiating green glare from yellow glare were determined from three studies by: Metcalf and Horn in 1958, Severin et al. in 1962, and Saur and Dobrash in 1969.

Figure 2-5: Diagram for Calculating Glare Hazard Effects

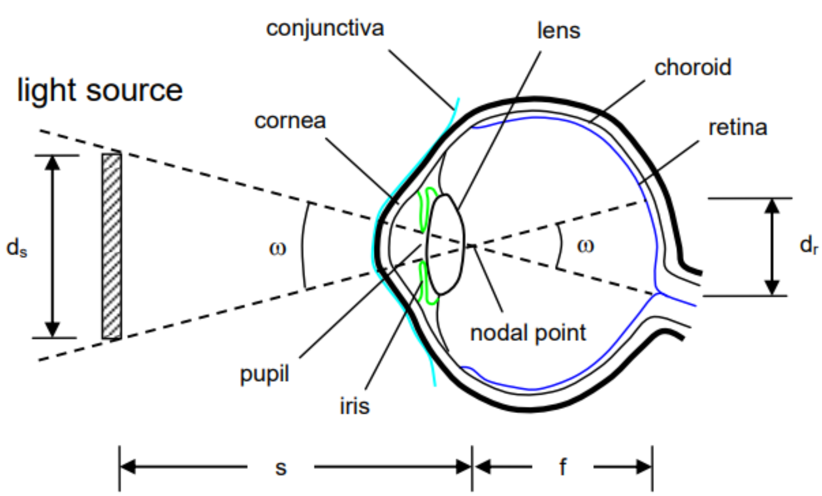
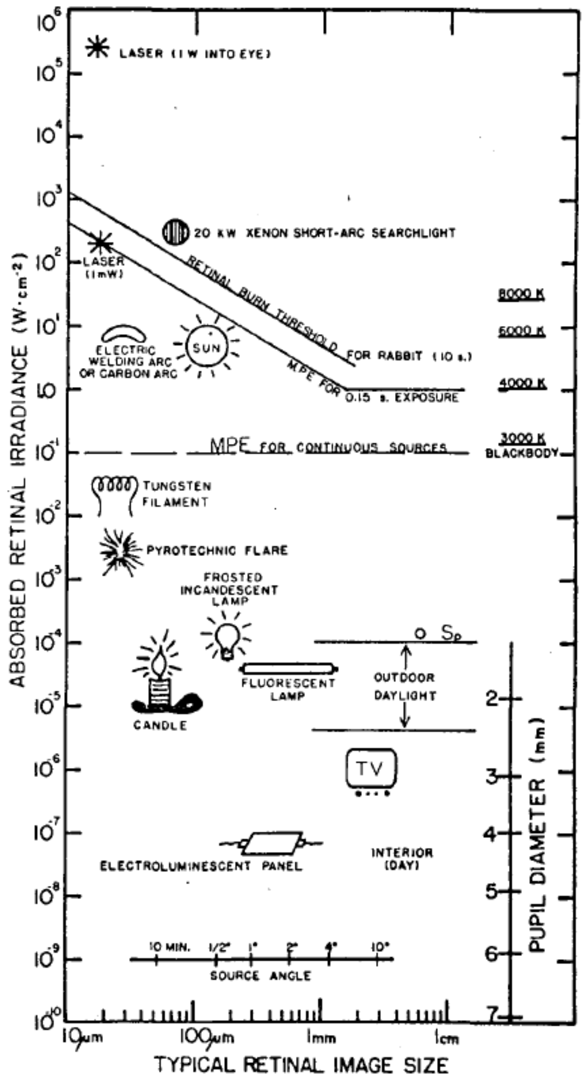


Figure 2-6 shows the original plot from the study done in 1977 by Brumleve. The important point to note in the figure is the relative effects ratings of common light sources.

Figure 2-6: Typical Light Sources and Eye Damage Thresholds

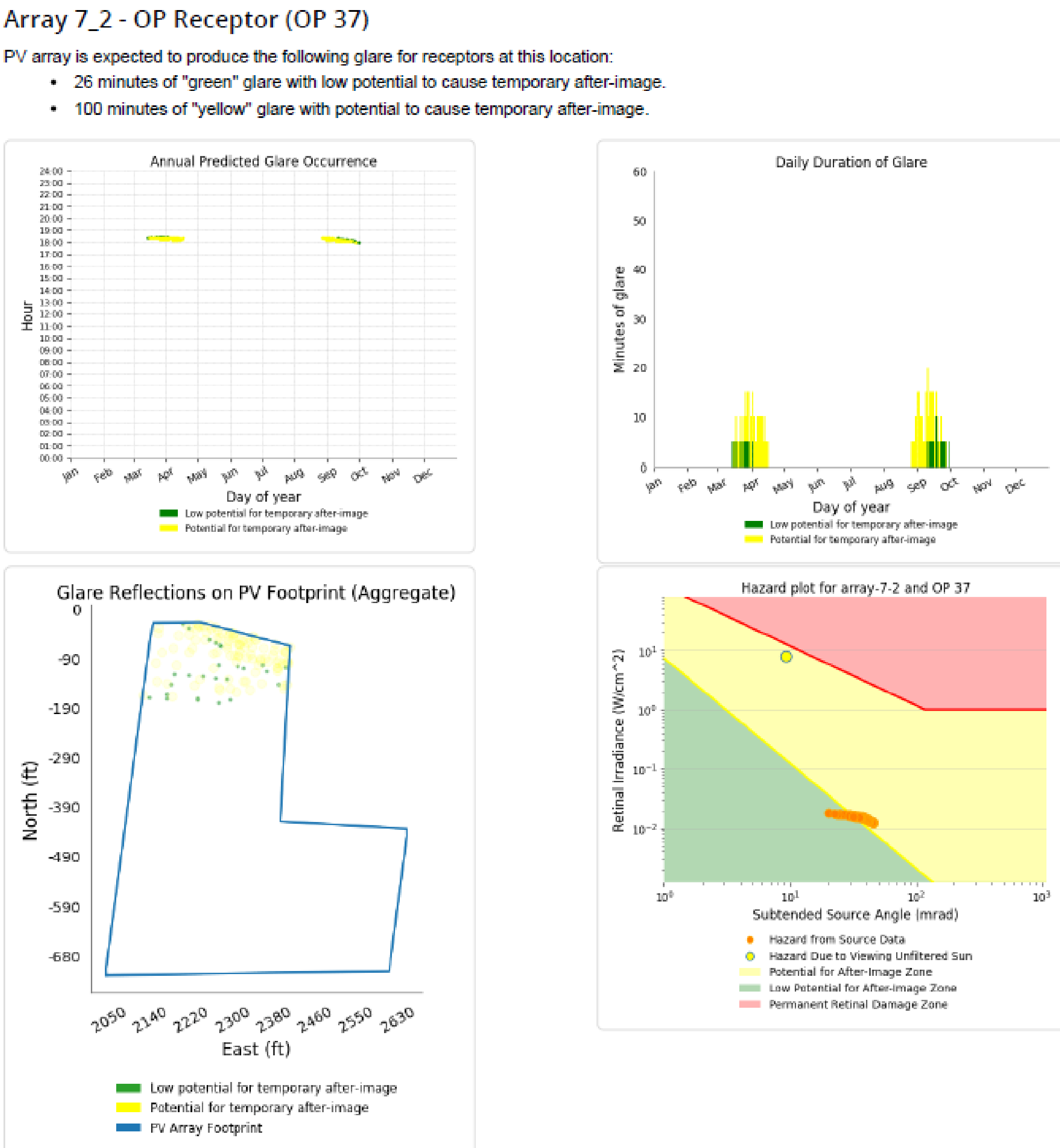


Source: (Brumleve, 1977)

Note: The eye is exposed to light sources having radiances varying from ~10^4 W/cm^2 to ~10^{-6} W/cm^2 and less. The resulting retinal irradiances vary from ~200 W/cm^2 down to 10^{-7} W/cm^2 and even lower; retinal irradiances are shown for typical image sizes for several sources. A minimal pupil size was assumed for intense sources, except for searchlight. The retinal burn threshold for a 10-second exposure of the rabbit retina is shown as the upper solid line. The maximum permissible exposure (MPE) applied by the U.S. Army Environmental Hygiene Agency in evaluating light sources is shown as the lower solid line. Threshold for permanent shift of blue-cone sensitivity in monkeys obtained by Sperling is shown as o Sp at 3 x 10^{-4} W/cm^2. Approximate pupil sizes are shown at lower right based upon exposure of most of the retina to light of the given irradiance. (Extracted from Sliney and Freasier) (Brumleve, 1977)

A sample of the SGHAT output is in Figure 2-7 for different site showing the result if there were a potential for glare. In this example, there is glare from Array 7_2 at OP37. It can be observed in the Annual Predicted Glare Occurrence plot that there is glare with a potential for temporary afterimage, “yellow glare”, occurring between 6:00 pm and 7:00 pm during the months of March, April, and September and glare with a low potential of afterimage, “green glare”, occurring closer to 7:00 pm. The SGOHP shows that the retinal irradiance of the glare has over 200 times less energy than looking directly at the sun.

Figure 2-7: Example Output from the SGHAT



2.4 Definition of Afterimage

Afterimage is a type of optical illusion in which an image continues to appear briefly even after exposure to the actual image has ended. Glancing at the bright midday sun or the glare of bright headlights at night are two instances that might produce this type of afterimage. This brief exposure to an intense source often produces a positive afterimage (Cherry, 2018).

This definition is what the SGOHP describes as potential for afterimage and it should be noted that the afterimage continues only briefly, and it is temporary.

2.5 FAA Glare Hazard Study

In 2015, the FAA conducted a study on pilots to determine how glare may impact a pilot's ability to fly the airplane and read the instrumentation ("Evaluation of Glare as a Hazard for General Aviation Pilots on Final Approach," Jason A. Rogers, Clifford K. Ho, Andrew Mead, Angel Millan, Melissa Beben, Gena Drechsler, July 2015.). The FAA used a flight simulator to simulate actual flying and positioned glare simulating devices ("GSD"), i.e. lights, outside the cockpit to simulate glare. Four GSDs were placed straight ahead of the pilot (0 degrees), and at 25, 50, and 90 degrees away from straight ahead.

Figure 2-8: Interior View of Cockpit With 0-degree GSD Triggered

Pilots were asked to rate the degree of impairment from the simulated glare on their ability to fly the plane using the following scale:

- 1 = No impairment: Can easily perform functions necessary to fly the plane with no noticeable impact of glare
- 2 = Slight to no impairment: Can still perform functions necessary to fly the plane, but glare is noticeable
- 3 = Moderate impairment: Can perform functions necessary to fly the plane, but glare required some action (e.g., physically blocking glare, averting eyes)

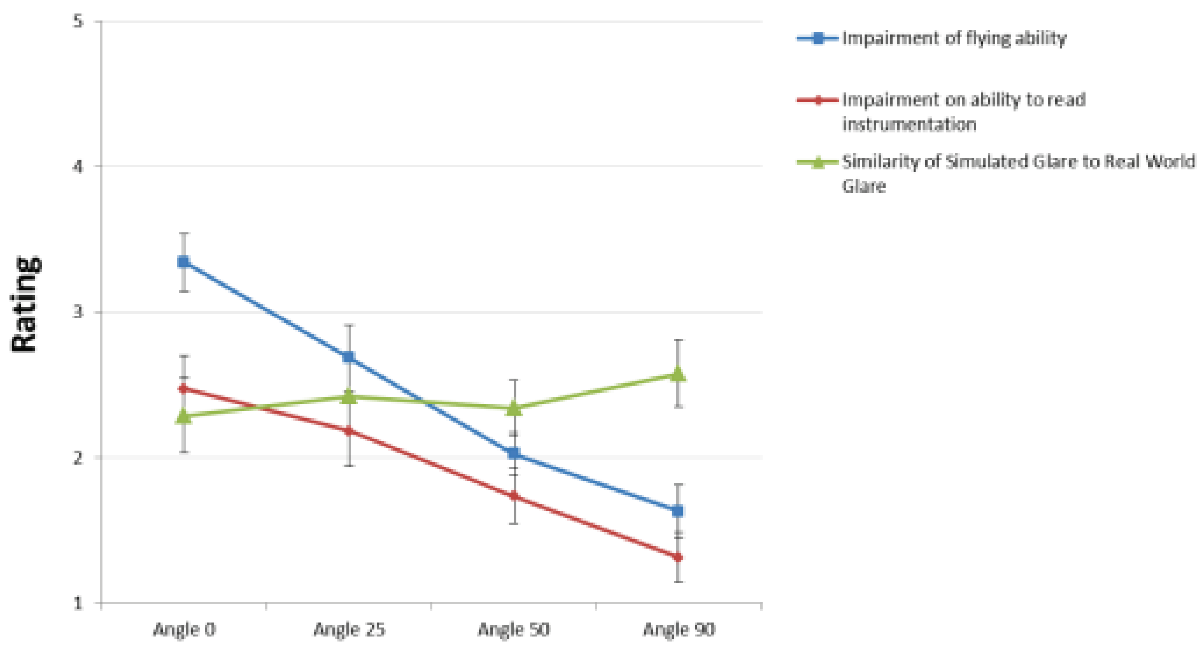
- 4 = Significant impairment: Difficulty performing functions necessary to fly the plane, even after performing actions in response to glare
- 5 = Severe impairment: Unable to perform functions necessary to fly the plane

Pilots were asked to rate the degree of impairment from the simulated glare on their ability to read their instruments using the following scale:

- 1 = No impairment: Can easily read instruments and values (e.g., altitude, speed) with no noticeable impact of glare
- 2 = Slight to no impairment: Can still read instruments and values, but glare is noticeable
- 3 = Moderate impairment: Can read instruments and values, but glare required shifting of eyes, blinking, or refocusing in order to read values
- 4 = Significant impairment: Difficulty reading instruments and values, even after shifting of eyes, blinking, or refocusing
- 5 = Severe impairment: Unable to read instruments and values
- N/A (did not view instruments during or after glare event)

Pilots ranged in age and flying experience as well as eyesight characteristics. Several pilots used corrective lenses when flying (contacts or glasses) and some had had corrective surgery. Results of the study are summarized in Figure 2-9 (Rogers, et al., 2015).

Figure 2-9: Mean Ratings of Impaired Flying Ability



The study concluded that the presence of glare was associated with the most impairment in the pilot's ability to see their instruments and to fly their airplane when the glare was straight ahead (angle 0-degrees), as well as slightly to the side, i.e. within 25 degrees of straight ahead. The more forward the glare was and the longer the glare duration, the greater the impairment to the pilots' ability to see their instruments and to fly the aircraft (Rogers, et al., 2015).

These results taken together suggest that any sources of glare at an airport may be potentially mitigated if the angle of the glare is greater than 25 degrees from the direction that the pilot is looking in (Rogers, et al., 2015). Case in point, at the Shafter-Minter Field, a relatively small general aviation facility, the FAA required a reflectivity analysis on the potential impacts of glare on aircrafts on final approach. The analysis showed that while there is a potential for an afterimage, that effect occurs when aircrafts are perpendicular to the glare source and it would be a brief occurrence in the pilots' peripheral view. The FAA issued a "determination of no hazard to air navigation" for the project (Barrett, 2013).

2.6 FAA Policy Regarding Glare

The FAA published the *Technical Guidance for Evaluating Selected Solar Technologies on Airports* in November 2010 without information at the time regarding glint and glare, revised it in October 2013 with a warning that the effect of glint and glare was being evaluated, and then updated the guidance with information regarding glint and glare in April 2018 which is the latest revision available from the FAA. The revision notes from the technical guidance document can be seen below for reference:

"

- October 2013:
  - Added a warning to the cover of this guide and corresponding FAA webpage that the FAA was reviewing sections of the guide based on the latest information about solar glint and glare.
  - Cautioned users of the guide against relying solely on the document until a subsequent update to the glint and glare sections.
- Version 1.1 (April 2018):
  - Updated Section 3.1.2, Reflectivity, to incorporate the latest information about evaluating solar glint and glare.
  - Updated corresponding references to glare throughout the document.
  - Clarified the relationship between solar energy and the FAA's Voluntary Airport Low Emissions (VALE) program in Section 5.3.2.
  - Added information about the FAA's Airport Energy Efficiency Program to Section 5.3.3.

- Updated FAA Contact information on Appendix A (where appropriate)."

The evaluation of glint and glare for the technical guidance document corresponds to Interim Policy 78 FR 63726 relating to glare from solar projects which contains the specific requirements to be met and the requirement to use SGHAT to evaluate the potential for glare. The FAA determined that for pilots, no yellow or red glare is allowable on approach, green glare is acceptable on approach, and there are no restrictions for when regularly flying the plane. Also, for airport traffic control towers no green, yellow, or red glare is acceptable. See below for exact wording on page 2 of Federal Register / Vol. 78, No. 205 / Wednesday, October 23, 2013 / Notices:

> "1. No potential for glint or glare in the existing or planned Airport Traffic Control Tower (ATCT) cab, and
>
> 2. No potential for glare or ‘‘low potential for after-image’’ (shown in green in Figure 1) along the final approach path for any existing landing threshold or future landing thresholds (including any planned interim phases of the landing thresholds) as shown on the current FAA-approved Airport Layout Plan (ALP). The final approach path is defined as two (2) miles from fifty (50) feet above the landing threshold using a standard three (3) degree glidepath." (FAA, 2013)

3.0 METHODOLOGY

3.1 SGHAT Analysis

The SGHAT was used to evaluate the ocular hazard from the Project for the landing approach paths for each runway at the Airport, the airport traffic control tower, intersections near the project site, and the roads adjacent to the project site. The runway parameters used in the analysis can be seen in Table 3-1. The glide slope of 2.5 degrees for Runways 22 and 4 were utilized as they are specified in the FAA information for the airport and the analysis was performed for a 2 mile approach path ending at the runway threshold.

Table 3-1: Runway Parameters

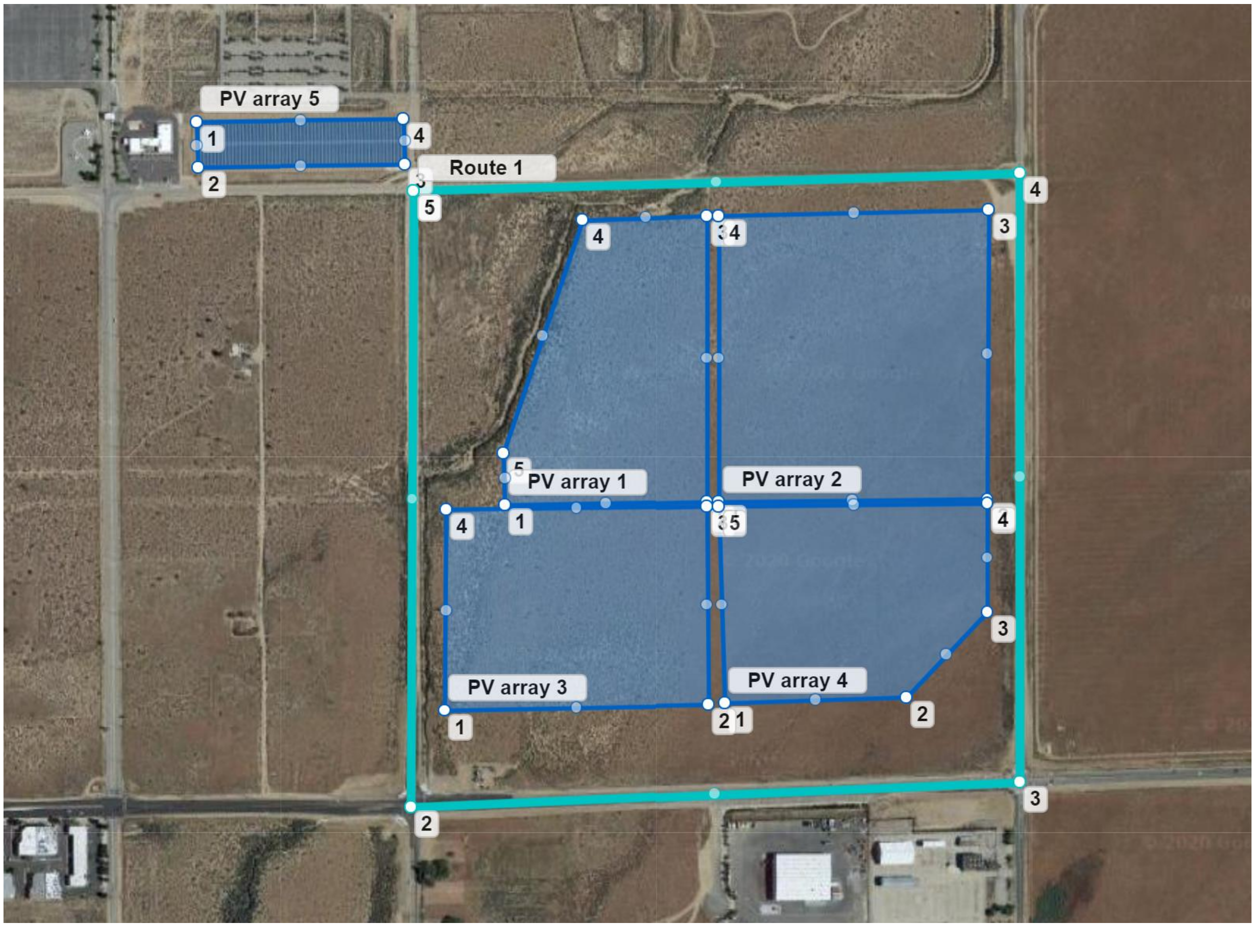
Name	Threshold Crossing Height (ft)	Runway Heading, True (degrees)	Glide Slope (degrees)
Runway 22	50	232	2.5
Runway 25	50	266	3.0
Runway 4	50	52	2.5
Runway 7	50	86	3.0

The observation points are located as seen in Figure 3-1 with the ATCT observation deck estimated to be 90ft above ground level and OP2 to OP12 being a person sitting in a vehicle estimated to be 4ft above ground level at nearby intersections.

Figure 3-1: Location of Observation Points

Also, a route receptor for the roads immediately adjacent to the site was placed to determine if any hazard exists for vehicles driving adjacent to the site. The location of the route receptor can be observed below in Figure 3-2.

Figure 3-2: Route Receptor



A total of five arrays were included in the analysis. Four were for the proposed expansion (Arrays 1 through 4) and one for the existing 1MWac array located northwest of the proposed expansion (Array 5) as it was noted that the previous analysis for the 1MWac array had fatal flaws in the parameters. The proposed expansion was divided into 4 arrays for more accurate results as recommended by the ForgeSolar help documentation which states:

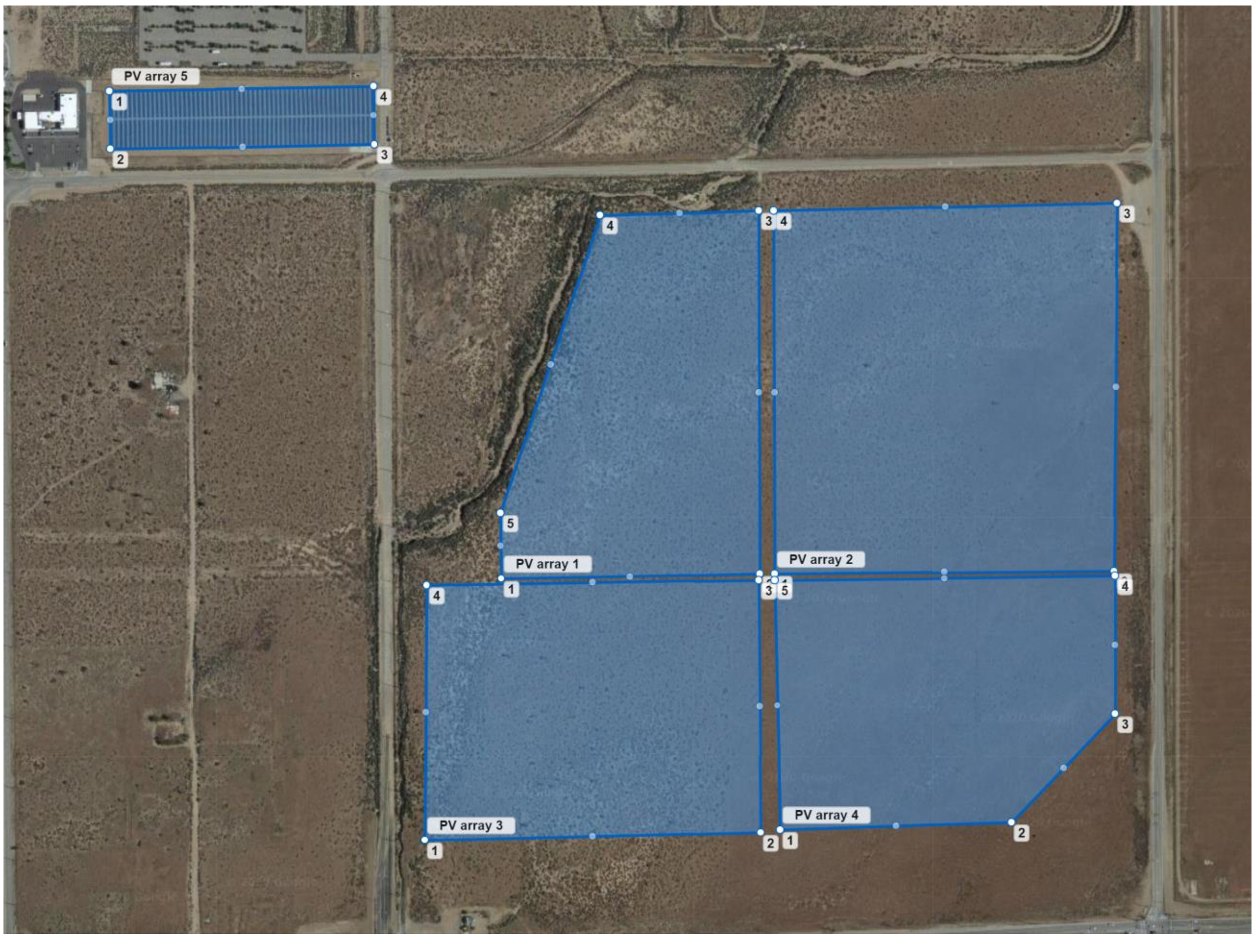
"Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare. This primarily affects analyses of path receptors."

The parameters used for the arrays can be seen in Table 3-2 and the placement observed in Figure 3-3.

Table 3-2: Parameters Used for PV Arrays and Modules

Array Type	Array Tilt (degrees)	Array Azimuth (degrees)	Module Surface Material	Average Height (ft)	Backtracking
Single-axis tracking	+/- 52	180	Smooth glass without anti-reflective coating	4	No

Figure 3-3: Array Placement



The FAA compliance report which provides pass/fail status for the three necessary components of the analysis: analysis parameters, flight paths, and ATCTs is provided in Attachment 2 and the full ForgeSolar report is included in Attachment 3. The results of the FAA glare compliance report can be found in Figure 3-4 and on page 1 of Attachment 2.

Figure 3-4: FAA Compliance Report Results

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	PASS	Receptor(s) marked as ATCT do not receive glare

4.0 CONCLUSION

Burns & McDonnell used the Solar Glare Hazard Analysis Tool licensed to ForgeSolar to evaluate potential glare from the Palmdale Solar Expansion Project located in Palmdale, California. Burns & McDonnell found the proposed expansion site and existing 1MWac array to be in compliance with FAA Interim Policy 78 FR 63276 and no ocular hazard was found for the selected observation points at nearby intersections or adjacent roads.

5.0 REFERENCES

Barrett, S. (2013). Glare Factor: Solar Installations and Airports. *Solar Industry Magazine*. Retrieved from https://solarindustrymag.com/online/issues/SI1306/FEAT_02_Glare_Factor.html

Brumleve, T. D. (1977). *Eye Hazard and Glint Evaluation for the 5-MWt Solar Thermal Test Facility.* Sandia National Laboratories.

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ATTACHMENT 1 - FAA INTERIM POLICY 78 FR 63276

Research and Innovative Technology Administration

Aylward, Anne D.; Brecht-Clark, Jan M.; Farley, Audrey L.; Hu, Patricia S.; Ishihara, David S.; Johns, Robert C.; Lang, Steven R.; Partridge, Ellen L.; Schmitt, Rolf R.; Womack, Kevin C.

Saint Lawrence Seaway Development Corporation

Middlebrook, Craig H.; Pisani, Salvatore L.

[FR Doc. 2013–24813 Filed 10–22–13; 8:45 am]

BILLING CODE 4910–9X–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Interim Policy, FAA Review of Solar Energy System Projects on Federally Obligated Airports

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of interim policy; opportunity to comment.

SUMMARY: This notice establishes interim FAA policy for proposals by sponsors of federally obligated airports to construct solar energy systems on airport property. FAA is adopting an interim policy because it is in the public interest to enhance safety by clarifying and adding standards for measuring ocular impact of proposed solar energy systems which are effective upon publication. FAA will consider comments and make appropriate modifications before issuing a final policy. The policy applies to any proposed on-airport solar energy system that has not received from the FAA either an unconditional airport layout plan approval or a ''no objection'' finding on a Notice of Proposed Construction or Alteration Form 7460–1.

DATES: The effective date of this interim policy is October 23, 2013.

Comments must be received by November 22, 2013.

ADDRESSES: You can get an electronic copy of the interim policy and the comment form on the FAA Airports Web site at *http://www.faa.gov/airports/environmental/.*

You can submit comments using the Comments Matrix, using any of the following methods:

Electronic Submittal to the FAA: Go to *http://www.faa.gov/airports/environmental/* and follow the instructions for sending your comments electronically.

Mail: FAA Office of Airports, Office of Airport Planning and Programming, Routing Symbol APP–400, 800 Independence Avenue SW., Room 615, Washington, DC 20591. Please send two copies.

Fax: 1–202–267–5302.

Hand Delivery: To FAA Office of Airports, Office of Airport Planning and Programming, Routing Symbol APP–400, 800 Independence Avenue SW., Room 615, Washington, DC 20591; between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Please provide two copies.

For more information on the notice and comment process, see the **SUPPLEMENTARY INFORMATION** section of this document.

Privacy: We will post all comments we receive, without change, to *http://www.faa.gov/airports/environmental/*, including any personal information you provide.

Comments Received: To read comments received, go to *http://www.faa.gov/airports/environmental/* at any time.

FOR FURTHER INFORMATION CONTACT: Ralph Thompson, Manager, Airport Planning and Environmental Division, APP–400, Federal Aviation Administration, 800 Independence Ave. SW., Washington, DC 20591, telephone (202) 267–3263; facsimile (202) 267–5257; email: *ralph.thompson@faa.gov.*

SUPPLEMENTARY INFORMATION: The FAA invites interested persons to join in this notice and comment process by filing written comments, data, or views. The most helpful comments reference a specific portion of the proposal, explain the reason for any recommended change, and include supporting data.

Availability of Documents

You can get an electronic copy of this interim policy by visiting the FAA's Airports Web page at *http://www.faa.gov/airports/environmental/.*

Authority for the Policy

This notice is published under the authority described in Subtitle VII, part B, chapter 471, section 47122 of title 49 United States Code.

Background

There is growing interest in installing solar photovoltaic (PV) and solar hot water (SHW) systems on airports. While solar PV or SHW systems (henceforth referred to as solar energy systems) are designed to absorb solar energy to maximize electrical energy production or the heating of water, in certain situations the glass surfaces of the solar energy systems can reflect sunlight and produce glint (a momentary flash of bright light) and glare (a continuous source of bright light). In conjunction with the United States Department of Energy (DOE), the FAA has determined that glint and glare from solar energy systems could result in an ocular impact to pilots and/or air traffic control (ATC) facilities and compromise the safety of the air transportation system. While the FAA supports solar energy systems on airports, the FAA seeks to ensure safety by eliminating the potential for ocular impact to pilots and/or air traffic control facilities due to glare from such projects.

The FAA established a cross-organizational working group in 2012, to establish a standard for measuring glint and glare, and clear thresholds for when glint and glare would impact aviation safety. The standards that this working group developed are set forth in this notice.

A sponsor of a federally-obligated airport must request FAA review and approval to depict certain proposed solar installations (e.g., ground-based installations and collocated installations that increase the footprint of the collocated building or structure) on its airport layout plan (ALP), before construction begins.[1] A sponsor of a federally-obligated airport must notify the FAA of its intent to construct any solar installation [2] by filing FAA Form 7460–1, ''Notice of Proposed Construction or Alteration'' under 14 CFR Part 77 for a Non-Rulemaking case (NRA) [3] [4]. This includes the intent to permit airport tenants, including Federal agencies, to build such

[1] FAA Technical Guidance for Evaluating Selected Solar Technologies on Airports, Section 2.3.5, states that ''solar installations of any size, located on an airport, that are not collocated on an existing structure (i.e., roof of an existing building) and require a new footprint, need to be shown on the Airport Layout Plan (ALP). Collocated solar installations need to be shown on the ALP only if these installations substantially change the footprint of the collocated building or structure. *Available at: http://www.faa.gov/airports/environmental/policy_guidance/media/airport_solar_guide_print.pdf.* Title 49 of the United States Code (USC), sec. 47107(a), requires, in part, a current ALP approved by the FAA prior to the approval of an airport development project. See Grant Assurance No. 29, AC No. 150/5070–6B, and FAA Order No. 5100.38.

[2] Any solar installation means any ground-based solar energy installation and those solar energy installations collocated with a building or structure (i.e., rooftop installations).

[3] FAA Technical Guidance for Evaluating Selected Solar Technologies on Airports Section 3.1 reads in part ''All solar projects at airports must submit to FAA a Notice of Proposed Construction Form 7460 . . .''. This section further states ''Even if the project will be roof mounted . . . the sponsor must still submit a case'' [i.e., file a Form 7460–1].

[4] The requirements of this policy are not mandatory for a proposed solar installation that is not on an airport and for which a form 7460–1 is filed under part 77 and is studied under the Obstruction Evaluation Program. However, the FAA urges proponents of off-airport solar-installations to voluntarily implement the provisions in this policy.

installations. The sponsor's obligation to obtain FAA review and approval to depict certain proposed solar energy installation projects at an airport is found in 49 U.S.C. 47107(a)(16) and Sponsor Grant Assurance 29, ''Airport Layout Plan.'' Under these latter provisions, the sponsor may not make or permit any changes or alterations in the airport or any of its facilities which are not in conformity with the ALP as approved by the FAA and which might, in the opinion of the FAA, adversely affect the safety, utility or efficiency of the airport.

Airport sponsors and project proponents must comply with the policies and procedures in this notice to demonstrate to the FAA that a proposed solar energy system will not result in an ocular impact that compromises the safety of the air transportation system. This process enables the FAA to approve amendment of the ALP to depict certain solar energy projects or issue a ''no objection'' finding to a filed 7460–1 form. The FAA expects to continue to update these policies and procedures as part of an iterative process as new information and technologies become available.

Solar energy systems located on an airport that is not federally-obligated or located outside the property of a federally-obligated airport are not subject to this policy. Proponents of solar energy systems located off-airport property or on non-federally-obligated airports are strongly encouraged to consider the requirements of this policy when siting such systems.

This interim policy clarifies and adds standards for measurement of glint or glare presented in the 2010 Technical Guidance document. Later this year the FAA plans to publish an update to the ''Technical Guidance for Evaluating Selected Solar Technologies on Airports,'' (hereinafter referred to as ''Technical Guidance'') dated November 2010. This update to the technical guidance will include the standards for measuring glint and glare outlined in this notice. It will also provide enhanced criteria to ensure the proper siting of a solar energy installation to eliminate the potential for harmful glare to pilots or air traffic control facilities.

In advance of the planned update, as part of this Notice, we are clarifying one aspect of the Technical Guidance relating to airport sponsor and FAA responsibilities for evaluating the potential for solar energy systems installed on airports to either block, reflect, or disrupt radar signals, NAVAIDS, and other equipment required for safe aviation operations. Section 3.1 of the Technical Guidance, entitled ''Airspace Review,'' correctly states that this role is exclusively the responsibility of FAA Technical Operations (Tech Ops). However subsection 3.1.3, ''System Interference,'' states: ''[s]tudies conducted during project siting should identify the location of radar transmission and receiving facilities and other NAVAIDS, and determine locations that would not be suitable for structures based on their potential to either block, reflect, or disrupt radar signals.''

Reading the two sections together, what is meant is that the airport sponsor, in siting a proposed solar energy system, is responsible for limiting the potential for inference with communication, navigation, and surveillance (CNS) facilities. The sponsor should do so by ensuring that solar energy systems remain clear of the critical areas surrounding CNS facilities. FAA Advisory Circular (AC) 5300–13, ''Airport Design,'' Chapter 6, defines the critical areas for common CNS facilities located on an airport. Sponsors may need to coordinate with FAA Technical Operations concerning CNS facilities not in AC 5300–13. As stated in Section 3.1, the FAA is responsible for evaluating if there are any impacts to CNS facilities. The FAA will conduct this review after the Form 7460–1 is filed for the construction of a new solar energy system installation on an airport. In summary, airport sponsors do not need to conduct studies on their own to determine impacts to CNS facilities when siting a solar energy system on airport. Section 3.1.3 will be revised accordingly in the next version of the Technical Guidance.

Interim Policy Statement

The following sets forth the standards for measuring ocular impact, the required analysis tool, and the obligations of the Airport Sponsor when a solar energy system is proposed for development on a federally-obligated airport.

The FAA is adopting an interim policy because it is in the public interest to enhance safety by clarifying and adding standards for measuring ocular impact of proposed solar energy systems. FAA will consider comments and make appropriate modifications before issuing a final policy in a future **Federal Register** Notice. The policy applies to any proposed solar energy system that has not received unconditional airport layout plan approval (ALP) or a ''no objection'' from the FAA on a filed 7460–1, Notice of Proposed Construction or Alteration.

Standard for Measuring Ocular Impact

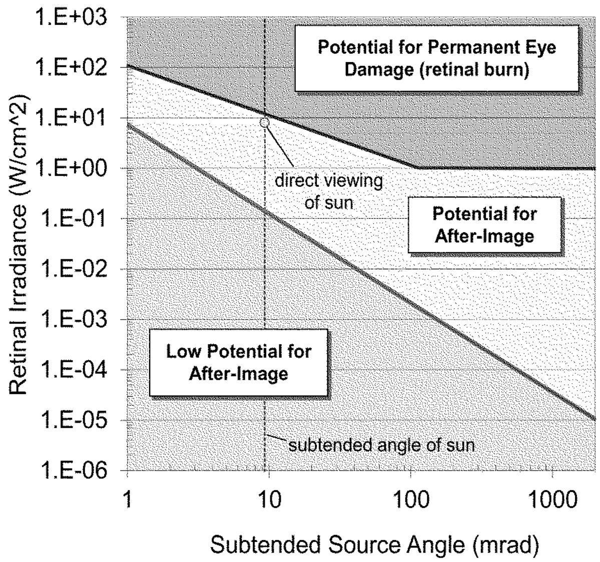
FAA adopts the *Solar Glare Hazard Analysis Plot* shown in Figure 1 below as the standard for measuring the ocular impact of any proposed solar energy system on a federally-obligated airport. To obtain FAA approval to revise an airport layout plan to depict a solar installation and/or a ''no objection'' to a Notice of Proposed Construction Form 7460–1, the airport sponsor will be required to demonstrate that the proposed solar energy system meets the following standards:

1. No potential for glint or glare in the existing or planned Airport Traffic Control Tower (ATCT) cab, and

2. No potential for glare or ''low potential for after-image'' (shown in green in Figure 1) along the final approach path for any existing landing threshold or future landing thresholds (including any planned interim phases of the landing thresholds) as shown on the current FAA-approved Airport Layout Plan (ALP). The final approach path is defined as two (2) miles from fifty (50) feet above the landing threshold using a standard three (3) degree glidepath.

Ocular impact must be analyzed over the entire calendar year in one (1) minute intervals from when the sun rises above the horizon until the sun sets below the horizon.

Figure 1



Solar Glare Ocular Hazard Plot: The potential ocular hazard from solar glare is a function of retinal irradiance and the subtended angle (size/distance) of the glare source. It should be noted that the ratio of spectrally weighted solar illuminance to solar irradiance at the earth's surface yields a conversion factor of ~100 lumens/W. Plot adapted from Ho et al., 2011.

Chart References: Ho, C.K., C.M. Ghanbari, and R.B. Diver, 2011, Methodology to Assess Potential Glint and Glare Hazards from Concentrating Solar Power Plants: Analytical Models and Experimental Validation, J. Solar Energy Engineering, August 2011, Vol. 133, 031021-1 – 031021-9.

Tool To Assess Ocular Impact

In cooperation with the DOE, the FAA is making available free-of-charge the *Solar Glare Hazard Analysis Tool* (SGHAT). The SGHAT was designed to determine whether a proposed solar energy project would result in the potential for ocular impact as depicted on the *Solar Glare Hazard Analysis Plot* shown above.

The SGHAT employs an interactive Google map where the user can quickly locate a site, draw an outline of the proposed solar energy system, and specify observer locations (Airport Traffic Control Tower cab) and final approach paths. Latitude, longitude, and elevation are automatically recorded through the Google interface, providing necessary information for sun position and vector calculations. Additional information regarding the orientation and tilt of the solar energy panels, reflectance, environment, and ocular factors are entered by the user.

If glare is found, the tool calculates the retinal irradiance and subtended source angle (size/distance) of the glare source to predict potential ocular hazards ranging from temporary after-image to retinal burn. The results are presented in a simple, easy-to-interpret plot that specifies when glare will occur throughout the year, with color codes indicating the potential ocular hazard. The tool can also predict relative energy production while evaluating alternative designs, layouts, and locations to identify configurations that maximize energy production while mitigating the impacts of glare.

Users must first register for the use of the tool at this web address: *www.sandia.gov/glare.*

Required Use of the SGHAT

As of the date of publication of this interim policy, the FAA requires the use of the SGHAT to demonstrate compliance with the standards for measuring ocular impact stated above for any proposed solar energy system located on a federally-obligated airport. The SGHAT is a validated tool specifically designed to measure glare according to the *Solar Glare Hazard Analysis Plot.* All sponsors of federally-obligated airports who propose to install or to permit others to install solar energy systems on the airport must attach the SGHAT report, outlining solar panel glare and ocular impact, for each point of measurement to the Notice of Proposed Construction Form 7460–1. The FAA will consider the use of alternative tools or methods on a case-by-case basis. However, the FAA must approve the use of an alternative tool or method prior to an airport sponsor seeking approval for any proposed on-airport solar energy system. The alternative tool or method must evaluate ocular impact in accordance with the *Solar Glare Hazard Analysis Plot.*

Please contact the Office of Airport Planning and Programming, Airport Planning and Environmental Division, APP–400, for more information on the validation process for alternative tools or methods.

Airport sponsor obligations have been discussed above under Background. We caution airport sponsors that under preexisting airport grant compliance policy, failure to seek FAA review of a solar installation prior to construction could trigger possible compliance action under 14 CFR Part 16, ''Rules of Practice for Federally-Assisted Airport Enforcement Proceedings.'' Moreover, if a solar installation creates glare that interferes with aviation safety, the FAA could require the airport to pay for the elimination of solar glare by removing or relocating the solar facility.

Issued in Washington, DC, on September 27, 2013.

Benito De Leon,

Director, Office of Airport Planning and Programming.

[FR Doc. 2013–24729 Filed 10–22–13; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Third Meeting: RTCA Tactical Operations Committee (TOC)

AGENCY: Federal Aviation Administration (FAA), U.S. Department of Transportation (DOT)

ACTION: Third Meeting Notice of RTCA Tactical Operations Committee.

SUMMARY: The FAA is issuing this notice to advise the public of the third meeting of the RTCA Tactical Operations Committee.

DATES: The meeting will be held November 7, 2013 from 9 a.m.–3 p.m.

ADDRESSES: The meeting will be held at RTCA Headquarters, 1150 18th Street NW., Suite 910, Washington, DC 20036.

FOR FURTHER INFORMATION CONTACT: The RTCA Secretariat, 1150 18th Street NW., Suite 910, Washington, DC 20036, or by telephone at (202) 833–9339, fax at (202) 833–9434, or Web site *http://www.rtca.org.* Andy Cebula, NAC Secretary can also be contacted at *acebula@rtca.org* or 202–330–0652.

SUPPLEMENTARY INFORMATION: Pursuant to section 10(a)(2) of the Federal Advisory Committee Act (Pub. L. No. 92–463, 5 U.S.C., App.), notice is hereby given for a meeting of the Tactical Operations Committee (TOC). The agenda will include the following:

November 19, 2013

- Opening of Meeting/Introduction of TOC Members
- Official Statement of Designated Federal Official
- Approval of July 23, 2013 Meeting Summary
- FAA Report
- Notice to Airmen (NOTAM) Activity Prioritization
- Regional Task Groups (RTGs)
- Reports on current activities underway by Regional Task Groups: Eastern, Central, Western
- VHF Omni-directional Range (VOR) Minimum Operating Network
- New Tasking: Obstacle Clearance
- Anticipated Issues for TOC consideration and action at the next meeting
- Other Business
- Adjourn

Attendance is open to the interested public but limited to space availability. With the approval of the chairman, members of the public may present oral statements at the meeting. Persons wishing to present statements or obtain information should contact the person listed in the **FOR FURTHER INFORMATION CONTACT** section. Members of the public may present a written statement to the committee at any time.

Issued in Washington, DC, on October 18, 2013.

Edith V. Parish,

Senior Advisor, Mission Support Services, Air Traffic Organization, Federal Aviation Administration.

[FR Doc. 2013–24968 Filed 10–22–13; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Public Notice for Waiver of Aeronautical Land-Use Assurance

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of intent of waiver with respect to land; French Lick Airport; French Lick, Indiana.

SUMMARY: The FAA is considering a proposal to change a portion of airport land from aeronautical use to non-aeronautical use and to authorize the sale of airport property located at French Lick Airport, French Lick, Indiana. The aforementioned land is not needed for aeronautical use. The proposal consists of 18.606 acres located in the southern section of airport property which is not being used by the airport presently. The land is to be sold to Commissioners of Orange County for the construction of County Road CR 300 South/Airport Road to facilitate access to the airport.

DATES: Comments must be received on or before November 22, 2013.

ADDRESSES: Documents are available for review by appointment at the FAA Airports District Office, Azra Hussain, Program Manager, 2300 E. Devon Avenue, Des Plaines, Illinois 60018 Telephone: (847) 294–8252/Fax: (847) 294–7046 and Zachary D. Brown, French Lick Municipal Airport, 9764 West County Road 375 South, French Lick, Indiana, 47933.

Written comments on the Sponsor's request must be delivered or mailed to: Azra Hussain, Program Manager, Federal Aviation Administration, Airports District Office, 2300 E. Devon Avenue, Des Plaines, Illinois (847) 294–7046.

FOR FURTHER INFORMATION CONTACT: Azra Hussain, Program Manager, Federal Aviation Administration, Airports District Office, 2300 E. Devon Avenue, Des Plaines, Illinois 60018. Telephone Number: (847) 294–8252/FAX Number: (847) 294–7046.

SUPPLEMENTARY INFORMATION: In accordance with section 47107(h) of Title 49, United States Code, this notice is required to be published in the **Federal Register** 30 days before modifying the land-use assurance that requires the property to be used for an aeronautical purpose.

The subject land consists of two parcels. Parcel 1 (approx. 16.667 acres) was acquired through the Federal Aid to Airport Program dated July 28, 1963 and Parcel 2 (approx. 1.939 acres) was acquired by the sponsor as part of a larger parcel (approx. 9.97 acres) for the nominal sum of One Dollar and zero cents ($1.00) on April 19, 2010. The Commissioners of Orange County intend to purchase the property for a nominal sum of One Dollar and zero cents ($1.00) for the construction of County Road CR 300 South/Airport Road. Construction of the road will facilitate access to the airport. The aforementioned land is not needed for aeronautical use, as shown on the Airport Layout Plan. There are no impacts to the airport by allowing the airport to dispose of the property.

This notice announces that the FAA is considering the release of the subject airport property at French Lick Airport, French Lick, Indiana, subject to easements and covenants running with the land. Approval does not constitute a commitment by the FAA to financially assist in the disposal of the subject airport property nor a determination that all measures covered by the program are eligible for grant-in-aid funding from the FAA. The disposition of proceeds from the sale of the airport property will be in accordance with FAA's Policy and Procedures Concerning the Use of Airport Revenue, published in the **Federal Register** on February 16, 1999 (64 FR 7696).

Issued in Des Plaines, Illinois on September 30, 2013.

James Keefer,

Manager, Chicago Airports District Office, FAA, Great Lakes Region.

[FR Doc. 2013–24738 Filed 10–22–13; 8:45 am]

BILLING CODE 4910–13–P

ATTACHMENT 2 - FORGESOLAR FAA REPORT

FORGESOLAR GLARE ANALYSIS

Project: **LM Palmdale Airport**
Site configuration: **Base**
Analysis conducted by Axel Olson (aolson2@burnsmcd.com) at 22:09 on 01 Jul, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	PASS	Receptor(s) marked as ATCT do not receive glare

Default glare analysis parameters and observer eye characteristics (for reference only):

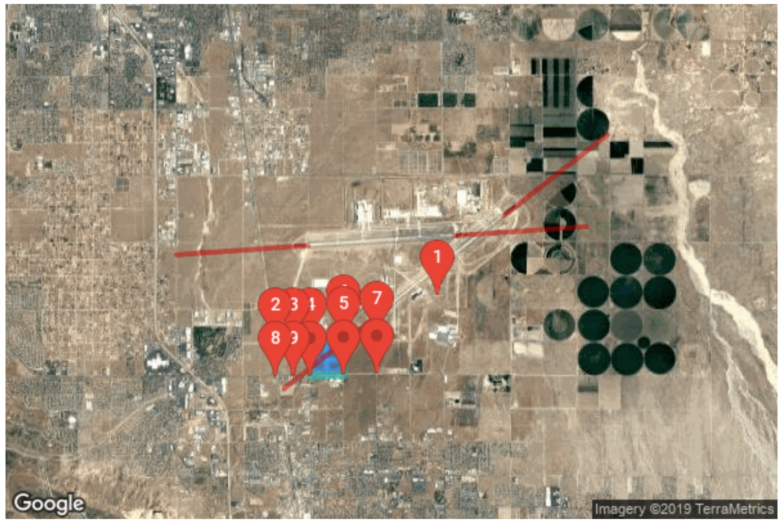
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 29197.5243

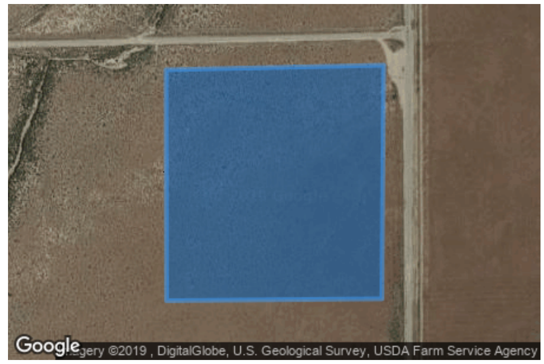


PV Array(s)

Name: PV array 1
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 52.0°
Resting angle: 52.0°
Rated power: -
Panel material: Smooth glass without AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

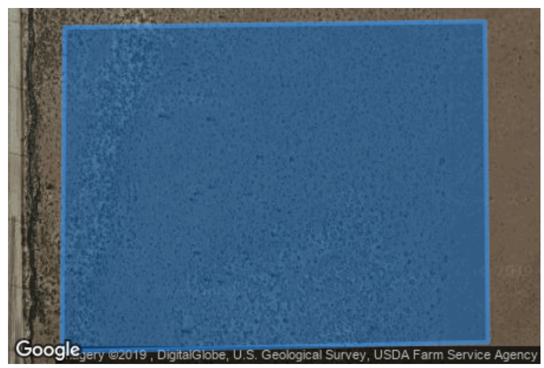
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	34.605502	-118.110731	2587.52	4.00	2591.52
2	34.605542	-118.107759	2583.88	4.00	2587.88
3	34.608981	-118.107770	2579.59	4.00	2583.59
4	34.608933	-118.109589	2579.19	4.00	2583.19
5	34.606120	-118.110742	2587.71	4.00	2591.71

Name: PV array 2
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 52.0°
Resting angle: 52.0°
Rated power: -
Panel material: Smooth glass without AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



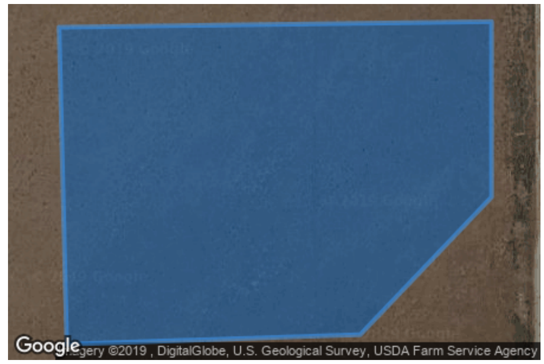
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	34.605545	-118.107588	2583.52	4.00	2587.52
2	34.605573	-118.103682	2579.87	4.00	2583.87
3	34.609051	-118.103648	2573.39	4.00	2577.39
4	34.608981	-118.107596	2581.14	4.00	2585.14

Name: PV array 3
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 52.0°
Resting angle: 52.0°
Rated power: -
Panel material: Smooth glass without AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



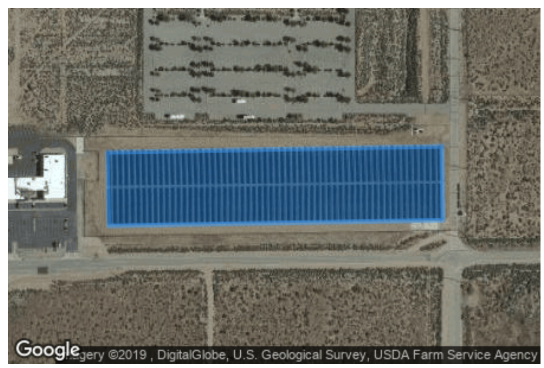
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	34.603027	-118.111609	2593.03	4.00	2597.03
2	34.603098	-118.107746	2588.03	4.00	2592.03
3	34.605487	-118.107773	2583.92	4.00	2587.92
4	34.605442	-118.111587	2589.56	4.00	2593.56

Name: PV array 4
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 52.0°
Resting angle: 52.0°
Rated power: -
Panel material: Smooth glass without AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	34.603124	-118.107521	2587.65	4.00	2591.65
2	34.603195	-118.104860	2583.53	4.00	2587.53
3	34.604219	-118.103669	2581.52	4.00	2585.52
4	34.605525	-118.103669	2579.95	4.00	2583.95
5	34.605484	-118.107591	2583.69	4.00	2587.69

Name: PV array 5
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 52.0°
Resting angle: 52.0°
Rated power: -
Panel material: Smooth glass without AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	34.610111	-118.115236	2593.46	4.00	2597.46
2	34.609562	-118.115222	2594.37	4.00	2598.37
3	34.609604	-118.112191	2587.71	4.00	2591.71
4	34.610155	-118.112201	2587.02	4.00	2591.02

Flight Path Receptor(s)

Name: Runway 22
Description:
Threshold height: 50 ft
Direction: 232.0°
Glide slope: 2.5°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	34.637119	-118.060551	2493.59	50.00	2543.59
Two-mile	34.654920	-118.032827	2472.71	531.97	3004.68

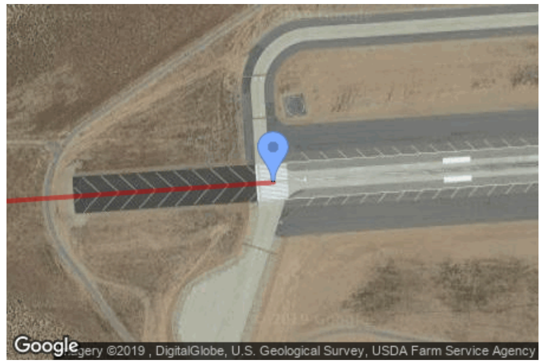
Name: Runway 25
Description:
Threshold height: 50 ft
Direction: 266.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	34.632764	-118.073580	2501.14	50.00	2551.15
Two-mile	34.634781	-118.038486	2499.70	604.90	3104.60

Name: Runway 4
Description:
Threshold height: 50 ft
Direction: 52.0°
Glide slope: 2.5°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	34.617062	-118.091401	2544.72	50.00	2594.72
Two-mile	34.599262	-118.119118	2614.31	441.49	3055.80

Name: Runway 7
Description:
Threshold height: 50 ft
Direction: 86.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	34.630614	-118.112783	2542.40	50.00	2592.40
Two-mile	34.628597	-118.147877	2598.11	547.75	3145.86

Discrete Observation Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
1-ATCT	1	34.619586	-118.078118	2525.25	90.00
OP 2	2	34.609206	-118.121476	2609.99	4.00
OP 3	3	34.609249	-118.116546	2596.77	4.00
OP 4	4	34.609321	-118.112097	2587.29	4.00
OP 5	5	34.609487	-118.103207	2571.57	4.00
OP 6	6	34.612119	-118.103137	2567.38	4.00
OP 7	7	34.610659	-118.094274	2558.99	4.00
OP 8	8	34.601793	-118.121364	2620.26	4.00
OP 9	9	34.601855	-118.116472	2602.97	4.00
OP 10	10	34.601873	-118.112073	2595.46	4.00
OP 11	11	34.602174	-118.103193	2583.82	4.00
OP 12	12	34.602405	-118.094375	2571.34	4.00

Map image of 1-ATCT

Route Receptor(s)

Name: Route 1
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	34.609283	-118.112064	2587.14	4.00	2591.14
2	34.601866	-118.112107	2595.46	4.00	2599.46
3	34.602170	-118.103210	2583.85	4.00	2587.85
4	34.609488	-118.103209	2571.57	4.00	2575.57
5	34.609283	-118.112064	2587.14	4.00	2591.14

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 1	SA tracking	SA tracking	0	0	-
PV array 2	SA tracking	SA tracking	0	0	-
PV array 3	SA tracking	SA tracking	0	0	-
PV array 4	SA tracking	SA tracking	0	0	-
PV array 5	SA tracking	SA tracking	0	0	-

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
Runway 22	0	0
Runway 25	0	0

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
Runway 4	0	0
Runway 7	0	0
1-ATCT	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
Route 1	0	0

Results for: PV array 1

Receptor	Green Glare (min)	Yellow Glare (min)
Runway 22	0	0
Runway 25	0	0
Runway 4	0	0
Runway 7	0	0
1-ATCT	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
Route 1	0	0

Flight Path: Runway 22

0 minutes of yellow glare
0 minutes of green glare

Flight Path: Runway 25

0 minutes of yellow glare
0 minutes of green glare

Flight Path: Runway 4

0 minutes of yellow glare
0 minutes of green glare

Flight Path: Runway 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: 1-ATCT

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2

Receptor	Green Glare (min)	Yellow Glare (min)
Runway 22	0	0
Runway 25	0	0
Runway 4	0	0
Runway 7	0	0
1-ATCT	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
Route 1	0	0

Flight Path: Runway 22

0 minutes of yellow glare
0 minutes of green glare

Flight Path: Runway 25

0 minutes of yellow glare
0 minutes of green glare

Flight Path: Runway 4

0 minutes of yellow glare
0 minutes of green glare

Flight Path: Runway 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: 1-ATCT

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare

0 minutes of green glare

Results for: PV array 3

Receptor	Green Glare (min)	Yellow Glare (min)
Runway 22	0	0
Runway 25	0	0
Runway 4	0	0
Runway 7	0	0
1-ATCT	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
Route 1	0	0

Flight Path: Runway 22

0 minutes of yellow glare
0 minutes of green glare

Flight Path: Runway 25

0 minutes of yellow glare
0 minutes of green glare

Flight Path: Runway 4

0 minutes of yellow glare
0 minutes of green glare

Flight Path: Runway 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: 1-ATCT

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 4

Receptor	Green Glare (min)	Yellow Glare (min)
Runway 22	0	0
Runway 25	0	0
Runway 4	0	0
Runway 7	0	0
1-ATCT	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
Route 1	0	0

Flight Path: Runway 22

0 minutes of yellow glare
0 minutes of green glare

Flight Path: Runway 25

0 minutes of yellow glare
0 minutes of green glare

Flight Path: Runway 4

0 minutes of yellow glare
0 minutes of green glare

Flight Path: Runway 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: 1-ATCT

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 5

Receptor	Green Glare (min)	Yellow Glare (min)
Runway 22	0	0
Runway 25	0	0
Runway 4	0	0
Runway 7	0	0
1-ATCT	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
OP 6	0	0
OP 7	0	0
OP 8	0	0
OP 9	0	0
OP 10	0	0
OP 11	0	0
OP 12	0	0
Route 1	0	0

Flight Path: Runway 22

0 minutes of yellow glare
0 minutes of green glare

Flight Path: Runway 25

0 minutes of yellow glare
0 minutes of green glare

Flight Path: Runway 4

0 minutes of yellow glare
0 minutes of green glare

Flight Path: Runway 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: 1-ATCT

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 8

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 9

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 10

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 11

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 12

0 minutes of yellow glare
0 minutes of green glare

Route: Route 1

0 minutes of yellow glare

0 minutes of green glare

Assumptions

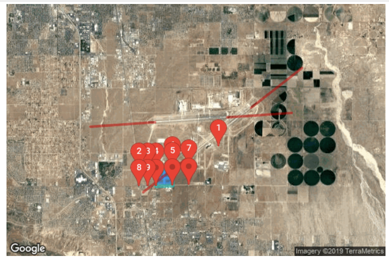
"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size.
Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.

ATTACHMENT 3 - FORGESOLAR FULL REPORT

GlareGauge Glare Analysis Results

Site Configuration: Base

Project site configuration details and results.



Created **July 1, 2019 12:51 p.m.**
Updated **July 1, 2019 6:23 p.m.**
DNI **varies** and peaks at **1,000.0 W/m^2**
Analyze every **1** minute(s)
0.5 ocular transmission coefficient
0.002 m pupil diameter
0.017 m eye focal length
9.3 mrad sun subtended angle
Timezone **UTC-8**
Site Configuration ID: 29197.5243

Summary of Results No glare predicted!

PV name	Tilt	Orientation	"Green" Glare	"Yellow" Glare	Energy Produced
	deg	deg	min	min	kWh
PV array 1	SA tracking	SA tracking	0	0	-
PV array 2	SA tracking	SA tracking	0	0	-
PV array 3	SA tracking	SA tracking	0	0	-
PV array 4	SA tracking	SA tracking	0	0	-
PV array 5	SA tracking	SA tracking	0	0	-

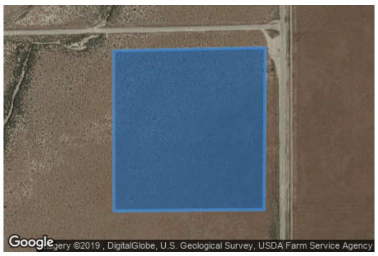
Component Data

PV Array(s)

Name: PV array 1
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0 deg
Tracking axis tilt: 0.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 52.0 deg
Resting angle: 52.0 deg
Rated power: -
Panel material: Smooth glass without AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 6.55 mrad

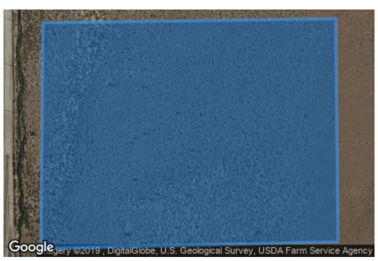
Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	ft	ft	ft
1	34.605502	-118.110731	2587.52	4.00	2591.52
2	34.605542	-118.107759	2583.88	4.00	2587.88
3	34.608981	-118.107770	2579.59	4.00	2583.59
4	34.608933	-118.109589	2579.19	4.00	2583.19
5	34.606120	-118.110742	2587.71	4.00	2591.71

Name: PV array 2
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0 deg
Tracking axis tilt: 0.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 52.0 deg
Resting angle: 52.0 deg
Rated power: -
Panel material: Smooth glass without AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 6.55 mrad



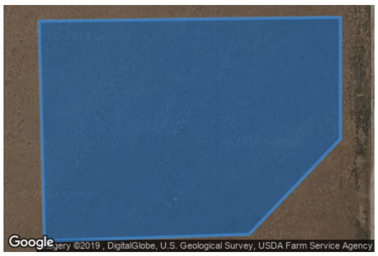
Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	ft	ft	ft
1	34.605545	-118.107588	2583.52	4.00	2587.52
2	34.605573	-118.103682	2579.87	4.00	2583.87
3	34.609051	-118.103648	2573.39	4.00	2577.39
4	34.608981	-118.107596	2581.14	4.00	2585.14

Name: PV array 3
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0 deg
Tracking axis tilt: 0.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 52.0 deg
Resting angle: 52.0 deg
Rated power: -
Panel material: Smooth glass without AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 6.55 mrad



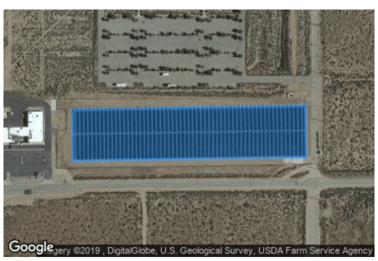
Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	ft	ft	ft
1	34.603027	-118.111609	2593.03	4.00	2597.03
2	34.603098	-118.107746	2588.03	4.00	2592.03
3	34.605487	-118.107773	2583.92	4.00	2587.92
4	34.605442	-118.111587	2589.56	4.00	2593.56

Name: PV array 4
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0 deg
Tracking axis tilt: 0.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 52.0 deg
Resting angle: 52.0 deg
Rated power: -
Panel material: Smooth glass without AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 6.55 mrad



Vertex	Latitude deg	Longitude deg	Ground elevation ft	Height above ground ft	Total elevation ft
1	34.603124	-118.107521	2587.65	4.00	2591.65
2	34.603195	-118.104860	2583.53	4.00	2587.53
3	34.604219	-118.103669	2581.52	4.00	2585.52
4	34.605525	-118.103669	2579.95	4.00	2583.95
5	34.605484	-118.107591	2583.69	4.00	2587.69

Name: PV array 5
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0 deg
Tracking axis tilt: 0.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 52.0 deg
Resting angle: 52.0 deg
Rated power: -
Panel material: Smooth glass without AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 6.55 mrad



Vertex	Latitude deg	Longitude deg	Ground elevation ft	Height above ground ft	Total elevation ft
1	34.610111	-118.115236	2593.46	4.00	2597.46
2	34.609562	-118.115222	2594.37	4.00	2598.37
3	34.609604	-118.112191	2587.71	4.00	2591.71
4	34.610155	-118.112201	2587.02	4.00	2591.02

2-Mile Flight Path Receptor(s)

Name: Runway 22
Description:
Threshold height : 50 ft
Direction: 232.0 deg
Glide slope: 2.5 deg
Pilot view restricted? Yes
Vertical view restriction: 30.0 deg
Azimuthal view restriction: 50.0 deg

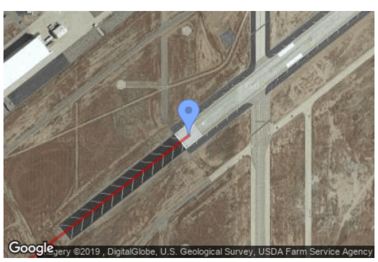
Point	Latitude deg	Longitude deg	Ground elevation ft	Height above ground ft	Total elevation ft
Threshold	34.637119	-118.060551	2493.59	50.00	2543.59
2-mile point	34.654920	-118.032827	2472.71	531.97	3004.68

Name: Runway 25
Description:
Threshold height : 50 ft
Direction: 266.0 deg
Glide slope: 3.0 deg
Pilot view restricted? Yes
Vertical view restriction: 30.0 deg
Azimuthal view restriction: 50.0 deg

Point	Latitude deg	Longitude deg	Ground elevation ft	Height above ground ft	Total elevation ft
Threshold	34.632764	-118.073580	2501.14	50.00	2551.15
2-mile point	34.634781	-118.038486	2499.70	604.90	3104.60

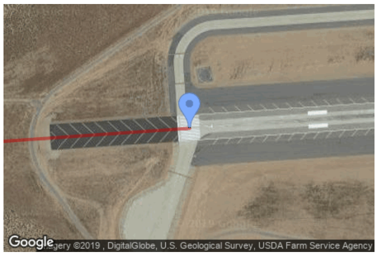
Name: Runway 4
Description:
Threshold height : 50 ft
Direction: 52.0 deg
Glide slope: 2.5 deg
Pilot view restricted? Yes
Vertical view restriction: 30.0 deg
Azimuthal view restriction: 50.0 deg

Point	Latitude deg	Longitude deg	Ground elevation ft	Height above ground ft	Total elevation ft
Threshold	34.617062	-118.091401	2544.72	50.00	2594.72
2-mile point	34.599262	-118.119118	2614.31	441.49	3055.80



Name: Runway 7
Description:
Threshold height : 50 ft
Direction: 86.0 deg
Glide slope: 3.0 deg
Pilot view restricted? Yes
Vertical view restriction: 30.0 deg
Azimuthal view restriction: 50.0 deg

Point	Latitude deg	Longitude deg	Ground elevation ft	Height above ground ft	Total elevation ft
Threshold	34.630614	-118.112783	2542.40	50.00	2592.40
2-mile point	34.628597	-118.147877	2598.11	547.75	3145.86



Route Receptor(s)

Name: Route 1
Route type Two-way
View angle: 50.0 deg

Vertex	Latitude deg	Longitude deg	Ground elevation ft	Height above ground ft	Total elevation ft
1	34.609283	-118.112064	2587.14	4.00	2591.14
2	34.601866	-118.112107	2595.46	4.00	2599.46
3	34.602170	-118.103210	2583.85	4.00	2587.85
4	34.609488	-118.103209	2571.57	4.00	2575.57
5	34.609283	-118.112064	2587.14	4.00	2591.14

Discrete Observation Receptors

Number	Latitude	Longitude	Ground elevation	Height above ground	Total Elevation
	deg	deg	ft	ft	ft
1-ATCT	34.619586	-118.078118	2525.25	90.00	2615.26
OP 2	34.609206	-118.121476	2609.99	4.00	2613.99
OP 3	34.609249	-118.116546	2596.77	4.00	2600.77
OP 4	34.609321	-118.112097	2587.29	4.00	2591.29
OP 5	34.609487	-118.103207	2571.57	4.00	2575.57
OP 6	34.612119	-118.103137	2567.38	4.00	2571.38
OP 7	34.610659	-118.094274	2558.99	4.00	2562.99
OP 8	34.601793	-118.121364	2620.26	4.00	2624.26
OP 9	34.601855	-118.116472	2602.97	4.00	2606.97
OP 10	34.601873	-118.112073	2595.46	4.00	2599.46
OP 11	34.602174	-118.103193	2583.82	4.00	2587.82
OP 12	34.602405	-118.094375	2571.34	4.00	2575.34

1-ATCT map image

PV Array Results

PV array 1

Component	Green glare (min)	Yellow glare (min)
FP: Runway 22	0	0
FP: Runway 25	0	0
FP: Runway 4	0	0
FP: Runway 7	0	0
OP: 1-ATCT	0	0
OP: OP 2	0	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	0	0
OP: OP 7	0	0
OP: OP 8	0	0
OP: OP 9	0	0
OP: OP 10	0	0
OP: OP 11	0	0
OP: OP 12	0	0
Route: Route 1	0	0

PV array 2

Component	Green glare (min)	Yellow glare (min)
FP: Runway 22	0	0
FP: Runway 25	0	0
FP: Runway 4	0	0
FP: Runway 7	0	0
OP: 1-ATCT	0	0
OP: OP 2	0	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	0	0
OP: OP 7	0	0
OP: OP 8	0	0
OP: OP 9	0	0
OP: OP 10	0	0
OP: OP 11	0	0
OP: OP 12	0	0
Route: Route 1	0	0

PV array 3

Component	Green glare (min)	Yellow glare (min)
FP: Runway 22	0	0
FP: Runway 25	0	0
FP: Runway 4	0	0
FP: Runway 7	0	0
OP: 1-ATCT	0	0
OP: OP 2	0	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	0	0
OP: OP 7	0	0
OP: OP 8	0	0
OP: OP 9	0	0
OP: OP 10	0	0
OP: OP 11	0	0
OP: OP 12	0	0
Route: Route 1	0	0

PV array 4

Component	Green glare (min)	Yellow glare (min)
FP: Runway 22	0	0
FP: Runway 25	0	0
FP: Runway 4	0	0
FP: Runway 7	0	0
OP: 1-ATCT	0	0
OP: OP 2	0	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	0	0
OP: OP 7	0	0
OP: OP 8	0	0
OP: OP 9	0	0
OP: OP 10	0	0
OP: OP 11	0	0
OP: OP 12	0	0
Route: Route 1	0	0

PV array 5

Component	Green glare (min)	Yellow glare (min)
FP: Runway 22	0	0
FP: Runway 25	0	0
FP: Runway 4	0	0
FP: Runway 7	0	0
OP: 1-ATCT	0	0
OP: OP 2	0	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	0	0
OP: OP 7	0	0
OP: OP 8	0	0
OP: OP 9	0	0
OP: OP 10	0	0
OP: OP 11	0	0
OP: OP 12	0	0
Route: Route 1	0	0

Assumptions

- Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
- Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
- Detailed system geometry is not rigorously simulated.
- The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual values and results may vary.
- Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
- The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
- Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
- Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
- Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
- Refer to the **Help page** for assumptions and limitations not listed here.

CREATE AMAZING.

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APPENDIX B AIR QUALITY AND GREENHOUSE GAS CALEEMOD CALCULATIONS

LMA Palmdale Plant 10 Solar System

Antelope Valley APCD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	6,969.60	1000sqft	160.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	33
Climate Zone	9			**Operational Year**	2021
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - No building structure

Construction Phase - Per Project Schedule

Off-road Equipment - Per engineering estimate

Off-road Equipment - Per engineering estimates

Off-road Equipment - Per engineering estimates

Off-road Equipment - Per engineering estimates

Off-road Equipment - Per engineering estimates

Grading - Per engineering estimates

Trips and VMT - Per engineering estimates

Construction Off-road Equipment Mitigation - Average Leve 3 engines

Table Name	Column Name	Default Value	New Value
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
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tblConstructionPhase	NumDays	120.00	35.00
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tblConstructionPhase	NumDays	3,100.00	52.00
tblGrading	AcresOfGrading	15.00	160.00
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tblLandUse	LandUseSquareFeet	6,969,600.00	0.00
tblOffRoadEquipment	LoadFactor	0.34	0.34
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2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.0178	0.1758	0.1090	1.9000e-004	0.0592	9.3900e-003	0.0686	0.0320	8.6400e-003	0.0406	0.0000	17.0341	17.0341	4.8700e-003	0.0000	17.1558
2021	0.1726	1.6050	1.4333	2.5800e-003	0.2689	0.0858	0.3547	0.0974	0.0792	0.1767	0.0000	228.6092	228.6092	0.0551	0.0000	229.9874
Maximum	**0.1726**	**1.6050**	**1.4333**	**2.5800e-003**	**0.2689**	**0.0858**	**0.3547**	**0.0974**	**0.0792**	**0.1767**	**0.0000**	**228.6092**	**228.6092**	**0.0551**	**0.0000**	**229.9874**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					

2020	0.0178	0.1758	0.1090	1.9000e-004	0.0243	1.4300e-003	0.0257	0.0128	1.3200e-003	0.0141	0.0000	17.0341	17.0341	4.8700e-003	0.0000	17.1558
2021	0.1726	1.6050	1.4333	2.5800e-003	0.1326	0.0132	0.1459	0.0454	0.0122	0.0576	0.0000	228.6090	228.6090	0.0551	0.0000	229.9872
Maximum	**0.1726**	**1.6050**	**1.4333**	**2.5800e-003**	**0.1326**	**0.0132**	**0.1459**	**0.0454**	**0.0122**	**0.0576**	**0.0000**	**228.6090**	**228.6090**	**0.0551**	**0.0000**	**229.9872**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	52.18	84.58	59.47	55.04	84.57	66.99	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**12-1-2020**	**2-28-2021**	1.2087	1.2087
2	**3-1-2021**	**5-31-2021**	0.7102	0.7102
		Highest	1.2087	1.2087

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	12/7/2020	1/22/2021	5	35	
2	Grading	Grading	1/4/2021	2/12/2021	5	30	
3	Building Construction - Fence	Building Construction	12/28/2020	2/5/2021	5	30	
4	Building Construction - Structural	Building Construction	12/28/2020	4/9/2021	5	75	
5	Building Construction - Electrical	Building Construction	2/15/2021	4/27/2021	5	52	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 160

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Building Construction - Structural	Cranes	1	7.00	231	0.29
Building Construction - Electrical	Cranes	1	7.00	231	0.29

Building Construction - Structural	Forklifts	4	8.00	89	0.20
Site Preparation	Rubber Tired Dozers	1	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Excavators	1	0.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	1	0.00	367	0.48
Grading	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Building Construction - Fence	Cranes	1	0.00	231	0.29
Building Construction - Fence	Forklifts	1	8.00	89	0.20
Building Construction - Fence	Generator Sets	1	0.00	84	0.74
Building Construction - Fence	Tractors/Loaders/Backhoes	3	0.00	97	0.37
Building Construction - Fence	Welders	1	0.00	46	0.45
Building Construction - Electrical	Forklifts	3	8.00	89	0.20
Building Construction - Structural	Generator Sets	1	0.00	84	0.74
Building Construction - Electrical	Generator Sets	1	8.00	84	0.74
Building Construction - Structural	Tractors/Loaders/Backhoes	5	7.00	97	0.37
Building Construction - Electrical	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Building Construction - Structural	Welders	1	0.00	46	0.45
Building Construction - Electrical	Welders	1	0.00	46	0.45
Grading	Rollers	1	8.00	80	0.38
Grading	Skid Steer Loaders	1	8.00	65	0.37
Building Construction - Fence	Other General Industrial Equipment	1	8.00	88	0.34
Building Construction - Electrical	Trenchers	1	8.00	78	0.50

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Building Construction - Structural	12	50.00	4.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	2	10.00	0.00	12.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	7	10.00	0.00	162.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

Building Construction - Fence	8	12.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction - Electrical	9	120.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use DPF for Construction Equipment

Water Exposed Area

3.2 Site Preparation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0572	0.0000	0.0572	0.0315	0.0000	0.0315	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0123	0.1277	0.0609	1.1000e-004		6.5400e-003	6.5400e-003		6.0100e-003	6.0100e-003	0.0000	9.7224	9.7224	3.1400e-003	0.0000	9.8010
Total	**0.0123**	**0.1277**	**0.0609**	**1.1000e-004**	**0.0572**	**6.5400e-003**	**0.0638**	**0.0315**	**6.0100e-003**	**0.0375**	**0.0000**	**9.7224**	**9.7224**	**3.1400e-003**	**0.0000**	**9.8010**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.0000e-005	8.7000e-004	1.8000e-004	0.0000	9.0000e-005	0.0000	9.0000e-005	2.0000e-005	0.0000	3.0000e-005	0.0000	0.2599	0.2599	1.0000e-005	0.0000	0.2601
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.9000e-004	3.3000e-004	3.5200e-003	1.0000e-005	7.7000e-004	1.0000e-005	7.7000e-004	2.0000e-004	1.0000e-005	2.1000e-004	0.0000	0.7109	0.7109	3.0000e-005	0.0000	0.7116

Total	**4.2000e-004**	**1.2000e-003**	**3.7000e-003**	**1.0000e-005**	**8.6000e-004**	**1.0000e-005**	**8.6000e-004**	**2.2000e-004**	**1.0000e-005**	**2.4000e-004**	**0.0000**	**0.9708**	**0.9708**	**4.0000e-005**	**0.0000**	**0.9717**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0223	0.0000	0.0223	0.0123	0.0000	0.0123	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0123	0.1277	0.0609	1.1000e-004		9.8000e-004	9.8000e-004		9.0000e-004	9.0000e-004	0.0000	9.7223	9.7223	3.1400e-003	0.0000	9.8010
Total	**0.0123**	**0.1277**	**0.0609**	**1.1000e-004**	**0.0223**	**9.8000e-004**	**0.0233**	**0.0123**	**9.0000e-004**	**0.0132**	**0.0000**	**9.7223**	**9.7223**	**3.1400e-003**	**0.0000**	**9.8010**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.0000e-005	8.7000e-004	1.8000e-004	0.0000	9.0000e-005	0.0000	9.0000e-005	2.0000e-005	0.0000	3.0000e-005	0.0000	0.2599	0.2599	1.0000e-005	0.0000	0.2601
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.9000e-004	3.3000e-004	3.5200e-003	1.0000e-005	7.7000e-004	1.0000e-005	7.7000e-004	2.0000e-004	1.0000e-005	2.1000e-004	0.0000	0.7109	0.7109	3.0000e-005	0.0000	0.7116
Total	**4.2000e-004**	**1.2000e-003**	**3.7000e-003**	**1.0000e-005**	**8.6000e-004**	**1.0000e-005**	**8.6000e-004**	**2.2000e-004**	**1.0000e-005**	**2.4000e-004**	**0.0000**	**0.9708**	**0.9708**	**4.0000e-005**	**0.0000**	**0.9717**

3.2 Site Preparation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0482	0.0000	0.0482	0.0265	0.0000	0.0265	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.8700e-003	0.1029	0.0504	9.0000e-005		5.1500e-003	5.1500e-003		4.7400e-003	4.7400e-003	0.0000	8.1883	8.1883	2.6500e-003	0.0000	8.2545
Total	**9.8700e-003**	**0.1029**	**0.0504**	**9.0000e-005**	**0.0482**	**5.1500e-003**	**0.0533**	**0.0265**	**4.7400e-003**	**0.0312**	**0.0000**	**8.1883**	**8.1883**	**2.6500e-003**	**0.0000**	**8.2545**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	6.8000e-004	1.5000e-004	0.0000	9.0000e-005	0.0000	9.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.2170	0.2170	1.0000e-005	0.0000	0.2172
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1000e-004	2.5000e-004	2.7500e-003	1.0000e-005	6.4000e-004	1.0000e-005	6.5000e-004	1.7000e-004	0.0000	1.8000e-004	0.0000	0.5838	0.5838	2.0000e-005	0.0000	0.5843
Total	**3.3000e-004**	**9.3000e-004**	**2.9000e-003**	**1.0000e-005**	**7.3000e-004**	**1.0000e-005**	**7.4000e-004**	**1.9000e-004**	**0.0000**	**2.0000e-004**	**0.0000**	**0.8008**	**0.8008**	**3.0000e-005**	**0.0000**	**0.8015**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0188	0.0000	0.0188	0.0103	0.0000	0.0103	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.8700e-003	0.1029	0.0504	9.0000e-005		7.7000e-004	7.7000e-004		7.1000e-004	7.1000e-004	0.0000	8.1883	8.1883	2.6500e-003	0.0000	8.2545

Total	9.8700e-003	0.1029	0.0504	9.0000e-005	0.0188	7.7000e-004	0.0196	0.0103	7.1000e-004	0.0110	0.0000	8.1883	8.1883	2.6500e-003	0.0000	8.2545

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	6.8000e-004	1.5000e-004	0.0000	9.0000e-005	0.0000	9.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.2170	0.2170	1.0000e-005	0.0000	0.2172
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1000e-004	2.5000e-004	2.7500e-003	1.0000e-005	6.4000e-004	1.0000e-005	6.5000e-004	1.7000e-004	0.0000	1.8000e-004	0.0000	0.5838	0.5838	2.0000e-005	0.0000	0.5843
Total	**3.3000e-004**	**9.3000e-004**	**2.9000e-003**	**1.0000e-005**	**7.3000e-004**	**1.0000e-005**	**7.4000e-004**	**1.9000e-004**	**0.0000**	**2.0000e-004**	**0.0000**	**0.8008**	**0.8008**	**3.0000e-005**	**0.0000**	**0.8015**

3.3 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1752	0.0000	0.1752	0.0588	0.0000	0.0588	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0293	0.3258	0.1700	3.4000e-004		0.0149	0.0149		0.0137	0.0137	0.0000	30.2667	30.2667	9.7900e-003	0.0000	30.5115
Total	**0.0293**	**0.3258**	**0.1700**	**3.4000e-004**	**0.1752**	**0.0149**	**0.1901**	**0.0588**	**0.0137**	**0.0725**	**0.0000**	**30.2667**	**30.2667**	**9.7900e-003**	**0.0000**	**30.5115**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	6.1000e-004	0.0201	4.3200e-003	7.0000e-005	1.3900e-003	5.0000e-005	1.4400e-003	3.8000e-004	5.0000e-005	4.3000e-004	0.0000	6.4077	6.4077	2.3000e-004	0.0000	6.4134
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.7000e-004	4.7000e-004	5.1500e-003	1.0000e-005	1.2100e-003	1.0000e-005	1.2200e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.0946	1.0946	4.0000e-005	0.0000	1.0956
Total	**1.1800e-003**	**0.0205**	**9.4700e-003**	**8.0000e-005**	**2.6000e-003**	**6.0000e-005**	**2.6600e-003**	**7.0000e-004**	**6.0000e-005**	**7.6000e-004**	**0.0000**	**7.5024**	**7.5024**	**2.7000e-004**	**0.0000**	**7.5089**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0684	0.0000	0.0684	0.0229	0.0000	0.0229	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0293	0.3258	0.1700	3.4000e-004		2.2300e-003	2.2300e-003		2.0500e-003	2.0500e-003	0.0000	30.2667	30.2667	9.7900e-003	0.0000	30.5114
Total	**0.0293**	**0.3258**	**0.1700**	**3.4000e-004**	**0.0684**	**2.2300e-003**	**0.0706**	**0.0229**	**2.0500e-003**	**0.0250**	**0.0000**	**30.2667**	**30.2667**	**9.7900e-003**	**0.0000**	**30.5114**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	6.1000e-004	0.0201	4.3200e-003	7.0000e-005	1.3900e-003	5.0000e-005	1.4400e-003	3.8000e-004	5.0000e-005	4.3000e-004	0.0000	6.4077	6.4077	2.3000e-004	0.0000	6.4134
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Worker	5.7000e-004	4.7000e-004	5.1500e-003	1.0000e-005	1.2100e-003	1.0000e-005	1.2200e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.0946	1.0946	4.0000e-005	0.0000	1.0956
Total	**1.1800e-003**	**0.0205**	**9.4700e-003**	**8.0000e-005**	**2.6000e-003**	**6.0000e-005**	**2.6600e-003**	**7.0000e-004**	**6.0000e-005**	**7.6000e-004**	**0.0000**	**7.5024**	**7.5024**	**2.7000e-004**	**0.0000**	**7.5089**

3.4 Building Construction - Fence - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	7.6000e-004	6.9000e-003	6.3600e-003	1.0000e-005		5.1000e-004	5.1000e-004		4.7000e-004	4.7000e-004	0.0000	0.7208	0.7208	2.3000e-004	0.0000	0.7267
Total	**7.6000e-004**	**6.9000e-003**	**6.3600e-003**	**1.0000e-005**		**5.1000e-004**	**5.1000e-004**		**4.7000e-004**	**4.7000e-004**	**0.0000**	**0.7208**	**0.7208**	**2.3000e-004**	**0.0000**	**0.7267**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.0000e-005	4.7000e-004	1.1000e-004	0.0000	3.0000e-005	0.0000	3.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1144	0.1144	1.0000e-005	0.0000	0.1146
Worker	1.0000e-004	8.0000e-005	8.9000e-004	0.0000	1.9000e-004	0.0000	1.9000e-004	5.0000e-005	0.0000	5.0000e-005	0.0000	0.1796	0.1796	1.0000e-005	0.0000	0.1798
Total	**1.1000e-004**	**5.5000e-004**	**1.0000e-003**	**0.0000**	**2.2000e-004**	**0.0000**	**2.2000e-004**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**0.0000**	**0.2940**	**0.2940**	**2.0000e-005**	**0.0000**	**0.2943**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	7.6000e-004	6.9000e-003	6.3600e-003	1.0000e-005		8.0000e-005	8.0000e-005		7.0000e-005	7.0000e-005	0.0000	0.7208	0.7208	2.3000e-004	0.0000	0.7267
Total	**7.6000e-004**	**6.9000e-003**	**6.3600e-003**	**1.0000e-005**		**8.0000e-005**	**8.0000e-005**		**7.0000e-005**	**7.0000e-005**	**0.0000**	**0.7208**	**0.7208**	**2.3000e-004**	**0.0000**	**0.7267**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.0000e-005	4.7000e-004	1.1000e-004	0.0000	3.0000e-005	0.0000	3.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1144	0.1144	1.0000e-005	0.0000	0.1146
Worker	1.0000e-004	8.0000e-005	8.9000e-004	0.0000	1.9000e-004	0.0000	1.9000e-004	5.0000e-005	0.0000	5.0000e-005	0.0000	0.1796	0.1796	1.0000e-005	0.0000	0.1798
Total	**1.1000e-004**	**5.5000e-004**	**1.0000e-003**	**0.0000**	**2.2000e-004**	**0.0000**	**2.2000e-004**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**0.0000**	**0.2940**	**0.2940**	**2.0000e-005**	**0.0000**	**0.2943**

3.4 Building Construction - Fence - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.4600e-003	0.0410	0.0410	5.0000e-005		2.8500e-003	2.8500e-003		2.6200e-003	2.6200e-003	0.0000	4.6854	4.6854	1.5200e-003	0.0000	4.7233

Total	4.4600e-003	0.0410	0.0410	5.0000e-005		2.8500e-003	2.8500e-003		2.6200e-003	2.6200e-003	0.0000	4.6854	4.6854	1.5200e-003	0.0000	4.7233

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	8.0000e-005	2.7700e-003	6.1000e-004	1.0000e-005	1.7000e-004	0.0000	1.8000e-004	5.0000e-005	0.0000	5.0000e-005	0.0000	0.7402	0.7402	3.0000e-005	0.0000	0.7410
Worker	6.0000e-004	4.9000e-004	5.3500e-003	1.0000e-005	1.2600e-003	1.0000e-005	1.2700e-003	3.3000e-004	1.0000e-005	3.4000e-004	0.0000	1.1384	1.1384	4.0000e-005	0.0000	1.1394
Total	**6.8000e-004**	**3.2600e-003**	**5.9600e-003**	**2.0000e-005**	**1.4300e-003**	**1.0000e-005**	**1.4500e-003**	**3.8000e-004**	**1.0000e-005**	**3.9000e-004**	**0.0000**	**1.8786**	**1.8786**	**7.0000e-005**	**0.0000**	**1.8804**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.4600e-003	0.0410	0.0410	5.0000e-005		4.3000e-004	4.3000e-004		3.9000e-004	3.9000e-004	0.0000	4.6854	4.6854	1.5200e-003	0.0000	4.7233
Total	**4.4600e-003**	**0.0410**	**0.0410**	**5.0000e-005**		**4.3000e-004**	**4.3000e-004**		**3.9000e-004**	**3.9000e-004**	**0.0000**	**4.6854**	**4.6854**	**1.5200e-003**	**0.0000**	**4.7233**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					tons/yr								MT/yr			
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	8.0000e-005	2.7700e-003	6.1000e-004	1.0000e-005	1.7000e-004	0.0000	1.8000e-004	5.0000e-005	0.0000	5.0000e-005	0.0000	0.7402	0.7402	3.0000e-005	0.0000	0.7410
Worker	6.0000e-004	4.9000e-004	5.3500e-003	1.0000e-005	1.2600e-003	1.0000e-005	1.2700e-003	3.3000e-004	1.0000e-005	3.4000e-004	0.0000	1.1384	1.1384	4.0000e-005	0.0000	1.1394
Total	**6.8000e-004**	**3.2600e-003**	**5.9600e-003**	**2.0000e-005**	**1.4300e-003**	**1.0000e-005**	**1.4500e-003**	**3.8000e-004**	**1.0000e-005**	**3.9000e-004**	**0.0000**	**1.8786**	**1.8786**	**7.0000e-005**	**0.0000**	**1.8804**

3.5 Building Construction - Structural - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					tons/yr								MT/yr			
Off-Road	3.7800e-003	0.0382	0.0331	5.0000e-005		2.3300e-003	2.3300e-003		2.1400e-003	2.1400e-003	0.0000	4.3489	4.3489	1.4100e-003	0.0000	4.3841
Total	**3.7800e-003**	**0.0382**	**0.0331**	**5.0000e-005**		**2.3300e-003**	**2.3300e-003**		**2.1400e-003**	**2.1400e-003**	**0.0000**	**4.3489**	**4.3489**	**1.4100e-003**	**0.0000**	**4.3841**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					tons/yr								MT/yr			
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Vendor	3.0000e-005	9.4000e-004	2.1000e-004	0.0000	5.0000e-005	0.0000	6.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.2289	0.2289	1.0000e-005	0.0000	0.2291
Worker	4.1000e-004	3.4000e-004	3.7000e-003	1.0000e-005	8.1000e-004	1.0000e-005	8.1000e-004	2.1000e-004	1.0000e-005	2.2000e-004	0.0000	0.7483	0.7483	3.0000e-005	0.0000	0.7490
Total	**4.4000e-004**	**1.2800e-003**	**3.9100e-003**	**1.0000e-005**	**8.6000e-004**	**1.0000e-005**	**8.7000e-004**	**2.3000e-004**	**1.0000e-005**	**2.4000e-004**	**0.0000**	**0.9772**	**0.9772**	**4.0000e-005**	**0.0000**	**0.9781**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	3.7800e-003	0.0382	0.0331	5.0000e-005		3.5000e-004	3.5000e-004		3.2000e-004	3.2000e-004	0.0000	4.3489	4.3489	1.4100e-003	0.0000	4.3841
Total	**3.7800e-003**	**0.0382**	**0.0331**	**5.0000e-005**		**3.5000e-004**	**3.5000e-004**		**3.2000e-004**	**3.2000e-004**	**0.0000**	**4.3489**	**4.3489**	**1.4100e-003**	**0.0000**	**4.3841**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.0000e-005	9.4000e-004	2.1000e-004	0.0000	5.0000e-005	0.0000	6.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.2289	0.2289	1.0000e-005	0.0000	0.2291
Worker	4.1000e-004	3.4000e-004	3.7000e-003	1.0000e-005	8.1000e-004	1.0000e-005	8.1000e-004	2.1000e-004	1.0000e-005	2.2000e-004	0.0000	0.7483	0.7483	3.0000e-005	0.0000	0.7490
Total	**4.4000e-004**	**1.2800e-003**	**3.9100e-003**	**1.0000e-005**	**8.6000e-004**	**1.0000e-005**	**8.7000e-004**	**2.3000e-004**	**1.0000e-005**	**2.4000e-004**	**0.0000**	**0.9772**	**0.9772**	**4.0000e-005**	**0.0000**	**0.9781**

3.5 Building Construction - Structural - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0603	0.6125	0.5785	8.8000e-004		0.0354	0.0354		0.0325	0.0325	0.0000	77.2103	77.2103	0.0250	0.0000	77.8345
Total	**0.0603**	**0.6125**	**0.5785**	**8.8000e-004**		**0.0354**	**0.0354**		**0.0325**	**0.0325**	**0.0000**	**77.2103**	**77.2103**	**0.0250**	**0.0000**	**77.8345**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.3000e-004	0.0152	3.3100e-003	4.0000e-005	9.5000e-004	2.0000e-005	9.7000e-004	2.7000e-004	2.0000e-005	3.0000e-004	0.0000	4.0428	4.0428	1.7000e-004	0.0000	4.0471
Worker	6.7900e-003	5.5300e-003	0.0609	1.4000e-004	0.0143	1.2000e-004	0.0144	3.8000e-003	1.1000e-004	3.9100e-003	0.0000	12.9529	12.9529	4.5000e-004	0.0000	12.9640
Total	**7.2200e-003**	**0.0207**	**0.0642**	**1.8000e-004**	**0.0152**	**1.4000e-004**	**0.0154**	**4.0700e-003**	**1.3000e-004**	**4.2100e-003**	**0.0000**	**16.9956**	**16.9956**	**6.2000e-004**	**0.0000**	**17.0111**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0603	0.6125	0.5785	8.8000e-004		5.3000e-003	5.3000e-003		4.8800e-003	4.8800e-003	0.0000	77.2102	77.2102	0.0250	0.0000	77.8345

Total	**0.0603**	**0.6125**	**0.5785**	**8.8000e-004**		**5.3000e-003**	**5.3000e-003**		**4.8800e-003**	**4.8800e-003**	**0.0000**	**77.2102**	**77.2102**	**0.0250**	**0.0000**	**77.8345**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.3000e-004	0.0152	3.3100e-003	4.0000e-005	9.5000e-004	2.0000e-005	9.7000e-004	2.7000e-004	2.0000e-005	3.0000e-004	0.0000	4.0428	4.0428	1.7000e-004	0.0000	4.0471
Worker	6.7900e-003	5.5300e-003	0.0609	1.4000e-004	0.0143	1.2000e-004	0.0144	3.8000e-003	1.1000e-004	3.9100e-003	0.0000	12.9529	12.9529	4.5000e-004	0.0000	12.9640
Total	**7.2200e-003**	**0.0207**	**0.0642**	**1.8000e-004**	**0.0152**	**1.4000e-004**	**0.0154**	**4.0700e-003**	**1.3000e-004**	**4.2100e-003**	**0.0000**	**16.9956**	**16.9956**	**6.2000e-004**	**0.0000**	**17.0111**

3.6 Building Construction - Electrical - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0472	0.4622	0.4026	6.5000e-004		0.0271	0.0271		0.0253	0.0253	0.0000	56.8329	56.8329	0.0144	0.0000	57.1924
Total	**0.0472**	**0.4622**	**0.4026**	**6.5000e-004**		**0.0271**	**0.0271**		**0.0253**	**0.0253**	**0.0000**	**56.8329**	**56.8329**	**0.0144**	**0.0000**	**57.1924**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.6000e-004	5.5500e-003	1.2100e-003	2.0000e-005	3.5000e-004	1.0000e-005	3.6000e-004	1.0000e-004	1.0000e-005	1.1000e-004	0.0000	1.4805	1.4805	6.0000e-005	0.0000	1.4820
Worker	0.0119	9.7100e-003	0.1071	2.5000e-004	0.0251	2.1000e-004	0.0253	6.6700e-003	1.9000e-004	6.8700e-003	0.0000	22.7679	22.7679	7.8000e-004	0.0000	22.7874
Total	**0.0121**	**0.0153**	**0.1083**	**2.7000e-004**	**0.0255**	**2.2000e-004**	**0.0257**	**6.7700e-003**	**2.0000e-004**	**6.9800e-003**	**0.0000**	**24.2483**	**24.2483**	**8.4000e-004**	**0.0000**	**24.2695**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0472	0.4622	0.4026	6.5000e-004		4.0600e-003	4.0600e-003		3.7900e-003	3.7900e-003	0.0000	56.8328	56.8328	0.0144	0.0000	57.1923
Total	**0.0472**	**0.4622**	**0.4026**	**6.5000e-004**		**4.0600e-003**	**4.0600e-003**		**3.7900e-003**	**3.7900e-003**	**0.0000**	**56.8328**	**56.8328**	**0.0144**	**0.0000**	**57.1923**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Vendor	1.6000e-004	5.5500e-003	1.2100e-003	2.0000e-005	3.5000e-004	1.0000e-005	3.6000e-004	1.0000e-004	1.0000e-005	1.1000e-004	0.0000	1.4805	1.4805	6.0000e-005	0.0000	1.4820
Worker	0.0119	9.7100e-003	0.1071	2.5000e-004	0.0251	2.1000e-004	0.0253	6.6700e-003	1.9000e-004	6.8700e-003	0.0000	22.7679	22.7679	7.8000e-004	0.0000	22.7874
Total	**0.0121**	**0.0153**	**0.1083**	**2.7000e-004**	**0.0255**	**2.2000e-004**	**0.0257**	**6.7700e-003**	**2.0000e-004**	**6.9800e-003**	**0.0000**	**24.2483**	**24.2483**	**8.4000e-004**	**0.0000**	**24.2695**

LMA Palmdale Plant 10 Solar System

Antelope Valley APCD Air District, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	6,969.60	1000sqft	160.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	33
Climate Zone	9			**Operational Year**	2021
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - No building structure

Construction Phase - Per Project Schedule

Off-road Equipment - Per engineering estimate

Off-road Equipment - Per engineering estimates

Off-road Equipment - Per engineering estimates

Off-road Equipment - Per engineering estimates

Off-road Equipment - Per engineering estimates

Grading - Per engineering estimates

Trips and VMT - Per engineering estimates

Construction Off-road Equipment Mitigation - Average Leve 3 engines

Table Name	Column Name	Default Value	New Value
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	8.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	12.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstructionPhase	NumDays	3,100.00	30.00
tblConstructionPhase	NumDays	310.00	30.00
tblConstructionPhase	NumDays	120.00	35.00

tblConstructionPhase	NumDays	3,100.00	75.00
tblConstructionPhase	NumDays	3,100.00	52.00
tblGrading	AcresOfGrading	15.00	160.00
tblGrading	MaterialExported	0.00	100.00
tblGrading	MaterialImported	0.00	1,300.00
tblLandUse	LandUseSquareFeet	6,969,600.00	0.00
tblOffRoadEquipment	LoadFactor	0.34	0.34
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Other General Industrial Equipment
tblOffRoadEquipment	OffRoadEquipmentType		Trenchers
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	5.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblTripsAndVMT	HaulingTripNumber	13.00	12.00
tblTripsAndVMT	HaulingTripNumber	163.00	162.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00

tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripNumber	5.00	10.00
tblTripsAndVMT	WorkerTripNumber	18.00	10.00
tblTripsAndVMT	WorkerTripNumber	0.00	12.00
tblTripsAndVMT	WorkerTripNumber	0.00	50.00
tblTripsAndVMT	WorkerTripNumber	0.00	120.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2020	3.9282	37.0141	29.4004	0.0492	6.6643	2.1135	8.7778	3.4815	1.9445	5.4260	0.0000	4,798.4852	4,798.4852	1.3019	0.0000	4,831.0323
2021	5.6558	57.2413	40.7807	0.0774	18.5254	2.8601	21.3855	7.4512	2.6314	10.0826	0.0000	7,571.1164	7,571.1164	2.0381	0.0000	7,622.0687
Maximum	**5.6558**	**57.2413**	**40.7807**	**0.0774**	**18.5254**	**2.8601**	**21.3855**	**7.4512**	**2.6314**	**10.0826**	**0.0000**	**7,571.1164**	**7,571.1164**	**2.0381**	**0.0000**	**7,622.0687**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2020	3.9282	37.0141	29.4004	0.0492	2.9906	0.3241	3.3147	1.4622	0.2983	1.7604	0.0000	4,798.4852	4,798.4852	1.3019	0.0000	4,831.0323
2021	5.6558	57.2413	40.7807	0.0774	7.7251	0.4375	8.1626	3.0397	0.4027	3.4423	0.0000	7,571.1164	7,571.1164	2.0381	0.0000	7,622.0687

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Maximum	5.6558	57.2413	40.7807	0.0774	7.7251	0.4375	8.1626	3.0397	0.4027	3.4423	0.0000	7,571.1164	7,571.1164	2.0381	0.0000	7,622.0687
Percent Reduction	0.00	0.00	0.00	0.00	57.46	84.69	61.95	58.82	84.68	66.45	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	12/7/2020	1/22/2021	5	35	
2	Grading	Grading	1/4/2021	2/12/2021	5	30	
3	Building Construction - Fence	Building Construction	12/28/2020	2/5/2021	5	30	
4	Building Construction - Structural	Building Construction	12/28/2020	4/9/2021	5	75	
5	Building Construction - Electrical	Building Construction	2/15/2021	4/27/2021	5	52	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 160

Acres of Paving: 160

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Building Construction - Structural	Cranes	1	7.00	231	0.29
Building Construction - Electrical	Cranes	1	7.00	231	0.29
Building Construction - Structural	Forklifts	4	8.00	89	0.20
Site Preparation	Rubber Tired Dozers	1	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Excavators	1	0.00	158	0.38
Grading	Graders	1	8.00	187	0.41

Grading	Rubber Tired Dozers		1	8.00	247	0.40
Grading	Scrapers		1	0.00	367	0.48
Grading	Tractors/Loaders/Backhoes		1	8.00	97	0.37
Building Construction - Fence	Cranes		1	0.00	231	0.29
Building Construction - Fence	Forklifts		1	8.00	89	0.20
Building Construction - Fence	Generator Sets		1	0.00	84	0.74
Building Construction - Fence	Tractors/Loaders/Backhoes		3	0.00	97	0.37
Building Construction - Fence	Welders		1	0.00	46	0.45
Building Construction - Electrical	Forklifts		3	8.00	89	0.20
Building Construction - Structural	Generator Sets		1	0.00	84	0.74
Building Construction - Electrical	Generator Sets		1	8.00	84	0.74
Building Construction - Structural	Tractors/Loaders/Backhoes		5	7.00	97	0.37
Building Construction - Electrical	Tractors/Loaders/Backhoes		2	7.00	97	0.37
Building Construction - Structural	Welders		1	0.00	46	0.45
Building Construction - Electrical	Welders		1	0.00	46	0.45
Grading	Rollers		1	8.00	80	0.38
Grading	Skid Steer Loaders		1	8.00	65	0.37
Building Construction - Fence	Other General Industrial Equipment		1	8.00	88	0.34
Building Construction - Electrical	Trenchers		1	8.00	78	0.50

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Building Construction - Structural	12	50.00	4.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	2	10.00	0.00	12.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	7	10.00	0.00	162.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction - Fence	8	12.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction - Electrical	9	120.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use DPF for Construction Equipment

Water Exposed Area

3.2 Site Preparation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.0224	0.0000	6.0224	3.3103	0.0000	3.3103			0.0000			0.0000
Off-Road	1.2890	13.4374	6.4113	0.0116		0.6881	0.6881		0.6331	0.6331		1,128.1110	1,128.1110	0.3649		1,137.2324
Total	**1.2890**	**13.4374**	**6.4113**	**0.0116**	**6.0224**	**0.6881**	**6.7105**	**3.3103**	**0.6331**	**3.9433**		**1,128.1110**	**1,128.1110**	**0.3649**		**1,137.2324**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.6800e-003	0.0897	0.0184	2.9000e-004	9.8100e-003	2.4000e-004	0.0100	2.5800e-003	2.3000e-004	2.8000e-003		30.5193	30.5193	1.0600e-003		30.5458
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0480	0.0306	0.4304	9.1000e-004	0.0822	6.9000e-004	0.0828	0.0218	6.4000e-004	0.0224		90.7222	90.7222	3.3500e-003		90.8060
Total	**0.0507**	**0.1202**	**0.4488**	**1.2000e-003**	**0.0920**	**9.3000e-004**	**0.0929**	**0.0244**	**8.7000e-004**	**0.0252**		**121.2416**	**121.2416**	**4.4100e-003**		**121.3518**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.3487	0.0000	2.3487	1.2910	0.0000	1.2910			0.0000			0.0000
Off-Road	1.2890	13.4374	6.4113	0.0116		0.1032	0.1032		0.0950	0.0950	0.0000	1,128.1110	1,128.1110	0.3649		1,137.2324
Total	**1.2890**	**13.4374**	**6.4113**	**0.0116**	**2.3487**	**0.1032**	**2.4520**	**1.2910**	**0.0950**	**1.3860**	**0.0000**	**1,128.1110**	**1,128.1110**	**0.3649**		**1,137.2324**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.6800e-003	0.0897	0.0184	2.9000e-004	9.8100e-003	2.4000e-004	0.0100	2.5800e-003	2.3000e-004	2.8000e-003		30.5193	30.5193	1.0600e-003		30.5458
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0480	0.0306	0.4304	9.1000e-004	0.0822	6.9000e-004	0.0828	0.0218	6.4000e-004	0.0224		90.7222	90.7222	3.3500e-003		90.8060
Total	**0.0507**	**0.1202**	**0.4488**	**1.2000e-003**	**0.0920**	**9.3000e-004**	**0.0929**	**0.0244**	**8.7000e-004**	**0.0252**		**121.2416**	**121.2416**	**4.4100e-003**		**121.3518**

3.2 Site Preparation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.0224	0.0000	6.0224	3.3103	0.0000	3.3103			0.0000			0.0000
Off-Road	1.2336	12.8671	6.2980	0.0116		0.6442	0.6442		0.5927	0.5927		1,128.2523	1,128.2523	0.3649		1,137.3748

Total	**1.2336**	**12.8671**	**6.2980**	**0.0116**	**6.0224**	**0.6442**	**6.6666**	**3.3103**	**0.5927**	**3.9030**		**1,128.2523**	**1,128.2523**	**0.3649**		**1,137.3748**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.5500e-003	0.0829	0.0175	2.9000e-004	0.0114	2.0000e-004	0.0116	2.9600e-003	2.0000e-004	3.1600e-003		30.2605	30.2605	1.0100e-003		30.2858
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0450	0.0278	0.3999	8.9000e-004	0.0822	6.8000e-004	0.0828	0.0218	6.2000e-004	0.0224		88.4742	88.4742	3.0900e-003		88.5514
Total	**0.0475**	**0.1107**	**0.4174**	**1.1800e-003**	**0.0935**	**8.8000e-004**	**0.0944**	**0.0248**	**8.2000e-004**	**0.0256**		**118.7347**	**118.7347**	**4.1000e-003**		**118.8372**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.3487	0.0000	2.3487	1.2910	0.0000	1.2910			0.0000			0.0000
Off-Road	1.2336	12.8671	6.2980	0.0116		0.0966	0.0966		0.0889	0.0889	0.0000	1,128.2523	1,128.2523	0.3649		1,137.3748
Total	**1.2336**	**12.8671**	**6.2980**	**0.0116**	**2.3487**	**0.0966**	**2.4454**	**1.2910**	**0.0889**	**1.3799**	**0.0000**	**1,128.2523**	**1,128.2523**	**0.3649**		**1,137.3748**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.5500e-003	0.0829	0.0175	2.9000e-004	0.0114	2.0000e-004	0.0116	2.9600e-003	2.0000e-004	3.1600e-003		30.2605	30.2605	1.0100e-003		30.2858
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0450	0.0278	0.3999	8.9000e-004	0.0822	6.8000e-004	0.0828	0.0218	6.2000e-004	0.0224		88.4742	88.4742	3.0900e-003		88.5514
Total	**0.0475**	**0.1107**	**0.4174**	**1.1800e-003**	**0.0935**	**8.8000e-004**	**0.0944**	**0.0248**	**8.2000e-004**	**0.0256**		**118.7347**	**118.7347**	**4.1000e-003**		**118.8372**

3.3 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					11.6830	0.0000	11.6830	3.9217	0.0000	3.9217			0.0000			0.0000
Off-Road	1.9516	21.7194	11.3356	0.0230		0.9904	0.9904		0.9112	0.9112		2,224.2236	2,224.2236	0.7194		2,242.2076
Total	**1.9516**	**21.7194**	**11.3356**	**0.0230**	**11.6830**	**0.9904**	**12.6734**	**3.9217**	**0.9112**	**4.8329**		**2,224.2236**	**2,224.2236**	**0.7194**		**2,242.2076**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0402	1.3057	0.2752	4.5300e-003	0.0944	3.2300e-003	0.0976	0.0259	3.0900e-003	0.0290		476.6026	476.6026	0.0159		477.0012
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Worker	0.0450	0.0278	0.3999	8.9000e-004	0.0822	6.8000e-004	0.0828	0.0218	6.2000e-004	0.0224		88.4742	88.4742	3.0900e-003		88.5514
Total	**0.0851**	**1.3335**	**0.6751**	**5.4200e-003**	**0.1765**	**3.9100e-003**	**0.1804**	**0.0477**	**3.7100e-003**	**0.0514**		**565.0768**	**565.0768**	**0.0190**		**565.5526**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.5564	0.0000	4.5564	1.5295	0.0000	1.5295			0.0000			0.0000
Off-Road	1.9516	21.7194	11.3356	0.0230		0.1486	0.1486		0.1367	0.1367	0.0000	2,224.2236	2,224.2236	0.7194		2,242.2076
Total	**1.9516**	**21.7194**	**11.3356**	**0.0230**	**4.5564**	**0.1486**	**4.7049**	**1.5295**	**0.1367**	**1.6661**	**0.0000**	**2,224.2236**	**2,224.2236**	**0.7194**		**2,242.2076**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0402	1.3057	0.2752	4.5300e-003	0.0944	3.2300e-003	0.0976	0.0259	3.0900e-003	0.0290		476.6026	476.6026	0.0159		477.0012
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0450	0.0278	0.3999	8.9000e-004	0.0822	6.8000e-004	0.0828	0.0218	6.2000e-004	0.0224		88.4742	88.4742	3.0900e-003		88.5514
Total	**0.0851**	**1.3335**	**0.6751**	**5.4200e-003**	**0.1765**	**3.9100e-003**	**0.1804**	**0.0477**	**3.7100e-003**	**0.0514**		**565.0768**	**565.0768**	**0.0190**		**565.5526**

3.4 Building Construction - Fence - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.3805	3.4511	3.1800	4.1000e-003		0.2536	0.2536		0.2333	0.2333		397.2891	397.2891	0.1285		400.5014
Total	**0.3805**	**3.4511**	**3.1800**	**4.1000e-003**		**0.2536**	**0.2536**		**0.2333**	**0.2333**		**397.2891**	**397.2891**	**0.1285**		**400.5014**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	7.0000e-003	0.2327	0.0488	6.1000e-004	0.0135	1.0200e-003	0.0146	3.9000e-003	9.8000e-004	4.8800e-003		64.1464	64.1464	2.7100e-003		64.2143
Worker	0.0576	0.0367	0.5164	1.1000e-003	0.0986	8.3000e-004	0.0994	0.0262	7.6000e-004	0.0269		108.8667	108.8667	4.0200e-003		108.9672
Total	**0.0646**	**0.2694**	**0.5652**	**1.7100e-003**	**0.1121**	**1.8500e-003**	**0.1140**	**0.0301**	**1.7400e-003**	**0.0318**		**173.0131**	**173.0131**	**6.7300e-003**		**173.1815**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.3805	3.4511	3.1800	4.1000e-003		0.0380	0.0380		0.0350	0.0350	0.0000	397.2891	397.2891	0.1285		400.5014

Total	**0.3805**	**3.4511**	**3.1800**	**4.1000e-003**		**0.0380**	**0.0380**		**0.0350**	**0.0350**	**0.0000**	**397.2891**	**397.2891**	**0.1285**		**400.5014**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	7.0000e-003	0.2327	0.0488	6.1000e-004	0.0135	1.0200e-003	0.0146	3.9000e-003	9.8000e-004	4.8800e-003		64.1464	64.1464	2.7100e-003		64.2143
Worker	0.0576	0.0367	0.5164	1.1000e-003	0.0986	8.3000e-004	0.0994	0.0262	7.6000e-004	0.0269		108.8667	108.8667	4.0200e-003		108.9672
Total	**0.0646**	**0.2694**	**0.5652**	**1.7100e-003**	**0.1121**	**1.8500e-003**	**0.1140**	**0.0301**	**1.7400e-003**	**0.0318**		**173.0131**	**173.0131**	**6.7300e-003**		**173.1815**

3.4 Building Construction - Fence - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.3434	3.1508	3.1515	4.1000e-003		0.2194	0.2194		0.2018	0.2018		397.2891	397.2891	0.1285		400.5014
Total	**0.3434**	**3.1508**	**3.1515**	**4.1000e-003**		**0.2194**	**0.2194**		**0.2018**	**0.2018**		**397.2891**	**397.2891**	**0.1285**		**400.5014**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	5.8700e-003	0.2112	0.0430	6.1000e-004	0.0135	3.3000e-004	0.0139	3.9000e-003	3.2000e-004	4.2200e-003		63.8475	63.8475	2.5600e-003		63.9115
Worker	0.0540	0.0333	0.4799	1.0700e-003	0.0986	8.1000e-004	0.0994	0.0262	7.5000e-004	0.0269		106.1690	106.1690	3.7100e-003		106.2617
Total	**0.0599**	**0.2446**	**0.5229**	**1.6800e-003**	**0.1121**	**1.1400e-003**	**0.1133**	**0.0301**	**1.0700e-003**	**0.0311**		**170.0165**	**170.0165**	**6.2700e-003**		**170.1732**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.3434	3.1508	3.1515	4.1000e-003		0.0329	0.0329		0.0303	0.0303	0.0000	397.2891	397.2891	0.1285		400.5014
Total	**0.3434**	**3.1508**	**3.1515**	**4.1000e-003**		**0.0329**	**0.0329**		**0.0303**	**0.0303**	**0.0000**	**397.2891**	**397.2891**	**0.1285**		**400.5014**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

Vendor	5.8700e-003	0.2112	0.0430	6.1000e-004	0.0135	3.3000e-004	0.0139	3.9000e-003	3.2000e-004	4.2200e-003		63.8475	63.8475	2.5600e-003		63.9115
Worker	0.0540	0.0333	0.4799	1.0700e-003	0.0986	8.1000e-004	0.0994	0.0262	7.5000e-004	0.0269		106.1690	106.1690	3.7100e-003		106.2617
Total	**0.0599**	**0.2446**	**0.5229**	**1.6800e-003**	**0.1121**	**1.1400e-003**	**0.1133**	**0.0301**	**1.0700e-003**	**0.0311**		**170.0165**	**170.0165**	**6.2700e-003**		**170.1732**

3.5 Building Construction - Structural - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8893	19.1176	16.5457	0.0247		1.1635	1.1635		1.0705	1.0705		2,396.9265	2,396.9265	0.7752		2,416.3068
Total	**1.8893**	**19.1176**	**16.5457**	**0.0247**		**1.1635**	**1.1635**		**1.0705**	**1.0705**		**2,396.9265**	**2,396.9265**	**0.7752**		**2,416.3068**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0140	0.4654	0.0976	1.2200e-003	0.0271	2.0500e-003	0.0291	7.8000e-003	1.9600e-003	9.7500e-003		128.2928	128.2928	5.4300e-003		128.4285
Worker	0.2401	0.1530	2.1518	4.5600e-003	0.4107	3.4600e-003	0.4142	0.1090	3.1900e-003	0.1121		453.6112	453.6112	0.0168		454.0300
Total	**0.2541**	**0.6184**	**2.2494**	**5.7800e-003**	**0.4378**	**5.5100e-003**	**0.4433**	**0.1168**	**5.1500e-003**	**0.1219**		**581.9040**	**581.9040**	**0.0222**		**582.4585**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8893	19.1176	16.5457	0.0247		0.1745	0.1745		0.1606	0.1606	0.0000	2,396.926 5	2,396.926 5	0.7752		2,416.306 8
Total	**1.8893**	**19.1176**	**16.5457**	**0.0247**		**0.1745**	**0.1745**		**0.1606**	**0.1606**	**0.0000**	**2,396.926 5**	**2,396.926 5**	**0.7752**		**2,416.306 8**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0140	0.4654	0.0976	1.2200e-003	0.0271	2.0500e-003	0.0291	7.8000e-003	1.9600e-003	9.7500e-003		128.2928	128.2928	5.4300e-003		128.4285
Worker	0.2401	0.1530	2.1518	4.5600e-003	0.4107	3.4600e-003	0.4142	0.1090	3.1900e-003	0.1121		453.6112	453.6112	0.0168		454.0300
Total	**0.2541**	**0.6184**	**2.2494**	**5.7800e-003**	**0.4378**	**5.5100e-003**	**0.4433**	**0.1168**	**5.1500e-003**	**0.1219**		**581.9040**	**581.9040**	**0.0222**		**582.4585**

3.5 Building Construction - Structural - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6979	17.2538	16.2949	0.0248		0.9961	0.9961		0.9164	0.9164		2,397.457 6	2,397.457 6	0.7754		2,416.842 2

Total	**1.6979**	**17.2538**	**16.2949**	**0.0248**		**0.9961**	**0.9961**		**0.9164**	**0.9164**		**2,397.4576**	**2,397.4576**	**0.7754**		**2,416.8422**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0117	0.4225	0.0860	1.2200e-003	0.0271	6.6000e-004	0.0278	7.8000e-003	6.4000e-004	8.4300e-003		127.6951	127.6951	5.1200e-003		127.8230
Worker	0.2250	0.1389	1.9995	4.4500e-003	0.4107	3.3900e-003	0.4141	0.1090	3.1200e-003	0.1121		442.3708	442.3708	0.0154		442.7569
Total	**0.2367**	**0.5614**	**2.0855**	**5.6700e-003**	**0.4378**	**4.0500e-003**	**0.4419**	**0.1168**	**3.7600e-003**	**0.1205**		**570.0659**	**570.0659**	**0.0206**		**570.5799**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6979	17.2538	16.2949	0.0248		0.1494	0.1494		0.1375	0.1375	0.0000	2,397.4576	2,397.4576	0.7754		2,416.8422
Total	**1.6979**	**17.2538**	**16.2949**	**0.0248**		**0.1494**	**0.1494**		**0.1375**	**0.1375**	**0.0000**	**2,397.4576**	**2,397.4576**	**0.7754**		**2,416.8422**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0117	0.4225	0.0860	1.2200e-003	0.0271	6.6000e-004	0.0278	7.8000e-003	6.4000e-004	8.4300e-003		127.6951	127.6951	5.1200e-003		127.8230
Worker	0.2250	0.1389	1.9995	4.4500e-003	0.4107	3.3900e-003	0.4141	0.1090	3.1200e-003	0.1121		442.3708	442.3708	0.0154		442.7569
Total	**0.2367**	**0.5614**	**2.0855**	**5.6700e-003**	**0.4378**	**4.0500e-003**	**0.4419**	**0.1168**	**3.7600e-003**	**0.1205**		**570.0659**	**570.0659**	**0.0206**		**570.5799**

3.6 Building Construction - Electrical - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8169	17.7765	15.4850	0.0250		1.0417	1.0417		0.9718	0.9718		2,409.5211	2,409.5211	0.6096		2,424.7606
Total	**1.8169**	**17.7765**	**15.4850**	**0.0250**		**1.0417**	**1.0417**		**0.9718**	**0.9718**		**2,409.5211**	**2,409.5211**	**0.6096**		**2,424.7606**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Vendor	5.8700e-003	0.2112	0.0430	6.1000e-004	0.0135	3.3000e-004	0.0139	3.9000e-003	3.2000e-004	4.2200e-003		63.8475	63.8475	2.5600e-003		63.9115
Worker	0.5399	0.3334	4.7987	0.0107	0.9858	8.1400e-003	0.9939	0.2615	7.5000e-003	0.2690		1,061.6900	1,061.6900	0.0371		1,062.6165
Total	**0.5458**	**0.5446**	**4.8417**	**0.0113**	**0.9993**	**8.4700e-003**	**1.0078**	**0.2654**	**7.8200e-003**	**0.2732**		**1,125.5375**	**1,125.5375**	**0.0396**		**1,126.5280**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8169	17.7765	15.4850	0.0250		0.1563	0.1563		0.1458	0.1458	0.0000	2,409.5211	2,409.5211	0.6096		2,424.7606
Total	**1.8169**	**17.7765**	**15.4850**	**0.0250**		**0.1563**	**0.1563**		**0.1458**	**0.1458**	**0.0000**	**2,409.5211**	**2,409.5211**	**0.6096**		**2,424.7606**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	5.8700e-003	0.2112	0.0430	6.1000e-004	0.0135	3.3000e-004	0.0139	3.9000e-003	3.2000e-004	4.2200e-003		63.8475	63.8475	2.5600e-003		63.9115
Worker	0.5399	0.3334	4.7987	0.0107	0.9858	8.1400e-003	0.9939	0.2615	7.5000e-003	0.2690		1,061.6900	1,061.6900	0.0371		1,062.6165
Total	**0.5458**	**0.5446**	**4.8417**	**0.0113**	**0.9993**	**8.4700e-003**	**1.0078**	**0.2654**	**7.8200e-003**	**0.2732**		**1,125.5375**	**1,125.5375**	**0.0396**		**1,126.5280**

LMA Palmdale Plant 10 Solar System
Antelope Valley APCD Air District, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	6,969.60	1000sqft	160.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	33
Climate Zone	9			**Operational Year**	2021
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - No building structure

Construction Phase - Per Project Schedule

Off-road Equipment - Per engineering estimate

Off-road Equipment - Per engineering estimates

Off-road Equipment - Per engineering estimates

Off-road Equipment - Per engineering estimates

Off-road Equipment - Per engineering estimates

Grading - Per engineering estimates

Trips and VMT - Per engineering estimates

Construction Off-road Equipment Mitigation - Average Leve 3 engines

Table Name	Column Name	Default Value	New Value
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
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tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	8.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	12.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstructionPhase	NumDays	3,100.00	30.00
tblConstructionPhase	NumDays	310.00	30.00
tblConstructionPhase	NumDays	120.00	35.00

tblConstructionPhase	NumDays	3,100.00	75.00
tblConstructionPhase	NumDays	3,100.00	52.00
tblGrading	AcresOfGrading	15.00	160.00
tblGrading	MaterialExported	0.00	100.00
tblGrading	MaterialImported	0.00	1,300.00
tblLandUse	LandUseSquareFeet	6,969,600.00	0.00
tblOffRoadEquipment	LoadFactor	0.34	0.34
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Other General Industrial Equipment
tblOffRoadEquipment	OffRoadEquipmentType		Trenchers
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	5.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblTripsAndVMT	HaulingTripNumber	13.00	12.00
tblTripsAndVMT	HaulingTripNumber	163.00	162.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00

tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripNumber	5.00	10.00
tblTripsAndVMT	WorkerTripNumber	18.00	10.00
tblTripsAndVMT	WorkerTripNumber	0.00	12.00
tblTripsAndVMT	WorkerTripNumber	0.00	50.00
tblTripsAndVMT	WorkerTripNumber	0.00	120.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2020	3.9047	37.0230	28.8200	0.0483	6.6643	2.1135	8.7779	3.4815	1.9446	5.4260	0.0000	4,712.8907	4,712.8907	1.2995	0.0000	4,745.3795
2021	5.6322	57.2547	40.1874	0.0763	18.5254	2.8601	21.3855	7.4512	2.6315	10.0827	0.0000	7,463.3155	7,463.3155	2.0370	0.0000	7,514.2401
Maximum	**5.6322**	**57.2547**	**40.1874**	**0.0763**	**18.5254**	**2.8601**	**21.3855**	**7.4512**	**2.6315**	**10.0827**	**0.0000**	**7,463.3155**	**7,463.3155**	**2.0370**	**0.0000**	**7,514.2401**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2020	3.9047	37.0230	28.8200	0.0483	2.9906	0.3241	3.3148	1.4622	0.2983	1.7605	0.0000	4,712.8907	4,712.8907	1.2995	0.0000	4,745.3795
2021	5.6322	57.2547	40.1874	0.0763	7.7251	0.4376	8.1627	3.0397	0.4027	3.4424	0.0000	7,463.3155	7,463.3155	2.0370	0.0000	7,514.2401

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Maximum	5.6322	57.2547	40.1874	0.0763	7.7251	0.4376	8.1627	3.0397	0.4027	3.4424	0.0000	7,463.315 5	7,463.315 5	2.0370	0.0000	7,514.240 1
Percent Reduction	0.00	0.00	0.00	0.00	57.46	84.69	61.95	58.82	84.68	66.45	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	12/7/2020	1/22/2021	5	35	
2	Grading	Grading	1/4/2021	2/12/2021	5	30	
3	Building Construction - Fence	Building Construction	12/28/2020	2/5/2021	5	30	
4	Building Construction - Structural	Building Construction	12/28/2020	4/9/2021	5	75	
5	Building Construction - Electrical	Building Construction	2/15/2021	4/27/2021	5	52	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 160

Acres of Paving: 160

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Building Construction - Structural	Cranes	1	7.00	231	0.29
Building Construction - Electrical	Cranes	1	7.00	231	0.29
Building Construction - Structural	Forklifts	4	8.00	89	0.20
Site Preparation	Rubber Tired Dozers	1	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Excavators	1	0.00	158	0.38
Grading	Graders	1	8.00	187	0.41

Grading	Rubber Tired Dozers		1	8.00	247	0.40
Grading	Scrapers		1	0.00	367	0.48
Grading	Tractors/Loaders/Backhoes		1	8.00	97	0.37
Building Construction - Fence	Cranes		1	0.00	231	0.29
Building Construction - Fence	Forklifts		1	8.00	89	0.20
Building Construction - Fence	Generator Sets		1	0.00	84	0.74
Building Construction - Fence	Tractors/Loaders/Backhoes		3	0.00	97	0.37
Building Construction - Fence	Welders		1	0.00	46	0.45
Building Construction - Electrical	Forklifts		3	8.00	89	0.20
Building Construction - Structural	Generator Sets		1	0.00	84	0.74
Building Construction - Electrical	Generator Sets		1	8.00	84	0.74
Building Construction - Structural	Tractors/Loaders/Backhoes		5	7.00	97	0.37
Building Construction - Electrical	Tractors/Loaders/Backhoes		2	7.00	97	0.37
Building Construction - Structural	Welders		1	0.00	46	0.45
Building Construction - Electrical	Welders		1	0.00	46	0.45
Grading	Rollers		1	8.00	80	0.38
Grading	Skid Steer Loaders		1	8.00	65	0.37
Building Construction - Fence	Other General Industrial Equipment		1	8.00	88	0.34
Building Construction - Electrical	Trenchers		1	8.00	78	0.50

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Building Construction - Structural	12	50.00	4.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	2	10.00	0.00	12.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	7	10.00	0.00	162.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction - Fence	8	12.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction - Electrical	9	120.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use DPF for Construction Equipment

Water Exposed Area

3.2 Site Preparation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.0224	0.0000	6.0224	3.3103	0.0000	3.3103			0.0000			0.0000
Off-Road	1.2890	13.4374	6.4113	0.0116		0.6881	0.6881		0.6331	0.6331		1,128.1110	1,128.1110	0.3649		1,137.2324
Total	**1.2890**	**13.4374**	**6.4113**	**0.0116**	**6.0224**	**0.6881**	**6.7105**	**3.3103**	**0.6331**	**3.9433**		**1,128.1110**	**1,128.1110**	**0.3649**		**1,137.2324**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.7900e-003	0.0902	0.0203	2.8000e-004	9.8100e-003	2.4000e-004	0.0101	2.5800e-003	2.3000e-004	2.8100e-003		29.6564	29.6564	1.1500e-003		29.6851
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0446	0.0324	0.3466	8.0000e-004	0.0822	6.9000e-004	0.0828	0.0218	6.4000e-004	0.0224		80.0267	80.0267	2.9000e-003		80.0991
Total	**0.0474**	**0.1226**	**0.3669**	**1.0800e-003**	**0.0920**	**9.3000e-004**	**0.0929**	**0.0244**	**8.7000e-004**	**0.0252**		**109.6830**	**109.6830**	**4.0500e-003**		**109.7842**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.3487	0.0000	2.3487	1.2910	0.0000	1.2910			0.0000			0.0000
Off-Road	1.2890	13.4374	6.4113	0.0116		0.1032	0.1032		0.0950	0.0950	0.0000	1,128.1110	1,128.1110	0.3649		1,137.2324
Total	**1.2890**	**13.4374**	**6.4113**	**0.0116**	**2.3487**	**0.1032**	**2.4520**	**1.2910**	**0.0950**	**1.3860**	**0.0000**	**1,128.1110**	**1,128.1110**	**0.3649**		**1,137.2324**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.7900e-003	0.0902	0.0203	2.8000e-004	9.8100e-003	2.4000e-004	0.0101	2.5800e-003	2.3000e-004	2.8100e-003		29.6564	29.6564	1.1500e-003		29.6851
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0446	0.0324	0.3466	8.0000e-004	0.0822	6.9000e-004	0.0828	0.0218	6.4000e-004	0.0224		80.0267	80.0267	2.9000e-003		80.0991
Total	**0.0474**	**0.1226**	**0.3669**	**1.0800e-003**	**0.0920**	**9.3000e-004**	**0.0929**	**0.0244**	**8.7000e-004**	**0.0252**		**109.6830**	**109.6830**	**4.0500e-003**		**109.7842**

3.2 Site Preparation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.0224	0.0000	6.0224	3.3103	0.0000	3.3103			0.0000			0.0000
Off-Road	1.2336	12.8671	6.2980	0.0116		0.6442	0.6442		0.5927	0.5927		1,128.2523	1,128.2523	0.3649		1,137.3748

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Total	**1.2336**	**12.8671**	**6.2980**	**0.0116**	**6.0224**	**0.6442**	**6.6666**	**3.3103**	**0.5927**	**3.9030**		**1,128.2523**	**1,128.2523**	**0.3649**		**1,137.3748**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.6500e-003	0.0833	0.0194	2.8000e-004	0.0114	2.1000e-004	0.0116	2.9600e-003	2.0000e-004	3.1600e-003		29.3966	29.3966	1.1000e-003		29.4242
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0418	0.0294	0.3213	7.8000e-004	0.0822	6.8000e-004	0.0828	0.0218	6.2000e-004	0.0224		78.0345	78.0345	2.6700e-003		78.1013
Total	**0.0444**	**0.1127**	**0.3406**	**1.0600e-003**	**0.0935**	**8.9000e-004**	**0.0944**	**0.0248**	**8.2000e-004**	**0.0256**		**107.4312**	**107.4312**	**3.7700e-003**		**107.5255**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.3487	0.0000	2.3487	1.2910	0.0000	1.2910			0.0000			0.0000
Off-Road	1.2336	12.8671	6.2980	0.0116		0.0966	0.0966		0.0889	0.0889	0.0000	1,128.2523	1,128.2523	0.3649		1,137.3748
Total	**1.2336**	**12.8671**	**6.2980**	**0.0116**	**2.3487**	**0.0966**	**2.4454**	**1.2910**	**0.0889**	**1.3799**	**0.0000**	**1,128.2523**	**1,128.2523**	**0.3649**		**1,137.3748**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.6500e-003	0.0833	0.0194	2.8000e-004	0.0114	2.1000e-004	0.0116	2.9600e-003	2.0000e-004	3.1600e-003		29.3966	29.3966	1.1000e-003		29.4242
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0418	0.0294	0.3213	7.8000e-004	0.0822	6.8000e-004	0.0828	0.0218	6.2000e-004	0.0224		78.0345	78.0345	2.6700e-003		78.1013
Total	**0.0444**	**0.1127**	**0.3406**	**1.0600e-003**	**0.0935**	**8.9000e-004**	**0.0944**	**0.0248**	**8.2000e-004**	**0.0256**		**107.4312**	**107.4312**	**3.7700e-003**		**107.5255**

3.3 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					11.6830	0.0000	11.6830	3.9217	0.0000	3.9217			0.0000			0.0000
Off-Road	1.9516	21.7194	11.3356	0.0230		0.9904	0.9904		0.9112	0.9112		2,224.2236	2,224.2236	0.7194		2,242.2076
Total	**1.9516**	**21.7194**	**11.3356**	**0.0230**	**11.6830**	**0.9904**	**12.6734**	**3.9217**	**0.9112**	**4.8329**		**2,224.2236**	**2,224.2236**	**0.7194**		**2,242.2076**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0418	1.3116	0.3047	4.4000e-003	0.0944	3.2700e-003	0.0976	0.0259	3.1300e-003	0.0290		462.9971	462.9971	0.0174		463.4311
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Worker	0.0418	0.0294	0.3213	7.8000e-004	0.0822	6.8000e-004	0.0828	0.0218	6.2000e-004	0.0224		78.0345	78.0345	2.6700e-003		78.1013
Total	**0.0835**	**1.3410**	**0.6260**	**5.1800e-003**	**0.1765**	**3.9500e-003**	**0.1805**	**0.0477**	**3.7500e-003**	**0.0514**		**541.0317**	**541.0317**	**0.0200**		**541.5323**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.5564	0.0000	4.5564	1.5295	0.0000	1.5295			0.0000			0.0000
Off-Road	1.9516	21.7194	11.3356	0.0230		0.1486	0.1486		0.1367	0.1367	0.0000	2,224.2236	2,224.2236	0.7194		2,242.2076
Total	**1.9516**	**21.7194**	**11.3356**	**0.0230**	**4.5564**	**0.1486**	**4.7049**	**1.5295**	**0.1367**	**1.6661**	**0.0000**	**2,224.2236**	**2,224.2236**	**0.7194**		**2,242.2076**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0418	1.3116	0.3047	4.4000e-003	0.0944	3.2700e-003	0.0976	0.0259	3.1300e-003	0.0290		462.9971	462.9971	0.0174		463.4311
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0418	0.0294	0.3213	7.8000e-004	0.0822	6.8000e-004	0.0828	0.0218	6.2000e-004	0.0224		78.0345	78.0345	2.6700e-003		78.1013
Total	**0.0835**	**1.3410**	**0.6260**	**5.1800e-003**	**0.1765**	**3.9500e-003**	**0.1805**	**0.0477**	**3.7500e-003**	**0.0514**		**541.0317**	**541.0317**	**0.0200**		**541.5323**

3.4 Building Construction - Fence - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.3805	3.4511	3.1800	4.1000e-003		0.2536	0.2536		0.2333	0.2333		397.2891	397.2891	0.1285		400.5014
Total	**0.3805**	**3.4511**	**3.1800**	**4.1000e-003**		**0.2536**	**0.2536**		**0.2333**	**0.2333**		**397.2891**	**397.2891**	**0.1285**		**400.5014**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	7.3500e-003	0.2312	0.0558	5.9000e-004	0.0135	1.0400e-003	0.0146	3.9000e-003	9.9000e-004	4.8900e-003		61.5719	61.5719	2.9900e-003		61.6467
Worker	0.0535	0.0388	0.4159	9.7000e-004	0.0986	8.3000e-004	0.0994	0.0262	7.6000e-004	0.0269		96.0320	96.0320	3.4800e-003		96.1190
Total	**0.0609**	**0.2700**	**0.4717**	**1.5600e-003**	**0.1121**	**1.8700e-003**	**0.1140**	**0.0301**	**1.7500e-003**	**0.0318**		**157.6039**	**157.6039**	**6.4700e-003**		**157.7657**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.3805	3.4511	3.1800	4.1000e-003		0.0380	0.0380		0.0350	0.0350	0.0000	397.2891	397.2891	0.1285		400.5014

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Total	**0.3805**	**3.4511**	**3.1800**	**4.1000e-003**		**0.0380**	**0.0380**		**0.0350**	**0.0350**	**0.0000**	**397.2891**	**397.2891**	**0.1285**		**400.5014**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	7.3500e-003	0.2312	0.0558	5.9000e-004	0.0135	1.0400e-003	0.0146	3.9000e-003	9.9000e-004	4.8900e-003		61.5719	61.5719	2.9900e-003		61.6467
Worker	0.0535	0.0388	0.4159	9.7000e-004	0.0986	8.3000e-004	0.0994	0.0262	7.6000e-004	0.0269		96.0320	96.0320	3.4800e-003		96.1190
Total	**0.0609**	**0.2700**	**0.4717**	**1.5600e-003**	**0.1121**	**1.8700e-003**	**0.1140**	**0.0301**	**1.7500e-003**	**0.0318**		**157.6039**	**157.6039**	**6.4700e-003**		**157.7657**

3.4 Building Construction - Fence - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.3434	3.1508	3.1515	4.1000e-003		0.2194	0.2194		0.2018	0.2018		397.2891	397.2891	0.1285		400.5014
Total	**0.3434**	**3.1508**	**3.1515**	**4.1000e-003**		**0.2194**	**0.2194**		**0.2018**	**0.2018**		**397.2891**	**397.2891**	**0.1285**		**400.5014**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	6.2000e-003	0.2092	0.0497	5.8000e-004	0.0135	3.4000e-004	0.0139	3.9000e-003	3.3000e-004	4.2200e-003		61.2720	61.2720	2.8300e-003		61.3428
Worker	0.0501	0.0353	0.3855	9.4000e-004	0.0986	8.1000e-004	0.0994	0.0262	7.5000e-004	0.0269		93.6414	93.6414	3.2000e-003		93.7215
Total	**0.0563**	**0.2445**	**0.4352**	**1.5200e-003**	**0.1121**	**1.1500e-003**	**0.1133**	**0.0301**	**1.0800e-003**	**0.0311**		**154.9135**	**154.9135**	**6.0300e-003**		**155.0643**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.3434	3.1508	3.1515	4.1000e-003		0.0329	0.0329		0.0303	0.0303	0.0000	397.2891	397.2891	0.1285		400.5014
Total	**0.3434**	**3.1508**	**3.1515**	**4.1000e-003**		**0.0329**	**0.0329**		**0.0303**	**0.0303**	**0.0000**	**397.2891**	**397.2891**	**0.1285**		**400.5014**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Vendor	6.2000e-003	0.2092	0.0497	5.8000e-004	0.0135	3.4000e-004	0.0139	3.9000e-003	3.3000e-004	4.2200e-003		61.2720	61.2720	2.8300e-003		61.3428
Worker	0.0501	0.0353	0.3855	9.4000e-004	0.0986	8.1000e-004	0.0994	0.0262	7.5000e-004	0.0269		93.6414	93.6414	3.2000e-003		93.7215
Total	**0.0563**	**0.2445**	**0.4352**	**1.5200e-003**	**0.1121**	**1.1500e-003**	**0.1133**	**0.0301**	**1.0800e-003**	**0.0311**		**154.9135**	**154.9135**	**6.0300e-003**		**155.0643**

3.5 Building Construction - Structural - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8893	19.1176	16.5457	0.0247		1.1635	1.1635		1.0705	1.0705		2,396.9265	2,396.9265	0.7752		2,416.3068
Total	**1.8893**	**19.1176**	**16.5457**	**0.0247**		**1.1635**	**1.1635**		**1.0705**	**1.0705**		**2,396.9265**	**2,396.9265**	**0.7752**		**2,416.3068**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0147	0.4624	0.1117	1.1800e-003	0.0271	2.0700e-003	0.0292	7.8000e-003	1.9800e-003	9.7800e-003		123.1439	123.1439	5.9800e-003		123.2934
Worker	0.2229	0.1618	1.7328	4.0200e-003	0.4107	3.4600e-003	0.4142	0.1090	3.1900e-003	0.1121		400.1333	400.1333	0.0145		400.4956
Total	**0.2377**	**0.6242**	**1.8445**	**5.2000e-003**	**0.4378**	**5.5300e-003**	**0.4434**	**0.1168**	**5.1700e-003**	**0.1219**		**523.2772**	**523.2772**	**0.0205**		**523.7891**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8893	19.1176	16.5457	0.0247		0.1745	0.1745		0.1606	0.1606	0.0000	2,396.9265	2,396.9265	0.7752		2,416.3068
Total	**1.8893**	**19.1176**	**16.5457**	**0.0247**		**0.1745**	**0.1745**		**0.1606**	**0.1606**	**0.0000**	**2,396.9265**	**2,396.9265**	**0.7752**		**2,416.3068**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0147	0.4624	0.1117	1.1800e-003	0.0271	2.0700e-003	0.0292	7.8000e-003	1.9800e-003	9.7800e-003		123.1439	123.1439	5.9800e-003		123.2934
Worker	0.2229	0.1618	1.7328	4.0200e-003	0.4107	3.4600e-003	0.4142	0.1090	3.1900e-003	0.1121		400.1333	400.1333	0.0145		400.4956
Total	**0.2377**	**0.6242**	**1.8445**	**5.2000e-003**	**0.4378**	**5.5300e-003**	**0.4434**	**0.1168**	**5.1700e-003**	**0.1219**		**523.2772**	**523.2772**	**0.0205**		**523.7891**

3.5 Building Construction - Structural - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6979	17.2538	16.2949	0.0248		0.9961	0.9961		0.9164	0.9164		2,397.4576	2,397.4576	0.7754		2,416.8422

Total	**1.6979**	**17.2538**	**16.2949**	**0.0248**		**0.9961**	**0.9961**		**0.9164**	**0.9164**		**2,397.4576**	**2,397.4576**	**0.7754**		**2,416.8422**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0124	0.4185	0.0994	1.1700e-003	0.0271	6.8000e-004	0.0278	7.8000e-003	6.5000e-004	8.4500e-003		122.5440	122.5440	5.6600e-003		122.6856
Worker	0.2089	0.1469	1.6063	3.9200e-003	0.4107	3.3900e-003	0.4141	0.1090	3.1200e-003	0.1121		390.1727	390.1727	0.0134		390.5063
Total	**0.2213**	**0.5654**	**1.7057**	**5.0900e-003**	**0.4378**	**4.0700e-003**	**0.4419**	**0.1168**	**3.7700e-003**	**0.1205**		**512.7167**	**512.7167**	**0.0190**		**513.1920**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6979	17.2538	16.2949	0.0248		0.1494	0.1494		0.1375	0.1375	0.0000	2,397.4576	2,397.4576	0.7754		2,416.8422
Total	**1.6979**	**17.2538**	**16.2949**	**0.0248**		**0.1494**	**0.1494**		**0.1375**	**0.1375**	**0.0000**	**2,397.4576**	**2,397.4576**	**0.7754**		**2,416.8422**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0124	0.4185	0.0994	1.1700e-003	0.0271	6.8000e-004	0.0278	7.8000e-003	6.5000e-004	8.4500e-003		122.5440	122.5440	5.6600e-003		122.6856
Worker	0.2089	0.1469	1.6063	3.9200e-003	0.4107	3.3900e-003	0.4141	0.1090	3.1200e-003	0.1121		390.1727	390.1727	0.0134		390.5063
Total	**0.2213**	**0.5654**	**1.7057**	**5.0900e-003**	**0.4378**	**4.0700e-003**	**0.4419**	**0.1168**	**3.7700e-003**	**0.1205**		**512.7167**	**512.7167**	**0.0190**		**513.1920**

3.6 Building Construction - Electrical - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8169	17.7765	15.4850	0.0250		1.0417	1.0417		0.9718	0.9718		2,409.5211	2,409.5211	0.6096		2,424.7606
Total	**1.8169**	**17.7765**	**15.4850**	**0.0250**		**1.0417**	**1.0417**		**0.9718**	**0.9718**		**2,409.5211**	**2,409.5211**	**0.6096**		**2,424.7606**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Vendor	6.2000e-003	0.2092	0.0497	5.8000e-004	0.0135	3.4000e-004	0.0139	3.9000e-003	3.3000e-004	4.2200e-003		61.2720	61.2720	2.8300e-003		61.3428
Worker	0.5014	0.3526	3.8552	9.4100e-003	0.9858	8.1400e-003	0.9939	0.2615	7.5000e-003	0.2690		936.4144	936.4144	0.0320		937.2152
Total	**0.5076**	**0.5618**	**3.9049**	**9.9900e-003**	**0.9993**	**8.4800e-003**	**1.0078**	**0.2654**	**7.8300e-003**	**0.2732**		**997.6864**	**997.6864**	**0.0349**		**998.5580**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8169	17.7765	15.4850	0.0250		0.1563	0.1563		0.1458	0.1458	0.0000	2,409.5211	2,409.5211	0.6096		2,424.7606
Total	**1.8169**	**17.7765**	**15.4850**	**0.0250**		**0.1563**	**0.1563**		**0.1458**	**0.1458**	**0.0000**	**2,409.5211**	**2,409.5211**	**0.6096**		**2,424.7606**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	6.2000e-003	0.2092	0.0497	5.8000e-004	0.0135	3.4000e-004	0.0139	3.9000e-003	3.3000e-004	4.2200e-003		61.2720	61.2720	2.8300e-003		61.3428
Worker	0.5014	0.3526	3.8552	9.4100e-003	0.9858	8.1400e-003	0.9939	0.2615	7.5000e-003	0.2690		936.4144	936.4144	0.0320		937.2152
Total	**0.5076**	**0.5618**	**3.9049**	**9.9900e-003**	**0.9993**	**8.4800e-003**	**1.0078**	**0.2654**	**7.8300e-003**	**0.2732**		**997.6864**	**997.6864**	**0.0349**		**998.5580**

Appendix A - LMA Palmdale Plant 10 Solar system - GHG Emissions Displacement

GHG	Intensity Factors (lb/MWh)
CO2	702.44
CH4	0.029
N2O	0.006

Year	Energy Production (Kilowatt hour)	CO2 (Ton)	CH4 (Ton)	N2O (Ton)	GHG (MT)
1	57,700,000	20,265	0.84	0.17	19,696
2	57,411,500	20,164	0.83	0.17	19,597
3	57,124,443	20,063	0.83	0.17	19,499
4	56,838,820	19,963	0.82	0.17	19,402
5	56,554,626	19,863	0.82	0.17	19,305
6	56,271,853	19,764	0.82	0.17	19,208
7	55,990,494	19,665	0.81	0.17	19,112
8	55,710,541	19,567	0.81	0.17	19,017
9	55,431,989	19,469	0.80	0.17	18,922
10	55,154,829	19,371	0.80	0.17	18,827
11	54,879,055	19,275	0.80	0.16	18,733
12	54,604,659	19,178	0.79	0.16	18,639
13	54,331,636	19,082	0.79	0.16	18,546
14	54,059,978	18,987	0.78	0.16	18,453
15	53,789,678	18,892	0.78	0.16	18,361
16	53,520,730	18,798	0.78	0.16	18,269
17	53,253,126	18,704	0.77	0.16	18,178
18	52,986,860	18,610	0.77	0.16	18,087
19	52,721,926	18,517	0.76	0.16	17,997
20	52,458,316	18,424	0.76	0.16	17,907

LMA Palmdale Plant 10 Solar System

Antelope Valley APCD Air District, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	6,969.60	1000sqft	160.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	33
Climate Zone	9			**Operational Year**	2022
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Solar Panel Field

Operational emissioins based on 2021 CY

Off-road Equipment - One generator to be used to power a pressure washer needed to clean solar panels

Trips and VMT - VMT for inspectors and maintenance crew

Off-road Equipment Mitigation - Generator with tier 3 engine

2.0 Emissions Summary

2.1 Overall (Maximum Daily Emission)

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	0.3696	3.3319	3.7946	7.4100e-003	0.0337	0.1683	0.2020	9.3500e-003	0.1683	0.1776	0.0000	709.1651	709.1651	0.0340	0.0000	710.0155
Maximum	**0.3696**	**3.3319**	**3.7946**	**7.4100e-003**	**0.0337**	**0.1683**	**0.2020**	**9.3500e-003**	**0.1683**	**0.1776**	**0.0000**	**709.1651**	**709.1651**	**0.0340**	**0.0000**	**710.0155**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	0.1438	3.1696	4.1663	7.4100e-003	0.0337	0.2110	0.2447	9.3500e-003	0.2110	0.2204	0.0000	709.1651	709.1651	0.0340	0.0000	710.0155
Maximum	**0.1438**	**3.1696**	**4.1663**	**7.4100e-003**	**0.0337**	**0.2110**	**0.2447**	**9.3500e-003**	**0.2110**	**0.2204**	**0.0000**	**709.1651**	**709.1651**	**0.0340**	**0.0000**	**710.0155**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**61.10**	**4.87**	**-9.79**	**0.00**	**0.00**	**-25.41**	**-21.16**	**0.00**	**-25.41**	**-24.07**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Detail

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor

Operation	Generator Sets	1	8.00	84	0.74

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Operation	9	1.00	1.00	0.00	20.00	20.00	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures

Use Tier 3 engine for generator used for power washing

3.2 Operation - 2021

Unmitigated Emissions On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.3574	3.1662	3.6847	6.5800e-003		0.1677	0.1677		0.1677	0.1677		623.0346	623.0346	0.0318		623.8294
Total	**0.3574**	**3.1662**	**3.6847**	**6.5800e-003**		**0.1677**	**0.1677**		**0.1677**	**0.1677**		**623.0346**	**623.0346**	**0.0318**		**623.8294**

Unmitigated Emissions Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Vendor	5.4100e-003	0.1608	0.0396	6.7000e-004	0.0185	4.3000e-004	0.0189	5.3200e-003	4.1000e-004	5.7300e-003		69.9447	69.9447	1.6700e-003		69.9865

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Worker	6.8300e-003	4.8700e-003	0.0703	1.6000e-004	0.0152	1.2000e-004	0.0153	4.0300e-003	1.1000e-004	4.1400e-003		16.1859	16.1859	5.5000e-004		16.1997
Total	**0.0122**	**0.1657**	**0.1099**	**8.3000e-004**	**0.0337**	**5.5000e-004**	**0.0343**	**9.3500e-003**	**5.2000e-004**	**9.8700e-003**		**86.1306**	**86.1306**	**2.2200e-003**		**86.1861**

Mitigated Emissions On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.1316	3.0039	4.0564	6.5800e-003		0.2105	0.2105		0.2105	0.2105	0.0000	623.0346	623.0346	0.0318		623.8294
Total	**0.1316**	**3.0039**	**4.0564**	**6.5800e-003**		**0.2105**	**0.2105**		**0.2105**	**0.2105**	**0.0000**	**623.0346**	**623.0346**	**0.0318**		**623.8294**

Mitigated Emissions Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Vendor	5.4100e-003	0.1608	0.0396	6.7000e-004	0.0185	4.3000e-004	0.0189	5.3200e-003	4.1000e-004	5.7300e-003		69.9447	69.9447	1.6700e-003		69.9865
Worker	6.8300e-003	4.8700e-003	0.0703	1.6000e-004	0.0152	1.2000e-004	0.0153	4.0300e-003	1.1000e-004	4.1400e-003		16.1859	16.1859	5.5000e-004		16.1997
Total	**0.0122**	**0.1657**	**0.1099**	**8.3000e-004**	**0.0337**	**5.5000e-004**	**0.0343**	**9.3500e-003**	**5.2000e-004**	**9.8700e-003**		**86.1306**	**86.1306**	**2.2200e-003**		**86.1861**

APPENDIX C BIOLOGICAL RECOURSE TECHNICAL REPORT

Lockheed Martin Aeronautics Palmdale Facility

Biological Resources Technical Report

Prepared by:	Prepared for:
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Redlands, CA 92373	San Bernardino, CA 92408

August 2019

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SUMMARY

A survey was completed by Sunrise Consulting (Sunrise) for Tetra Tech, Inc. at the Lockheed Martin Aeronautics (LM Aero) Palmdale facility in the Spring of 2019 related to new facility developments. A habitat assessment was conducted in March 2019, followed by focused species-specific surveys outlined below.

Focused Species-Specific Surveys

Resource	Protocol/Guidance	Dates of Surveys
Desert tortoise (DT) *Gopherus agassizii*	*Preparing for Any Action that may Occur within the Range of the Mojave Desert Tortoise* (*Gopherus agassizii*); October 26, 2018	5/18/19
Burrowing owl (BUOW) *Athene cunicularia*	*Staff Report on Burrowing Owl Mitigation*, State of California Natural Resources Agency Department of Fish and Game; March 7, 2012	4/14/19 5/18/19 6/22/19 7/12/19
Mohave ground squirrel (MGS) *Xerospermophilus mohavensis*	*Mohave Ground Squirrel Survey Guidelines*, California Department Of Fish And Game; (January 2003; Minor Process And Contact Changes In July 2010)	4/11/19 – 4/15/19 5/16/19 – 5/20/19 6/21/19 – 6/25/19 6/26/19 – 6/30/19

The project site is within the City of Palmdale, north of Avenue P, east of Sierra Highway and the Union Pacific Railroad, and west of the Palmdale Airport. All areas of proposed developed that supported native or recovering desert habitats were included in the surveys.

No Mohave ground squirrels, burrowing owls, or desert tortoise were observed during these surveys. No sign (tracks, vocalizations, burrows, etc.) of any of these species was recorded. No other sensitive species were observed or recorded by sign during these surveys. It is unlikely any of these species inhabits the project areas.

The likelihood of harassment, injury or other take of these species is very unlikely during these development activities and permits for these species are not recommended. No specific avoidance measures are recommended except for competing nesting surveys if project construction activities were to occur during nesting season which typically ranges from February 15 to June 15 with some variance based on annual rainfall and temperatures.

1.0 INTRODUCTION

Lockheed Martin Aeronautics (LM Aero) proposes to develop several operational facilities on their property located in Palmdale, California, also known as the "Skunkworks." Project activities would include vegetation clearance, grading and construction of several small-scale operational facilities.

This report represents findings from Spring 2019 biological resource surveys conducted by Sunrise Consulting (Sunrise) at the facilities. Focused surveys were conducted for the state and federally endangered desert tortoise (*Gopherus agassizii*), state species of concern burrowing owl (*Athene cunicularia*), and state threatened Mohave ground squirrel (*Xerospermophilus mohavensis*). In addition, all plant and wildlife species observed incidental to these surveys were recorded.

1.1 Project Area and Biological Study Area

1.1.1 Project Area/Surrounding Land Use

LM Aero Palmdale is located in the southeast portion of the City of Palmdale. The proposed Project is east of Sierra Highway, existing Union Pacific Railroad tracks, and State Highway 14; north of Avenue P, and west of Palmdale International Airport (Figure 1).

1.1.2 Biological Study Area

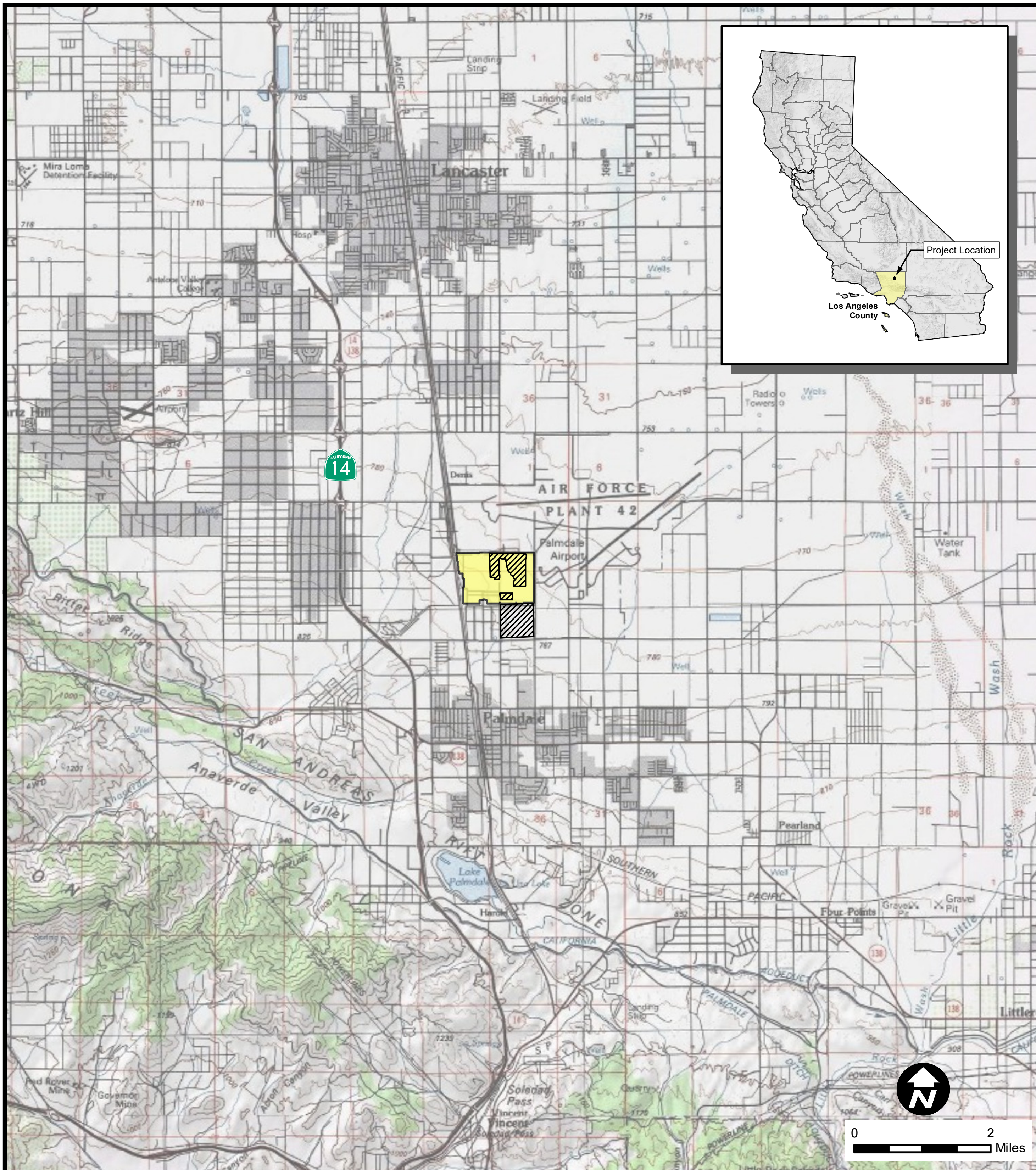
The Biological Study Area is an area that encompasses all areas where biological surveys were completed for the proposed Project and encompasses the area of the proposed Project facilities as defined above, and may also include a buffer area where any potential impacts to these species may occur (also known as the Area of Effect). The Biological Study Area is shown on Figure 2.

For this Project, the Biological Study Area does not include buffer areas since the study area is limited by available habitat, fencing, and private property. The Biological Study Area is located on the U.S. Geological Survey Palmdale quadrangle map within township 6N, range 12W and sections 11, 12, 13, and 14 of the San Bernardino Base & Meridian, San Bernardino County, California. Elevations range from approximately 2,550 feet (775 meters) to 2,600 feet (800 meters) above mean sea level. Soils on the Project site are a combination of sand and gravel with site slopes approximately 2-5 percent and a northeastern aspect towards Little Rock Creek located several miles east of the Biological Study Area. The Biological Study Area supports moderately to highly disturbed areas of creosote bush-white bursage scrub (Sawyer et al, 2009), moderately disturbed areas within existing channels, and unvegetated areas of numerous existing roads.

1.2 Project Description

As shown on Figure 2, LM Aero proposes construction of several facilities including two small areas of solar panel field and several warehouse related buildings. With the exception of the southern solar field, all project activities and development would occur within the existing fence of the LM Aero Palmdale facility. The southern solar field is on LM Aero-owned private property, and outside of the existing fence line for the Palmdale facility.

P:\GIS\Palmdale_MGS\Location_Bio.mxd



Biological Study Area

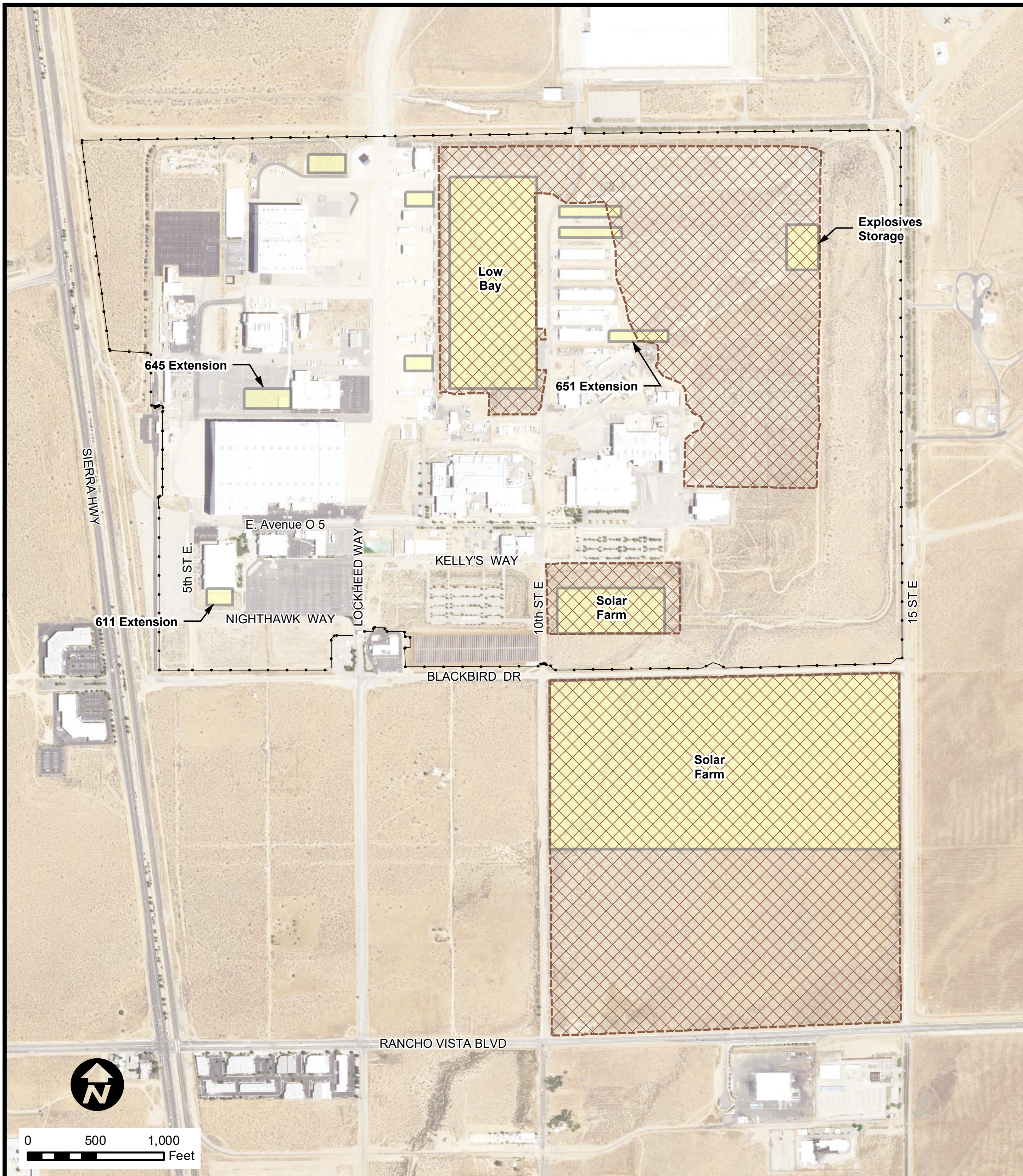
Lockheed Martin Aeronautics Plant 10

LOCKHEED MARTIN AERONAUTICS
PLANT 10, PALMDALE, CALIFORNIA

Figure 1

Regional Location

TETRA TECH



Biological Study Area

Future Building

LOCKHEED MARTIN AERONAUTICS
PLANT 10, PALMDALE, CALIFORNIA

Figure 2

Biological Study Area

TETRA TECH

2.0 METHODOLOGY

2.1 Literature Review and General Biological Setting

Prior to the surveys, relevant biological information for the site and surrounding area was reviewed, which included reviewing the California Natural Diversity Database (CNDDB 2019), California Native Plant Society's Electronic Inventory (CNPSEI 2019), and historical records of special status species found throughout the area for the past twenty years. Sunrise conducted protocol surveys that covered the Biological Study Area for desert tortoise, burrowing owl, and Mohave ground squirrel (MGS) as discussed individually below. In addition, all plant species observed were recorded by botanist Kent Hughes, and all wildlife observed were recorded during all surveys.

2.2 Desert Tortoise

Sunrise conducted a protocol survey (USFWS 2010, revised 2018) for desert tortoise between May 18, 2019, recording all signs of desert tortoises (live animals, burrows, scat, carcasses, etc.). Desert tortoise surveys were conducted by qualified biologists Kent Hughes and Lehong Chow. The survey consisted of pedestrian transects spaced 30 feet (10 meters) apart throughout the Biological Study Area.

2.3 Burrowing Owl

Sunrise conducted protocol surveys for burrowing owl (BUOW; CDFW 2012) with transect spacing between 15 to 30 meters depending on terrain and vegetation density. As described in the burrowing owl survey guidance, these surveys were conducted four times at least three weeks apart by qualified biologists as listed below in Table 1.

Table 1. Burrowing Owl Survey Dates

BUOW visit #	Date	Surveying Biologists
1	4/14/2019	Lehong Chow
2	5/18/2019	Lehong Chow, Kent Hughes
3	6/22/2019	Lehong Chow
4	7/12/2019	Kent Hughes, Kathy Simon

2.4 Mohave Ground Squirrel

Mohave ground squirrel surveys included live-trapping conducted by biologists permitted for these activities by California Department of Fish and Wildlife (CDFW) under Principal Investigator Kathryn Simon. Because the Biological Study Area covers 152.5 acres, it was determined that two live trapping grids would be placed in the best areas of native habitat, with one within the existing LM Aero fence and one outside of the existing fence. Table 2 below lists dates and personnel conducting the surveys.

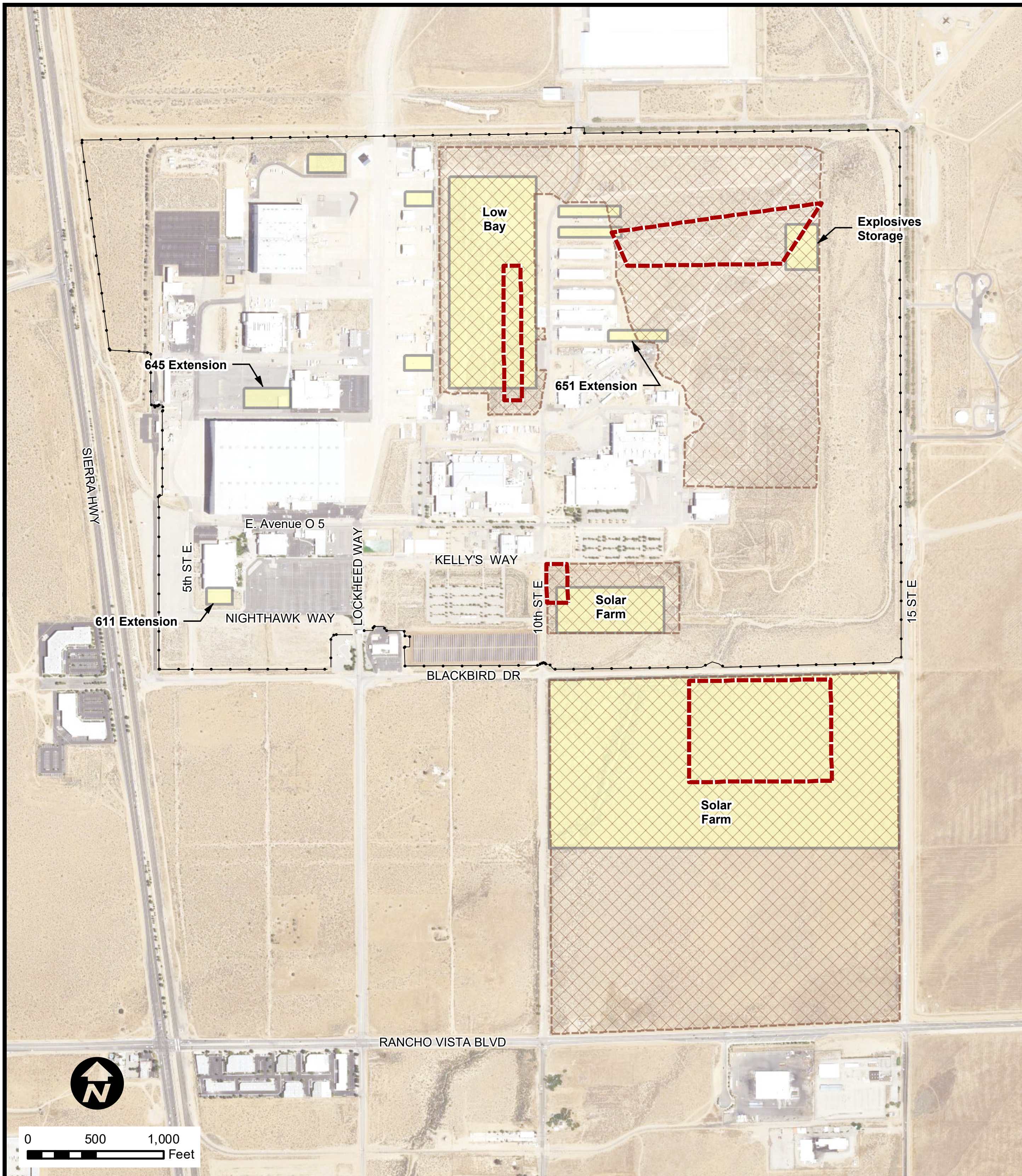
Table 1. MGS Trapping Dates

Inside Fence	Start	End	Surveying Biologist
session 1	4/11/2019	4/15/2019	Lehong Chow
session 2	5/16/2019	5/20/2019	Lehong Chow, Kent Hughes
session 3	6/21/2019	6/25/2019	Lehong Chow
Outside Fence	**Start**	**End**	**Surveying Biologist**
session 1	4/11/2019	4/15/2019	Kathy Simon
session 2	5/16/2019	5/20/2019	Lehong Chow, Kent Hughes
session 3	6/26/2019	6/30/2019	Kathy Simon

2.4.1 Live Trapping

CDFW guidelines (CDFW 2003, revised 2010) require live trapping for three sessions of trapping- the first session occurs between March and April, the second session in May, and the last session between mid-June and July. Each session consists of five consecutive days of trapping from sunrise to sunset with limits on temperature and inclement weather conditions. Two grids were established – one inside the facility fence that was divided into three portions where the Biological Study Area supported the best habitat for MGS, and one outside the facility fence (Figure 3).

One hundred 12-inch aluminum HB Sherman folding live-traps, spaced 35-meters apart, were used for each respective grid during each trapping session. The bait placed into individual traps consisted of a 4-way livestock grain and peanut powder mixture. Cardboard folded in an A-frame configuration and stabilized by soil was placed over each trap to provide shade. Traps were opened near sunrise, checked throughout the day, and then checked and closed before sunset.



MGS Grid Location

Biological Study Area

Future Building

LOCKHEED MARTIN AERONAUTICS
PLANT 10, PALMDALE, CALIFORNIA

Figure 3

MGS Grid Locations

TETRA TECH

3.0 RESULTS

3.1 General Biological Setting

This section discusses the plants and wildlife recorded incidental to other surveys performed at the site, and discussed in detail in the following sections.

3.1.1 Vegetation

A list of all plants detected are included in Table 3, and no sensitive plant species were detected during surveys. The Biological Study Area supports creosote bush scrub (Sawyer 2009), with areas of this community moderately and highly disturbed, as well as unvegetated areas of existing LM Aero access roads and facilities. Some areas are disturbed to the point of supporting monotypic vegetation of goldfields or horsebrush, with other areas moderately disturbed and supporting more diverse habitat of creosote bush scrub with sparse Joshua trees.

Table 2. Plants Detected

Scientific Name	Common Name	*Scientific Name*	Common Name
Achnatherum hymenoides	Indian rice grass	*Helianthus* sp.	sunflower
Ambrosia psilostachya	perennial ragweed	*Hirschfeldia incana**	short-pod mustard
Ambrosia salsola	cheesebush	*Hordeum marinum**	barley
*Amsinckia menziesii**	common fiddleneck	*Krascheninnikovia lanata*	winterfat
*Amsinckia tessellata**	devil's lettuce	*Larrea tridentata*	creosote bush
Artemisia tridentata	Basin big sage	*Lasthenia californica*	California goldfields
Atriplex canescens	4-wing saltbush	*Lycium andersonii*	Anderson's boxthorn
*Brassica nigra**	black mustard	*Lycium cooperi*	Cooper's boxthorn
*Bromus diandrus**	ripgut brome	*Malacothrix glabrata*	desert dandelion
*Bromus madritensis rubens**	red brome	*Mirabilis laevis*	wishbone plant
*Bromus tectorum**	cheat grass	*Pectis papposa*	many bristle chinchweed
Chorizanthe brevicornus	brittle spineflower	*Phacelia crenulata*	phacelia
Cryptantha micrantha	cushion cryptantha	*Poa secunda*	one-sided blue grass
Cuscuta californica	dodder	*Pyracantha* sp.*	firethorn
*Datura stramonium**	Jimson weed	*Salsola tragus**	Russian thistle
Ephedra nevadensis	Mormon tea	*Schismus barbatus**	Mediterranean grass
Ericameria nauseosa	rubber rabbitbrush	*Senecio flaccidus*	threadleaf ragwort
Eriogonum angulosum	anglestem buckwheat	*Sisymbrium irio**	London rocket
Eriogonum californica	California buckwheat	*Stephanomeria virgata*	wirelettuce
*Erodium cicutarium**	filaree	*Tetradymia synopsis*	horsebrush
Euphorbia albomarginata	white-margin sandmat	*Trichostema lanceolatum*	vinegarweed
Gnaphalium sp.	cudweed	*Yucca brevifolia*	Joshua tree
Grayia spinosa	spiny hopsage		

**= non-native species*

3.1.2 Wildlife

A list of all wildlife detected are included in Table 3. No sensitive species were observed incidentally during the surveys. One night of nocturnal trapping was conducted during diurnal trapping for Mohave ground squirrel, identifying the small mammal species listed in Table 3.

Table 3. Incidental Species Detected

Common Name	Scientific Name	Common Name	Scientific Name
black phoebe	*Sayornis nigricans*	lesser nighthawk	*Chordeilas acutipennis*
black-tailed jackrabbit	*Lepus californicus*	Long-tailed pocket mouse*	*Perognathus longimembris*
black-throated sparrow	*Amphispiza bilineata*	Merriam's kangaroo rat*	*Dipodymys merriami*
Chisel-toothed kangaroo rat*	*Dipodomys microps*	mourning dove	*Zenaida macroura*
common raven	*Corvus corax*	pocket mouse*	*Chaeotodipus* sp.
coyote	*Canis latrans*	side-blotched lizard	*Uta stansburiana*
domestic dog	*Canis lupis familiaris*	turkey vulture	*Cathartes aura*
greater roadrunner	*Geococcyx californianus*	western whiptail	*Aspidoscelis tigris*
horned lark	*Erimophila alpestris*	white-crowned sparrow	*Zonotrichia leucophrys*
house finch	*Haemorhous mexicanus*	zebra-tailed lizard	*Callisaurus draconoides*

* Observed in traps set for one night of nocturnal trapping.

3.2 Desert Tortoise

Neither live desert tortoises nor desert tortoise signs (burrows, scat, tracks, carcasses, etc.) were observed during the desert tortoise protocol survey.

3.3 Burrowing Owl

Neither live burrowing owls nor burrowing owl signs (burrows, whitewash, feathers, pellets, etc.) were observed during the burrowing owl protocol survey.

3.4 Mohave Ground Squirrel

No MGS were trapped during all three trapping sessions. White-tailed antelope ground squirrels (*Ammospermophilus leucurus*) were the primary species live-trapped. Table 4 shows results of diurnal trapping.

Table 4. MGS Live Trapping Results

WILDLIFE SPECIES TRAPPED	NUMBER OF INDIVIDUALS TRAPPED AT GRIDS					
	session 1		session 2		session 3	
	Inside Fence	Outside Fence	Inside Fence	Outside Fence	Inside Fence	Outside Fence
antelope ground squirrel *(Ammospermophilus leucurus)*	1	7	-	4	2	1
Merriam's kangaroo rat *(Dipodomys merriamii)*	-	-	1	-	-	-
western whiptail lizard *(Aspedoscelis tigris)*	-	-	2	-	-	-

4.0 RECOMMENDATIONS

Sunrise does not recommend additional focused surveys or permitting related to sensitive biological resources, as none were found in focused survey efforts. However, if vegetation removal and/or initial grading are proposed for nesting season (approximately February 15 – June 15 with some variance based on annual rainfall and temperatures), then pre-construction surveys focused on nest avoidance is recommended. This would ensure compliance with the Migratory Bird Treaty Act by avoiding take of nests or nesting species.

5.0 REFERENCES

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APPENDIX D JURISDICTIONAL DELINEATION

Jurisdictional Delineation of Wetlands/Waters Subject to Regulatory Authority Proposed Alternative Energy Project Site Lockheed Martin Aeronautics Company, Plant 10 Palmdale, California

Prepared for:

LOCKHEED MARTIN

TETRA TECH

301 E. Vanderbilt Way, Suite 450
San Bernardino, California 92408
TC# 100-PAS-T34941.58 Task 25
July 2019, Amended November 2020

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APPENDICIES

SECTION 1 INTRODUCTION

Tetra Tech, Inc. was contracted by Lockheed Martin Aeronautics Company – Palmdale (LM Aero) to conduct a jurisdictional wetland/ waters of the U.S. and waters of the State delineation of an unnamed drainage associated with Assessor Parcel Numbers 302-202-7016, 302-202-7910 and 302-202-7905 (project site). The project site is t bounded by Blackbird Way on the northern side, 10th Street on the western side, Avenue P/Rancho Vista Boulevard on the southern side and 15th Street on the eastern side. The project site is located at the LM Aero Plant 10 in Palmdale, Los Angeles County, California (Figure 1). The purpose of the delineation was to determine the limits of waters found within the project site for a proposed alternative energy project that are subject to regulatory authority under Section 404 and 401 of the Clean Water Act and those regulated under California Department of Fish and Game Code (CDFG) 1600 et seq. for any potential waters subject to state regulatory authority.

SECTION 2 PROJECT LOCATION

The project site is located in the Mojave Desert. The Mojave Desert is bounded to the east by the Colorado River and the California-Nevada border, on the north by the Garlock fault and on the south-west by San Gabriel and San Bernardino Mountains and the San Andreas fault (Harden, 1998). Locally, the project site and the unnamed drainage is located in undeveloped desert habitat and is characterized as generally level terrain with a gentle gradient trending from the south to the north.

SECTION 3 ENVIRONMENTAL SETTING

The project site is undeveloped and supports relatively undisturbed native habitat that is dominated by basin big sage (*Artemisia tridentata*), rubber rabbitbrush (*Ericameria nauseosa*) with Joshua trees (*Yucca brevifolia*) scattered across the landscape. Soils at the site have been classified as sands and sandy loams (United States Department of Agriculture 2019). The climate of the project site similar to that experienced in the Mojave Desert and is characterized by cool winter and hot summer temperatures. Temperatures in the western Mojave Desert where the project site is located are moderated by marine influences from the coast. Most rainfall with occasional snowfall occurs in the winter months.

SECTION 4 REGULATORY SETTING

4.1 FEDERAL REGULATORY SETTING

The U.S. Army Corps of Engineers (ACOE) regulates discharges of dredged or fill material into waters of the United States. These waters, or waters of the U.S., include wetlands and non-wetland bodies of water that meet specific criteria. U.S. Army Corps of Engineers regulatory jurisdiction pursuant to Section 404 of the Clean Water Act is founded on a connection or nexus between the water body in question and interstate commerce. This connection may be direct; through a tributary system linking a stream channel with traditional navigable waters used in interstate or foreign commerce, or may be indirect, through a nexus identified in the Corps regulations. The following definitions of waters of the United States are taken from the Code of Federal Regulations (CFR) under Section 33 CFR 328.3. See excerpt as follows.

a) The term *waters of the United States* mean
   1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
   2) All interstate waters including interstate wetlands;
   3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes or natural ponds, the use; degradation or destruction of which could affect interstate or foreign commerce including any such waters:
      i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
      ii) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
      iii) Which are used or could be used for industrial purpose by industries in interstate commerce;
   4) All impoundments of waters otherwise defined as waters of the United States under the definition;
   5) Tributaries of waters identified in paragraphs (a) (1) through (4) of this section;
   6) The territorial seas;
   7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) (1) through (6) of this section.
   8) Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other Federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with [Environmental Protection Agency] EPA.

   Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not waters of the United States.
b) The term *wetland* means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.
c) The term *adjacent* means bordering, contiguous, or neighboring. Wetlands separated from other waters of the United States by man-made dikes or barriers, natural river berms, beach dunes and the like are "adjacent wetlands."

In order to be considered a jurisdictional wetland under Section 404, an area must possess three wetland characteristics: hydrophytic vegetation, hydric soils, and wetland hydrology. Each characteristic has a specific set of mandatory wetland criteria that must be satisfied in order for that particular wetland characteristic to be met (Environmental Laboratory 1987; United States Army Corps of Engineers 2008). Several parameters may be analyzed to determine whether the criteria are satisfied.

The determination of waters of the U.S. associated with intermittent streams and washes in the arid southwest is made difficult by long periods of low to no water flow through these bodies. In recognition of these environments where field determination of jurisdictional waters is difficult, technical guidance on how to determine waters of the U.S. based on physical characteristics associated with dryland fluvial systems has been provided by the ACOE (United States Army Corps of Engineers 2008). With non-tidal waters, in the absence of adjacent wetlands, the extent of ACOE jurisdiction is defined by the "ordinary high water mark" (OHWM). This is defined in 33 CFR Part 329.1, as the line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line on the bank; shelving; changes in the character of the soil; destruction of terrestrial vegetation; and presence of litter and debris (U.S Army Corps of Engineers 2008). In dryland fluvial systems typical of the semi-arid southwest, some of the more common physical characteristics that indicate the OHWM of an intermittent channel include a clear natural scour line impressed on the bank, recent bank erosion, destruction of native terrestrial vegetation and the presence of litter and debris.

In 2006, the Supreme Court addressed the jurisdictional scope of Section 404 of the Clean Water Act, specifically the term "the waters of the U.S.," in *Rapanos v. U.S.* and in *Carabell v. U.S.* referred to as the Rapanos decision. The Supreme Court provided two new analytical standards for determining whether water bodies that are not Traditional Navigable Waters (TNWs), including a wetland adjacent to those non- traditional navigable waters, are subject to the Clean Water Act. Water bodies are subject to Clean Water Act jurisdiction if 1) the water body is relatively permanent, or if the water body is a wetland that directly abuts (e.g., the wetland is not separated from the tributary by uplands, a berm, dike, or similar feature) a relatively permanent water body; or 2) if a water body, in combination with all wetlands adjacent to that water body, has a significant nexus with Traditionally Navigable Waters (TNWs). TNWs include but are not limited to the "navigable waters of the United States". These waters are subject to the ebb and flow of the tide and/or the water body is presently used, or has been used in the past, or may be susceptible for use (with or without reasonable improvements) to transport interstate or foreign commerce. Relatively Permanent Waters that are tributaries to TNWs are also subject to regulatory authority by the ACOE.

4.2 STATE OF CALIFORNIA REGULATORY SETTING

Under California State law, "waters of the state" means "any surface or groundwater including saline waters, within boundaries of the state". After the Supreme Court decision in *Solid Waste Agency of Northern Cook County v. Army Corps of Engineers (SWANNC v. USCOE)*, the State Water Resources Control Board (SWRCB) confirmed the State's jurisdiction over isolated wetlands. The SWRCB has confirmed that under Section 401 of the Clean Water Act and the California Porter-Cologne Water Quality Control Act, discharges to wetlands and other "waters of the state" (including isolated wetlands) are subject to State regulations. The Regional Water Quality Control Board (RWQCB)-Lahontan Region regulates discharge to wetlands and "waters of the state" found in the project area.

The Porter-Cologne Water Quality Control Act (Act), Water Code §13000 et seq. provides for overall regulation under state law of water quality involving waters of the State of California. This relates to both groundwater and surface water. The Act provides specific regulations related to the discharge of pollutants to surface waters of the state. Dredging, filling or excavation of isolated waters constitutes a discharge of waste to waters of the state. The RWQCB claims jurisdiction over isolated wetlands that meet the Federal three-parameter definition of a wetland. For projects that would dredge, fill or excavate isolated waters, the project proponent would need to seek a waste discharge requirement (WDR) permit from the RWQCB.

Pursuant to Division 2, Chapter 6, Sections 1600-1603 of the CDFG Code, the California Department of Fish and Wildlife (CDFW) regulates all diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream or lake, which support fish or wildlife (i.e., bed to bank). The CDFW defines a "stream" (including creeks and rivers) as "a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life. This includes watercourses having surface or subsurface flow that supports or has supported riparian vegetation." In their definition of "lake", the CDFW also includes "natural lakes or man-made reservoirs." The CDFW has interpreted the term "streambed" to encompass all portions of the bed, banks, and channel of any stream, including intermittent and ephemeral streams, extending laterally to the upland edge of riparian vegetation. CDFG code in general does not specifically contain provisions regulating activities that would impact wetlands, isolate areas containing riparian vegetation or wetland hydrology.

SECTION 5 WETLAND AND WATERS OF THE U.S./WATERS OF THE STATE DELINEATION AND DETERMINATION

5.1 METHODS

Prior to mobilizing into the field, Tetra Tech conducted a review of any potential drainage features within the region and the proposed project site using recent aerial topography, USGS 7.5-minute quadrangle maps and recent satellite aerial photographs. A field investigation was conducted by a Tetra Tech delineation specialist on July 1, 2019, to identify the presence of waters subject to regulatory authority. A LM Aero photographer accompanied the delineation specialist to take photographs.

The focus of the field survey was to identify the location of OHWM and any jurisdictional wetlands. Indicators of OHWM can include undercut banks on corners, scour pits on the downstream sides of rocks or other in-stream obstacles, sandy berms indicating meandering, sorted sediment deposits, drift lines, and matted vegetation on the upstream side of plants. The drainage was mapped using aerial imagery. Photographs were taken at locations along the drainage within the project site.

Data sources reviewed in conjunction with the field survey included aerial photographs, US Geological Survey topographic maps, and the available soils information. The National Wetland Inventory (NWI) has mapped the unnamed drainage as a Riverine system (U.S. Fish and Wildlife Service 2019) (Appendix A). Riverine systems include wetlands and deep-water habitats that may be contained within a channel except wetlands dominated by trees, shrubs persistent emergent plants, mosses or lichens (United States Fish and Wildlife Service 1979). Topographic maps and aerial photos were used to identify drainage patterns and washes through the project site. The *Review of Ordinary High Water Mark Indicators for Delineating Arid Streams in the Southwestern United States* (U.S. Army Corps of Engineers 2008) was used as guidance for identifying and determining limits of ACOE and CDFW jurisdiction.

Visual observations of streambed bank cuts for characteristics of hydric soils as well as the well-graded sand deposited in the streambed were documented. In addition to signs of OHWM, the texture, color, presence of concretions and moisture in soils associated with the drainage at the sampling locations were recorded. No soil pits were dug. Field conditions for the sampling points within the drainages were documented on Wetland Delineation forms (Appendix B). Finally, the origin and terminus of the drainage associated with the project was site documented using aerial imagery and the US Geological Survey National Hydrography Dataset (2019).

5.2 FIELD RESULTS

Based on a review of aerial images and field verification, the unnamed drainage within the project site was found to have field characteristics supporting a determination of jurisdictional waters. Photographs 1 through 8 depict conditions for the surveyed drainage and adjacent areas. The location and orientation of photographs taken during the delineation of the unnamed drainage are indicated on Figure 2.

5.2.1 Vegetation

No plants associated with desert washes were observed within the unnamed drainage. One plant, perennial ragweed (*Ambrosia psilostachya*), categorized as a facultative upland plant, was observed during the delineation. Plants observed at the sampling point associated with the unnamed drainage are noted in Table 1. The definition of the wetland plant indicator status is found in Table 2.

Table 1
Plant Species Observed in the Unnamed Drainage by Sampling Point

Scientific Name	Common Name	Wetland Plant Indicator Status
Sampling Point 1		
Salsola tragus	Russian thistle	No indicator
Sisymbrium irio	London rocket	No indicator
Hirschfeldia incana	Short-pod mustard	No indicator
Amsinckia menziesii	Common fiddleneck	No indicator
Bromus diandrus	Ripgut brome	No indicator
Ambrosia psilostachya	Perennial ragweed	FACU
Artemisia tridentata	Basin big sage	No indicator

Scientific Name	Common Name	Wetland Plant Indicator Status
Sampling Point 2		
Salsola tragus	Russian thistle	No indicator
Sisymbrium irio	London rocket	No indicator
Ambrosia psilostachya	Perennial ragweed	FACU
Cuscuta californica	Dodder	No indicator
Datura stramonium	Jimson weed	No indicator
Bromus diandrus	Ripgut brome	No indicator
Ambrosia tridentata	Basin big sage	No indicator
Sampling Point 3		
Hirschfeldia incana	Short-pod mustard	No indicator
Artemisia tridentata	Basin big sage	No indicator
Sampling Point 4		
Artemisia tridentata	Basin big sage	No indicator
Sampling Point 5		
Artemisia tridentata	Basin big sage	No indicator
Cuscuta californica	Dodder	No indicator
Bromus diandrus	Ripgut brome	No indicator
Sampling Point 6		
Salsola tragus	Russian thistle	No indicator
Sisymbrium irio	London rocket	No indicator
Hirschfeldia incana	Short-pod mustard	No indicator
Bromus diandrus	Ripgut brome	No indicator
Artemisia tridentata	Basin big sage	No indicator

Table 2 Wetland Plant Indicator Status

Category	Acronym	Probability
Obligate Wetland	OBL	Occur almost (estimated probability >99%) under natural conditions found in wetlands.
Facultative Wetland	FACW	Usually occur in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands.
Facultative	FAC	Equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%).
Facultative Upland	FACU	Usually occur in non-wetlands (estimated probability 67%-99%), but occasionally found on wetlands (estimated probability 1%-33%).
Obligate Upland	UPL	Occurs in wetlands in another region but occur almost always (estimated probability > 99%) under natural conditions in non-wetlands in the region specified.

The hydrophytic vegetation criterion for regulatory jurisdiction is met if more than 50 percent of the dominant plant species from all strata (tree, shrub and herb layer) are considered hydrophytic (Environmental Laboratory 1987; United States Army Corps of Engineers 2008). Hydrophytic species are those included on the National List of Plant Species that Occur in Wetlands: California (Region 0) (Lichvar et. al. 2014). A predominance of the species found the various sampling points within the unnamed drainage are not are listed as plants that occur in wetlands in California.

5.2.2 Soils

Hydric soils, or soils associated with wetlands, are saturated or inundated long enough during the growing season to develop anaerobic conditions that favor growth and regeneration of hydrophytic vegetation. Soils are considered hydric when the following criteria for mineral soils are met:

I. All Histosols except Folists; or

II. Soils in Aquic suborders, Aquic subgroups, Albolls suborder, Salorthids great group, Pell great groups of Vertisols, Pachic suborders or Cumulic subgroups that are:

  A. Somewhat poorly drained and have a frequently occurring water table at less than 0.5 feet from the surface for a significant period (usually more than two weeks) during the growing season; or

  B. Poorly drained or very poorly drained and have either:

    (1) A frequently occurring water table at less than 0.5 feet from the surface for a significant period (usually more than two weeks) during the growing season if textures are coarse sands, or fine sands in all layers within 20 inches; or

    (2) A frequently occurring water table at less than 1.0 foot from the surface for a significant period (usually more than two weeks) during the growing season if permeability is greater than 6.0 inches/hour in all layers within 30 inches; or

    (3) A frequently occurring water table at less than 1.5 feet from the surface for a significant period (usually more than two weeks) during the growing season if permeability is less than 6.0 inches/hour in all layers within 20 inches; or

III. Soils that are frequently ponded for a long duration or very long duration during the growing season; or

IV. Soils that are frequently flooded for a long duration or a very long duration during the growing season.

There are a number of indicators that may indicate the presence of hydric soils, including hydrogen sulfide generation, the presence of iron and/or manganese concretions, low chroma associated with the soil color, gleyed color, and mottling due to oxidation and reduction of accumulated metals such as iron. A formal soil survey of the project site by the Natural Resources Conservation Service (NRCS) has been completed for the Antelope Valley Area that includes the project site (United States Department of Agriculture 2019). As indicated earlier, soils within the unnamed drainage and project site are sandy and sandy loam in texture. No soils with potential hydric characteristics were observed in the unnamed drainage.

5.2.3 Hydrology

No wetlands were observed within the unnamed drainage surveyed. Sign of sediment deposit, and drift (material such as plant debris) deposits were observed within the drainage. No standing water was observed. As a result, hydrology that could support wetlands was not observed in the unnamed drainage. A review of the National Hydrography Dataset maintained by the United States Geological Survey (2018) for the regional hydrologic setting of the unnamed drainage shows that the unnamed drainage originates to the northwest of the project area (Figure 3). The terminus of the unnamed drainage is some location to the north and east of the Palmdale Regional Airport found north and east of the project area and Plant 10.

5.3 REGULATORY AUTHORITY DETERMINATION RESULTS AND RECOMMENDATION

5.3.1 Determination Results

Using the previously described criteria for vegetation indicators, soils and hydrology, no jurisdictional wetlands are found within the unnamed drainage. The unnamed drainage is riverine streambed habitat that is characterized by intermittent streamflow that occurs only part of the year. Intermittent flooding may result in surface water flow within the drainage, but this condition has not resulted in the formation of hydric soils or the ability to support hydrophytic plants associated with wetlands.

5.3.2 Jurisdictional Wetlands and Traditional Navigable Waters-Waters of the United States

The ACOE continues to assert jurisdiction over all waters that are in use, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which may be subject to the ebb and flow of the tide and are defined as TNWs (U.S. Army Corps of Engineers and Environmental Protection Agency 2007). The ACOE has determined that waters connected to Lake Palmdale including the Palmdale Ditch are subject to regulatory authority under Section 404 of the Clean Water Act (U.S. Army Corps of Engineers 2013). Lake Palmdale and the Palmdale Ditch are located to the south of Plant 10 (Figure 3). All other drainages within the Antelope Valley area are tributaries to Rosamond, Buckhorn and Rogers Lakes and have been determined by the ACOE to be isolated waters and not a TNW and not subject to Section 404 of the Clean Water Act. As the unnamed drainage does not originate from Lake Palmdale or the Palmdale Ditch, it is likely an isolated water and not subject to Section 404 of the Clean Water Act.

5.3.3 Waters of the State

Under Section 401 of the Clean Water Act and the Porter-Cologne Water Quality Act, the RWQCB-Lahontan asserts jurisdiction over jurisdictional wetlands and those non-isolated waters associated with TNW. As the unnamed drainage it is not subject to regulation under Section 404; it is not subject to regulatory authority by the RWQCB-Lahontan under Section 401.

While not regulated under Section 401, the unnamed drainage is subject to regulation under state law for water quality as a water of the State of California. The Act provides specific regulations related to the discharge of pollutants to surface waters of the state. As a result, for project activities that would impact the unnamed drainage, the project proponent may need to seek a waste discharge requirement (WDR) permit from the RWQCB.

5.3.3.1 Jurisdictional Wetland Habitat and Definable Bed to Bank Streambed Features

Under Section 1600 et. seq. of the California Department of Fish and Game Code, the CDFW regulates all diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream or lake, which support fish or wildlife. The unnamed drainage is a riverine streambed with intermittent flow and would be subject to regulatory authority by the CDFW.

5.3.4 Recommendation

The following recommendation is provided related to jurisdictional waters found within the project area.

California Department of Fish and Game Code 1600 et. seq. Streambed Alteration Agreement. For any project-related impacts to the unnamed drainage, a. Streambed Alteration Agreement permit will be required. This permit details all project impacts to the unnamed drainage plus mitigation for compensating those losses. It is recommended that a pre-project meeting with the CDFW be undertaken to discuss possible project impacts to the unnamed drainage. This meeting would provide an opportunity to discuss a mitigation strategy to compensate losses of regulated waters. An analysis of project impacts as per the California Environmental Quality Act (CEQA) would be required prior to issuance of the Streambed Alteration Agreement permit by the CDFW.

Waste Discharge Requirement Permit. For any project related impacts to the unnamed drainage, a WDR permit may be required. The WDR permit would describe project impacts and receiving waters information, description of direct impacts to Waters of the State and compensatory mitigation. It is recommended that a pre-project meeting with the RWQCB be conducted to determine if a WDR is required and to discuss a compensatory mitigation strategy for impacts to regulated waters. An analysis of impacts as per CEQA will be required prior to issuance of the WDR by the RWQCB.

SECTION 6 REFERENCES

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FIGURES

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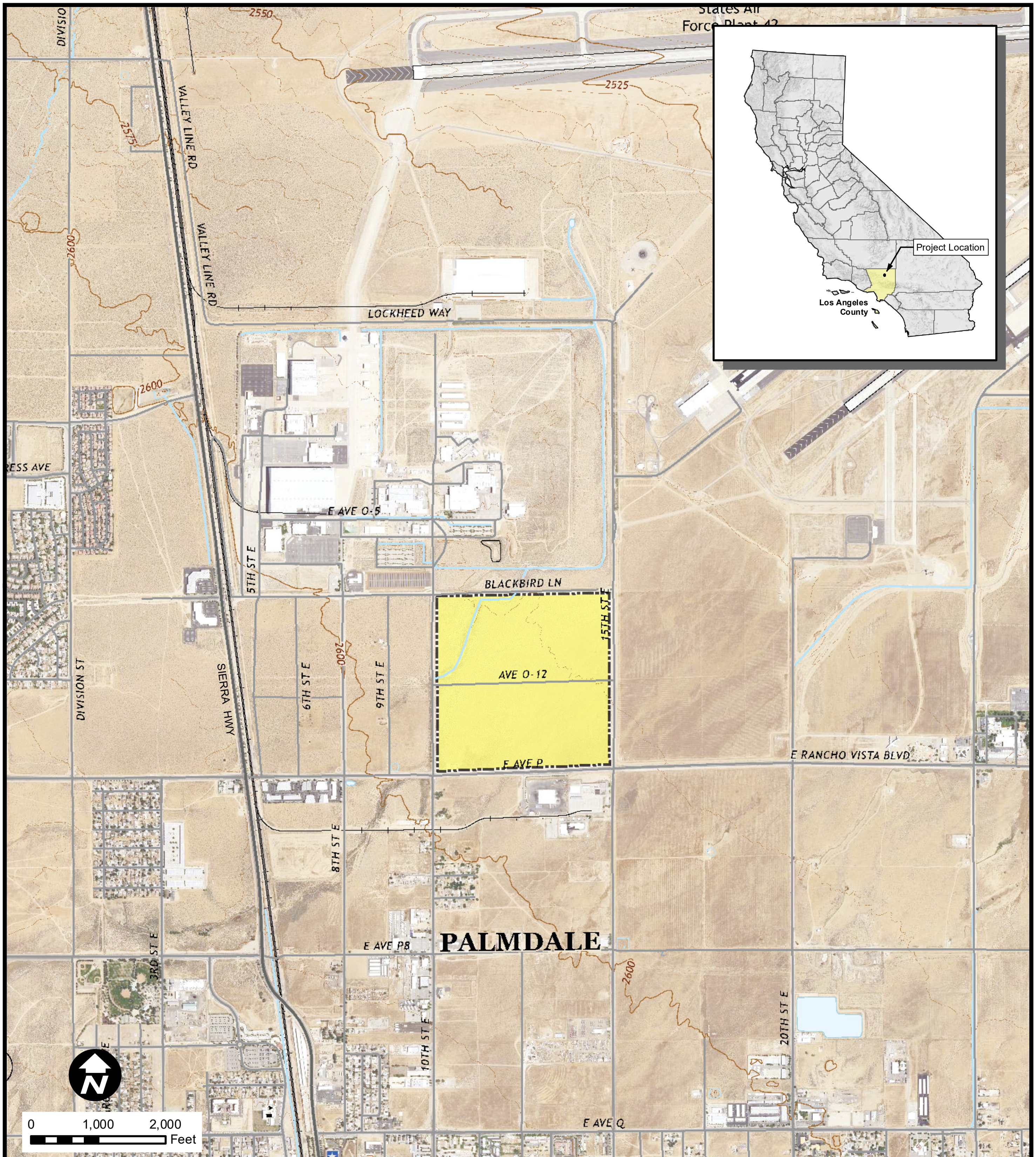

Alternative Energy Project Site

LOCKHEED MARTIN AERONAUTICS
PALMDALE PLANT 10

Figure 1

**Location Map-
Alternative Energy
Project Site**

TETRA TECH

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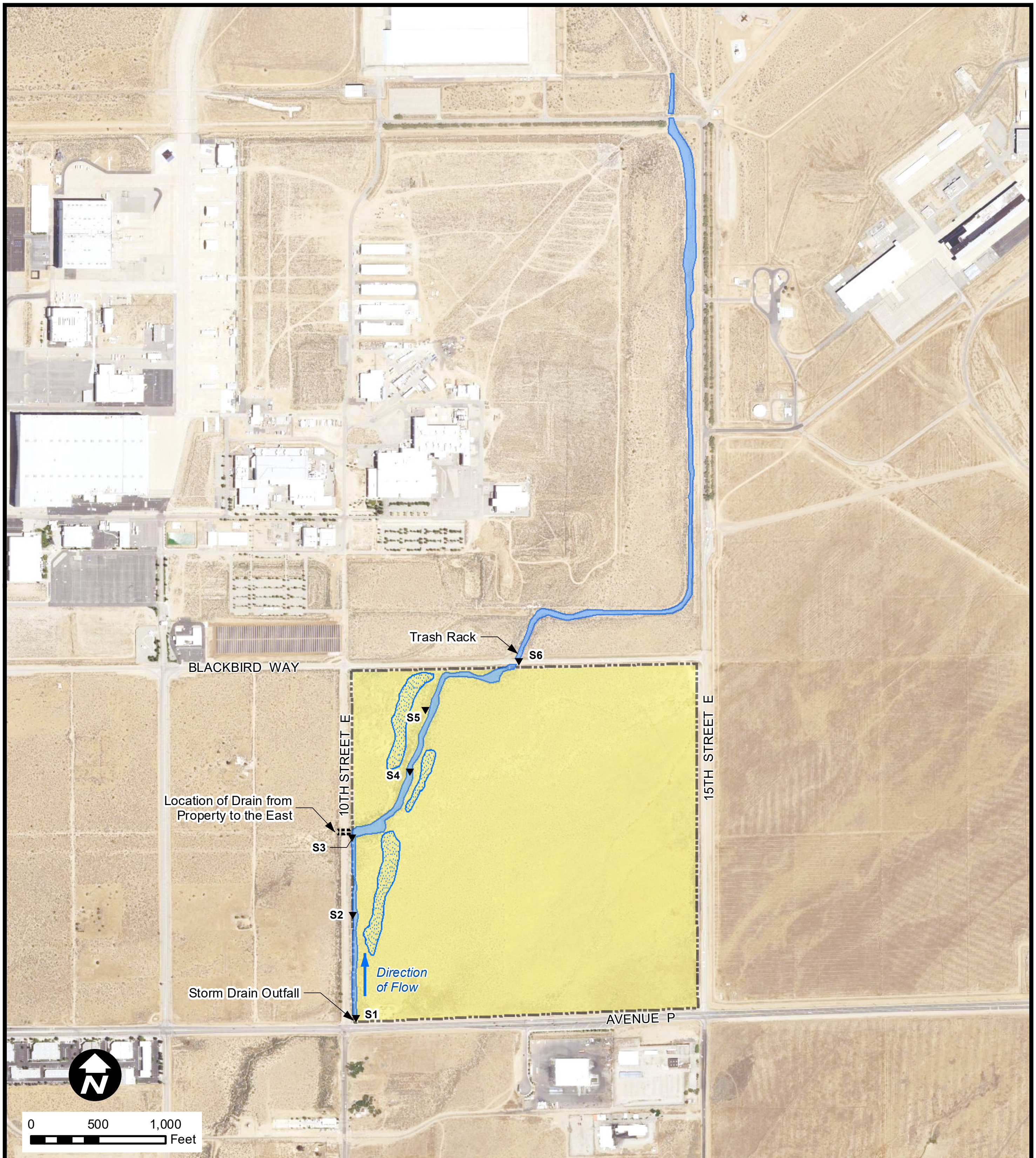

▼ Sampling Location

Riverine Waters Subject to Regulatory Authority as Waters of the State (Unnamed drainage)

Low Relief/Evidence of Ponded Water

Alternative Energy Project Site

LOCKHEED MARTIN AERONAUTICS
PALMDALE PLANT 10

Figure 2

Waters Subject to Regulatory Authority

TETRA TECH

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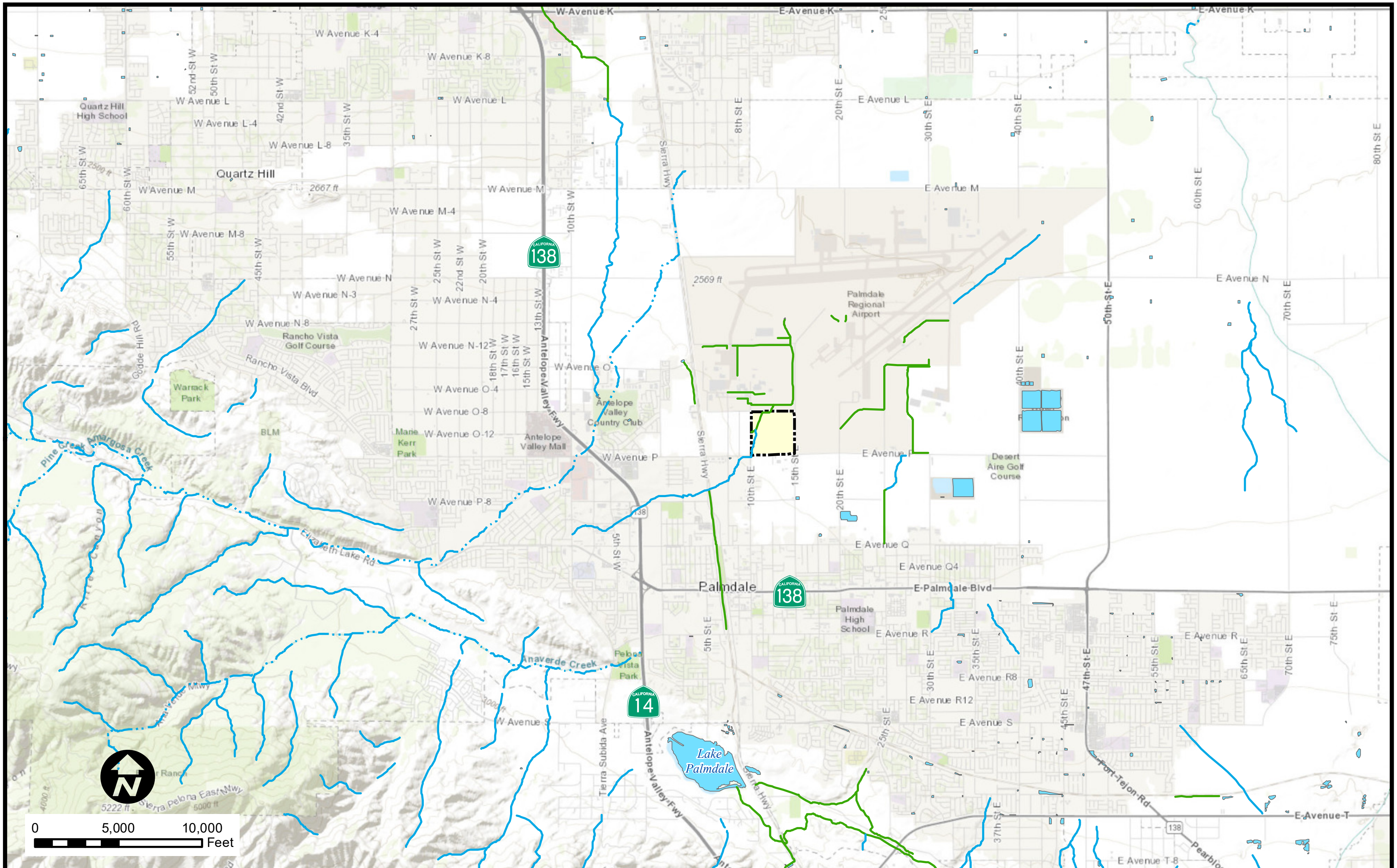

Alternative Energy Project Site

Stream/River: Hydrographic Category = Ephemeral

Stream/River: Hydrographic Category = Intermittent

Canal/Ditch

Canal/Ditch: Canal/Ditch Type = Aqueduct

Source:
Definition of Waters per USGS National Hydrography Dataset, HUC 18090206, May 2018

LOCKHEED MARTIN AERONAUTICS
PALMDALE PLANT 10

Figure 3
Hydrology
Unnamed Drainage, Plant 10
Alternative Energy Project Site

TETRA TECH

PHOTOGRAPHS

Photograph 1: **View of the unnamed drainage and Sampling Point S1, corner of Avenue P and 10th Street E. View to the north.**	
Photograph 2: **View of the unnamed drainage and Sampling Point S2, adjacent to 10th Street E. View to the east.**	

Photographs taken by Christopher Higgins, Lockheed Martin Aeronautics Company, 01 July 2019

Photograph 3: **View of the unnamed drainage and Sampling Point S3, adjacent to 10th Street E. View to the southeast.**	
Photograph 4: **View of the unnamed drainage and Sampling Point S4, east of 10th Street E. View to the southeast.**	

Photographs taken by Christopher Higgins, Lockheed Martin Aeronautics Company, 01 July 2019

Photograph 5: **View of the unnamed drainage and Sampling Point S5, east of 10th Street E. View to the southeast.**	

Photograph 6: **View of the unnamed drainage and Sampling Point S6, south of Blackbird Way. View to the west.**	

Photographs taken by Christopher Higgins, Lockheed Martin Aeronautics Company, 01 July 2019

Photograph 7: **View of the alternative energy project area from Blackbird Way. View to the west.**	

Photograph 8: **View of the alternative energy project area from Blackbird Way. View to the southwest.**	

Photographs taken by Christopher Higgins, Lockheed Martin Aeronautics Company, 01 July 2019

APPENDICIES

APPENDIX A
NATIONAL WETLANDS INVENTORY MAP

U.S. Fish and Wildlife Service

National Wetlands Inventory

Plant 10 Delineation

July 11, 2019

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

APPENDIX B
WETLAND DETERMINATION DATA FORMS

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: LM Aero Alternative Energy Project   City/County: Los Angeles   Sampling Date: 07/01/19

Applicant/Owner: Lockheed Martin Aeronautics Company-Palmdale   State: CA   Sampling Point: S1

Investigator(s): S. Pacheco   Section, Township, Range: 13, T6N, R12W

Landform (hillslope, terrace, etc.): Antelope Valley   Local relief (concave, convex, none): None   Slope (%): ~2%

Subregion (LRR): C - Mediterranean California   Lat: -118.111762   Long: 34.602098   Datum: NAD 83

Soil Map Unit Name: Hesperia fine sandy loam   NWI classification: Riverine (R4SBJ)

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ( )	No (●)
Hydric Soil Present?	Yes ( )	No (●)
Wetland Hydrology Present?	Yes ( )	No (●)

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1. Basin big sage (Artemisia tridentata)	100	Yes	Not Listed
2.			
3.			
4.			
5.			
Total Cover:	100%		
Herb Stratum			
1. Russian thistle (Salsola tragus)	5		Not Listed
2. London rocket (Sisymbrium irio)	5		Not Listed
3. Common fiddleneck (Amsinckia menziesii)	10		Not Listed
4. Ripgut brome (Bromus diandrus)	60	Yes	Not Listed
5. Perennial ragweed (Ambrosia psilostachya)	10		FACU
6. Short pod mustard (Hirschfeldia incana)	10		Not Listed
7.			
8.			
Total Cover:	100%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum ____ %   % Cover of Biotic Crust ____ %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species	10	x 4 =	40
UPL species	190	x 5 =	950
Column Totals:	200 (A)		990 (B)

Prevalence Index = B/A = 4.95

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ( ) No (●)

Remarks: Understory is dominated by non-native ruderal weeds and grasses.

SOIL

Sampling Point: S1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-6+							Sand	10 YR 6/6 dry color

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks: No hydric characteristics observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☒ Drift Deposits (B3) (**Riverine**)
- ☒ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Evidence of past water flow observed.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: LM Aero Alternative Energy Project | City/County: Los Angeles | Sampling Date: 07/01/19

Applicant/Owner: Lockheed Martin Aeronautics Company-Palmdale | State: CA | Sampling Point: S2

Investigator(s): S. Pacheco | Section, Township, Range: 13, T6N, R12W

Landform (hillslope, terrace, etc.): Antelope Valley | Local relief (concave, convex, none): None | Slope (%): ~2%

Subregion (LRR): C - Mediterranean California | Lat: -118.111846 | Long: 34.604199 | Datum: NAD 83

Soil Map Unit Name: Hesperia fine sandy loam | NWI classification: Riverine (R4SBJ)

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	( )	(●)
Hydric Soil Present?	( )	(●)
Wetland Hydrology Present?	( )	(●)

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1. Basin big sage (Artemisia tridentata)	100	Yes	Not Listed
2.			
3.			
4.			
5.			
Total Cover:	100%		
Herb Stratum			
1. Russian thistle (Salsola tragus)	6		Not Listed
2. London rocket (Sisymbrium irio)	1		Not Listed
3. Common fiddleneck (Amsinckia menziesii)	80	Yes	Not Listed
4. Perennial ragweed (Ambrosia psilostachya)	1		FACU
5. Dodder (Cuscuta californica)	1		Not Listed
6. Jimson weed (Datura stramonium)	1		Not Listed
7. Ripgut brome (Bromus diandrus)	10	Yes	Not Listed
8.			
Total Cover:	100%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum ____ %   % Cover of Biotic Crust ____ %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species	1	x 4 =	4
UPL species	199	x 5 =	995
Column Totals:	200 (A)		999 (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ( ) No (●)

Remarks:

SOIL

Sampling Point: S2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-6+							Sand	10 YR 6/6 dry color

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ●

Remarks: No hydric characteristics observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☒ Sediment Deposits (B2) (**Riverine**)
- ☒ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ●	Depth (inches):
Water Table Present?	Yes ○	No ●	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ●	Depth (inches):

Wetland Hydrology Present? Yes ○ No ●

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Evidence of past water flow observed.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: LM Aero Alternative Energy Project City/County: Los Angeles Sampling Date: 07/01/19

Applicant/Owner: Lockheed Martin Aeronautics Company-Palmdale State: CA Sampling Point: S3

Investigator(s): S. Pacheco Section, Township, Range: 13, T6N, R12W

Landform (hillslope, terrace, etc.): Antelope Valley Local relief (concave, convex, none): None Slope (%): ~2%

Subregion (LRR): C - Mediterranean California Lat: -118.111869 Long: 34.605785 Datum: NAD 83

Soil Map Unit Name: Rosamond loam NWI classification: Riverine (R4SBJ)

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (•) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (•) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ( )	No (•)	
Hydric Soil Present?	Yes ( )	No (•)	Is the Sampled Area
Wetland Hydrology Present?	Yes ( )	No (•)	**within a Wetland?** Yes ( ) No (•)

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1. Basin big sage (Artemisia tridentata)	10	Yes	Not Listed
2.			
3.			
4.			
5.			
Total Cover:	10 %		
Herb Stratum			
1. Short pod mustard (Hirschfeldia incana)	1		Not Listed
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	1 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum ____ % % Cover of Biotic Crust ____ %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species	11	x 5 =	55
Column Totals:	11	(A)	55 (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ( ) No (•)

Remarks:

SOIL

Sampling Point: S3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-6+							Sand	10 YR 6/6 dry color

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks: No hydric characteristics observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☒ Sediment Deposits (B2) (**Riverine**)
- ☒ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Evidence of past water flow observed.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: LM Aero Alternative Energy Project | City/County: Los Angeles | Sampling Date: 07/01/19

Applicant/Owner: Lockheed Martin Aeronautics Company-Palmdale | State: CA | Sampling Point: S4

Investigator(s): S. Pacheco | Section, Township, Range: 13, T6N, R12W

Landform (hillslope, terrace, etc.): Antelope Valley | Local relief (concave, convex, none): None | Slope (%): ~2%

Subregion (LRR): C - Mediterranean California | Lat: -118.110438 | Long: 34.607133 | Datum: NAD 83

Soil Map Unit Name: Rosamond loam | NWI classification: Riverine (R4SBJ)

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ( )	No (●)
Hydric Soil Present?	Yes ( )	No (●)
Wetland Hydrology Present?	Yes ( )	No (●)

Is the Sampled Area within a Wetland? **Yes** ( ) **No** (●)

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1. Basin big sage (Artemisia tridentata)	10	Yes	Not Listed
2.			
3.			
4.			
5.			
Total Cover:	10 %		
Herb Stratum			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum ____ % | % Cover of Biotic Crust ____ %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species	10	x 5 =	50
Column Totals:	10	(A)	50 (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ( ) **No** (●)

Remarks:

SOIL

Sampling Point: S4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-6+							Sand	10 YR 6/6 dry color

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- [ ] Histosol (A1)
- [ ] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [ ] Hydrogen Sulfide (A4)
- [ ] Stratified Layers (A5) (**LRR C**)
- [ ] 1 cm Muck (A9) (**LRR D**)
- [ ] Depleted Below Dark Surface (A11)
- [ ] Thick Dark Surface (A12)
- [ ] Sandy Mucky Mineral (S1)
- [ ] Sandy Gleyed Matrix (S4)
- [ ] Sandy Redox (S5)
- [ ] Stripped Matrix (S6)
- [ ] Loamy Mucky Mineral (F1)
- [ ] Loamy Gleyed Matrix (F2)
- [ ] Depleted Matrix (F3)
- [ ] Redox Dark Surface (F6)
- [ ] Depleted Dark Surface (F7)
- [ ] Redox Depressions (F8)
- [ ] Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- [ ] 1 cm Muck (A9) (**LRR C**)
- [ ] 2 cm Muck (A10) (**LRR B**)
- [ ] Reduced Vertic (F18)
- [ ] Red Parent Material (TF2)
- [ ] Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◯ No ◉

Remarks: No hydric characteristics observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- [ ] Surface Water (A1)
- [ ] High Water Table (A2)
- [ ] Saturation (A3)
- [ ] Water Marks (B1) (**Nonriverine**)
- [ ] Sediment Deposits (B2) (**Nonriverine**)
- [ ] Drift Deposits (B3) (**Nonriverine**)
- [ ] Surface Soil Cracks (B6)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Salt Crust (B11)
- [ ] Biotic Crust (B12)
- [ ] Aquatic Invertebrates (B13)
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Plowed Soils (C6)
- [ ] Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- [ ] Water Marks (B1) (**Riverine**)
- [x] Sediment Deposits (B2) (**Riverine**)
- [x] Drift Deposits (B3) (**Riverine**)
- [ ] Drainage Patterns (B10)
- [ ] Dry-Season Water Table (C2)
- [ ] Thin Muck Surface (C7)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◯	No ◉	Depth (inches):
Water Table Present?	Yes ◯	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ◯	No ◉	Depth (inches):

Wetland Hydrology Present? Yes ◯ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Evidence of past water flow observed.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: LM-Aero Alternative Energy Project City/County: Los Angeles Sampling Date: 07/01/19

Applicant/Owner: Lockheed Martin Aeronautics Company-Palmdale State: CA Sampling Point: S5

Investigator(s): S. Pacheco Section, Township, Range: 13, T6N, R12W

Landform (hillslope, terrace, etc.): Antelope Valley Local relief (concave, convex, none): None Slope (%): ~2%

Subregion (LRR): C - Mediterranean California Lat: -118.110052 Long: 34.608394 Datum: NAD 83

Soil Map Unit Name: Hesperia fine sandy loam NWI classification: Riverine (R4SBJ)

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ( )	No (●)
Hydric Soil Present?	Yes ( )	No (●)
Wetland Hydrology Present?	Yes (●)	No ( )

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1. Basin big sage (Artemisia tridentata)	100	Yes	Not Listed
2.			
3.			
4.			
5.			
Total Cover:	100%		
Herb Stratum			
1. Ripgut brome (Bromus diandrus)	10		Not Listed
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	10 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum ___ % % Cover of Biotic Crust ___ %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species	110	x 5 =	550
Column Totals:	110	(A)	550 (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

- Dominance Test is >50%
- Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ( ) No (●)

Remarks: Understory is dominated by non-native grasses.

SOIL

Sampling Point: S5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-6+							Sand	10 YR 6/6 dry color

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks: No hydric characteristics observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☒ Drift Deposits (B3) (**Riverine**)
- ☒ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Evidence of past water flow observed.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: LM Aero Alternative Energy Project City/County: Los Angeles Sampling Date: 07/01/19

Applicant/Owner: Lockheed Martin Aeronautics Company-Palmdale State: CA Sampling Point: S6

Investigator(s): S. Pacheco Section, Township, Range: 13, T6N, R12W

Landform (hillslope, terrace, etc.): Antelope Valley Local relief (concave, convex, none): None Slope (%): ~2%

Subregion (LRR): C - Mediterranean California Lat: -118.107752 Long: 34.609385 Datum: NAD 83

Soil Map Unit Name: Rosamond loam NWI classification: Riverine (R4SBJ)

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ( )	No (●)
Hydric Soil Present?	Yes ( )	No (●)
Wetland Hydrology Present?	Yes ( )	No (●)

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1. Basin big sage (Artemisia tridentata)	10	Yes	Not Listed
2.			
3.			
4.			
5.			
Total Cover:	10 %		
Herb Stratum			
1. Ripgut brome (Bromus diandrus)	1		Not Listed
2. Short pod mustard (Hirschfeldia incana)	1		Not Listed
3. Common fiddleneck (Amsinckia menziesii)	1		Not Listed
4. Russian thistle (Salsola tragus)	1		Not Listed
5.			
6.			
7.			
8.			
Total Cover:	4 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum ____ % % Cover of Biotic Crust ____ %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species	14	x 5 =	70
Column Totals:	14	(A)	70 (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ( ) No (●)

Remarks:

SOIL

Sampling Point: S6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-6+							Sand	10 YR 6/6 dry color

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks: No hydric characteristics observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
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- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☒ Sediment Deposits (B2) (**Riverine**)
- ☒ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Evidence of past water flow observed.

APPENDIX E CULTURAL RESOUCES SURVEY (CONFIDENTIAL)

APPENDIX F PRELIMINARY GEOTECHNICAL REPORT

GEOTECHNICAL ENGINEERING INVESTIGATION REPORT
LOCKHEED MARTIN PALMDALE SOLAR PROJECT
PALMDALE, CALIFORNIA

BSK PROJECT G19-139-11B

PREPARED FOR:

BURNS & MCDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114

AUGUST 15, 2019

GEOTECHNICAL ENGINEERING INVESTIGATION REPORT
LOCKHEED MARTIN PALMDALE SOLAR PROJECT
PALMDALE, CALIFORNIA

Prepared for:

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Bakersfield Project: G19-139-11B

August 15, 2019

Prepared by:

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Appendices

1. INTRODUCTION

This report presents the results of a Geotechnical Engineering Investigation Report conducted by BSK Associates (BSK), for the Lockheed Martin Palmdale Solar Project in Palmdale, California (Site). The Site is located at the greenfield land at the Lockheed Martin Palmdale facility located at 1011 Lockheed Way in Palmdale, California, as shown on the Site Vicinity Map, Figure A-1. The geotechnical engineering investigation was conducted in accordance with BSK Proposal GB19-18562, dated June 25, 2019.

This report provides a description of the geotechnical conditions at the Site and provides specific recommendations for earthwork and foundation design with respect to the planned structures. In the event that changes occur in the design of the project, this report's conclusions and recommendations will not be considered valid unless the changes are reviewed with BSK and the conclusions and recommendations are modified or verified in writing. Examples of such changes would include location, size of structures, foundation loads, etc.

1.1. Planned Construction

BSK understands that the site is located at the 160 acres of greenfield land at the Lockheed Martin Palmdale Facility in Palmdale, California. The proposed solar racking system will be a single axis tracker with a total system size of 25 MW. There will be a new associated switchyard and either an overhead or underground transmission line to tie into the Southern California Edison grid. Paved and unpaved roads around and through the site are also planned. BSK understands that the total system size will be 25 MW AC.

In the event that significant changes occur in the design of the proposed improvements, this report's conclusions and recommendations will not be considered valid unless the changes are reviewed with BSK and the conclusions and recommendations are modified or verified in writing.

1.2. Purpose and Scope of Services

The objective of this geotechnical investigation was to characterize the subsurface conditions in the areas of the proposed structures, and provide geotechnical engineering recommendations for the preparation of plans and specifications and bearing and lateral earth pressure conditions. The scope of the investigation included a field exploration, laboratory testing, field resistivity testing, thermal resistivity testing, engineering analyses, and preparation of this report.

2. FIELD INVESTIGATION AND LABORATORY TESTING

2.1. Field Exploration

The field exploration for this investigation was conducted under the oversight of a BSK staff member. A total of fourteen (14) borings were drilled at the site on July 9, 2019 and July 10, 2019 using a CME 75 Drill Rig provided by Baja Exploration. The borings were drilled to a maximum depth of 51.5 feet beneath the existing ground surface (bgs).

The soil materials encountered in the Borings were visually classified in the field, and the logs were recorded during the drilling and sampling operations. Visual classification of the materials encountered in the borings was made in general accordance with the Unified Soil Classification System (ASTM D 2488). A soil classification chart is presented in Appendix A.

Boring logs are presented in Appendix A and should be consulted for more details concerning subsurface conditions. Stratification lines were approximated by the field staff based on observations made at the time of drilling, while the actual boundaries between soil types may be gradual and soil conditions may vary at other locations.

2.2 Laboratory Testing

Laboratory tests were performed on selected soil samples to evaluate moisture content, dry density, moisture density relationship, shear strength, collapse/consolidation potential, thermal resistivity, fines content, and corrosion characteristics. A description of the laboratory test methods and results are presented in Appendix B.

2.3 Field Resistivity

Field resistivity tests were performed on-site in accordance with ASTM G57. Approximate field resistivity test locations are presented in Figure A-3 and the results are presented in Figure A-5.

2.4 Thermal Resistivity

Representative soil samples were evaluated for thermal resistivity of soil using accepted test methods and the results are presented in Appendix D. The samples were taken at Boring B-13.

3. SITE GEOLOGY/SEISMICITY CONDITIONS

The following sections address the Site descriptions and surface conditions, regional geology and seismic hazards, subsurface conditions, and groundwater conditions at the Site. This information is based on BSK's field exploration and published maps and reports.

3.1. Site Description and Surface Conditions

The Site is located at the greenfield land at the Lockheed Martin Palmdale Facility in Palmdale, California. The proposed solar structures will be located in an empty field located to the southeast of the facility. The Site surface is currently dry silty sand. The Site is located in Township 6 North, and Range 12 West of the San Bernardino Meridian. The WGS84 GPS coordinates for the center of the Site are 34.6059 degrees North latitude and 118.1076 degrees West longitude.

3.2. Regional Geology and Seismic Hazards Assessment

Our Scope of services included a review of published maps and reports to assess the regional geology and potential for seismic hazards.

3.2.1 Regional Geology

The Site is located in Mojave Desert geomorphic province. The Mojave Desert is characterized by block-faulted mountain ranges and intervening valleys. Broad alluvial fans have formed along the transition of the ranges and valleys. The western part of the Mohave Desert is bounded by two major active faults, the Garlock Fault to the north and the San Andreas Fault to the south.

3.2.2 Seismic Hazards Assessment

The types of geologic and seismic hazards assessed include surface ground fault rupture, liquefaction, seismically induced settlement, slope failure, flood hazards and inundation hazards.

The purpose of the Alquist-Priolo Geologic Hazards Zones Act, as summarized in CDMG Special Publication 42 (SP 42), is to "prohibit the location of most structures for human occupancy across the traces of active faults and to mitigate thereby the hazard of fault-rupture." As indicated by SP 42, "the State Geologist is required to delineate "earthquake fault zones" (EFZs) along known active faults in California. Cities and counties affected by the zones must regulate certain development 'projects' within the zones. They must withhold development permits for sites within the zones until geologic investigations demonstrate that the sites are not threatened by surface displacement from future faulting.

The Site is not located in a Fault-Rupture Hazard Zone. The closest Fault-Rupture Hazard Zone is associated with the San Andreas Fault located approximately 2.5 miles south of the Site.

Zones of Required Investigation referred to as "Seismic Hazard Zones" in CCR Article 10, Section 3722, are areas shown on Seismic Hazard Zone Maps where site investigations are required to determine the need for mitigation of potential liquefaction and/or earthquake-induced landslide ground displacements. There are no mapped areas that have Seismic Hazard Zones in the project area.

3.3 Subsurface Conditions

The subsurface material generally consisted of fine to coarse grained gravelly silty sand in the upper 5 feet. The material varies from gravelly silty sand, clayey silty sand, and silty clayey sand through out to the bottom of the boreholes.

Based on the results of the consolidation test, the on-site soils below 5 feet are considered to have a low potential for hydrocompaction.

The boring logs in Appendix A provide a more detailed description of the materials encountered, including the applicable Unified Soil Classification System symbols.

3.4 Groundwater Conditions

At the time of the field exploration in July 2019, groundwater was not encountered in our soil borings completed to a depth of 51.5 below the ground surface (bgs). To ascertain groundwater levels for the area during other time periods, groundwater elevation data from the California Department of Water Resources (DWR) were obtained for the period 1955 to 1980. Water level hydrographs from wells in the vicinity Site are presented on Appendix C, Figure C-2. The hydrographs indicate that, in the vicinity of the Site, the historical shallowest depth to groundwater was approximately 290 feet below the ground surface (bgs).

Please note that the groundwater level may fluctuate both seasonally and from year to year due to variations in rainfall, temperature, pumping from wells and possibly as the result of other factors such as irrigation, that were not evident at the time of our investigation.

4. CONCLUSIONS AND RECOMMENDATIONS

Based upon the data collected during this investigation, and from a geotechnical engineering standpoint, it is our opinion that the soil conditions would not preclude the construction of the proposed improvements.

The proposed improvements may be supported on shallow or mat foundations or driven piles if the recommendations presented herein are incorporated into the design and construction of the project. Difficult pile driving should be anticipated due to gravel and very dense soil.

4.1 Seismic Design Criteria

Based on Section 1613.3.2 of the 2016 California Building Code (CBC), the Site shall be classified as Site Class A, B, C, D, E or F based on the Site soil properties and in accordance with Chapter 20 of ASCE 7-10. Based on the "N" values from our soil Borings, as per Table 20.3-1 of ASCE 7-10, the Site is Class D ($15 \leq N \leq 50$).

The 2016 California Building Code (CBC) utilizes ground motion based on the Risk-Targeted Maximum Considered Earthquake (MCER) that is defined in the 2016 CBC as the most severe earthquake effects considered by this code, determined for the orientation that results in the largest maximum response to horizontal ground motions and with adjustment for targeted risk. Ground motion parameters in the 2016 CBC are based on ASCE 7-10, Chapter 11.

The United States Geologic Survey (USGS) has prepared maps presenting the Risk-Targeted MCE spectral acceleration (5 percent damping) for periods of 0.2 seconds (S_S) and 1.0 seconds (S_1). The values of S_S and S_1 can be obtained from the OSHPD Seismic Design Maps Application available at: https://seismicmaps.org/.

The OSHPD Seismic Design Maps Application and Chapter 16 of the 2016 CBC based on ASCE 7-10 produced the spectral acceleration parameters risk targeted maximum considered earthquake values in Table 1 based on Site Class D conditions.

As per Section 1803.5.12 of the CBC, peak ground acceleration (PGA) utilized for dynamic lateral earth pressures and liquefaction, shall be based on a site-specific study (ASCE 7-10, Section 21.5) or ASCE 7-10, Section 11.8.3. The OSHPD Seismic Design Maps Application and based on ASCE 7-10, Section 11.8.3 produced the Geometric Mean PGA value in Table 1 based on Site Class D conditions.

Table 1: Seismic Design Parameters			
Seismic Design Parameter	**2016 CBC Value**		**Reference**
MCE Mapped Spectral Acceleration (g)	S_S = 1.924	S_1 = 0.915	USGS Mapped Value
Amplification Factors (Site Class D)	F_a = 1.000	F_v = 1.500	Table 1613.3.3
Site Adjusted MCE Spectral Acceleration (g)	S_{MS} = 1.924	S_{M1} = 1.373	Equations 16-37, 38
Design Spectral Acceleration (g)	S_{DS} = 1.283	S_{D1} = 0.915	Equations 16-39, 40
Geometric Mean PGA (g)	PGA = 0.754		ASCE Equations 11.8-1

As shown above, the short period design spectral response acceleration coefficient, S_{DS}, is greater than 0.5, therefore the Site lies in Seismic Design Category D as specified in Section 1613.3.5 of the 2016 CBC. The long period design spectral response acceleration coefficient, S_1, is greater than 0.75, therefore the Site lies in Seismic Design Category E, based on Risk Category III. When S1 is greater or equal to 0.75g, the Seismic Design Category is E for buildings in Risk Categories I, II, and III, and for F for those in Risk Category IV. In accordance with the 2016 CBC, each structure shall be assigned to the more severe seismic design category in accordance with Table 1613.3.5(1) or 1613.3.5(2), irrespective of the fundamental period of vibration of the structure.

4.2 Soil Corrosivity

A surface soil sample obtained from the Site was tested to provide a preliminary screening of the potential for concrete deterioration or steel corrosion due to attack by soil-borne soluble salts. The corrosivity evaluation was performed by BSK on soil samples obtained at the time of drilling. The soil was evaluated for minimum resistivity (ASTM G57), pH (ASTM D4972), and soluble sulfate and chlorides (CT 417 and CT 422). The test results are presented in Appendix B.

The water-soluble sulfate content severity class is considered not severe to concrete (Exposure Category S0 per Table 4.2.1 of ACI 318-11). Representative samples of the Site soil in the vicinity has a minimum resistivity ranging from 610 ohm-cm to 17,000 ohm-cm which is considered very severely corrosive to very mildly corrosive, respectively, to buried metal conduit. Therefore, buried metal conduits, ferrous metal pipes, and exposed steel should have a protective coating in accordance with the manufacturer's specification.

4.3 Site Preparation Recommendations

The following procedures must be implemented during Site preparation for the proposed Site improvements. References to maximum dry density, optimum moisture content, and relative compaction are based on ASTM D 1557 (latest test revision) laboratory test procedures.

1. The areas of proposed improvements must be cleared of surface vegetation and debris. Materials resulting from the clearing and stripping operations must be removed and properly disposed of off-site. In addition, all undocumented fills should be removed where encountered and where fills or structural improvements will be placed.

2. Where existing utilities, inlets, or underground tanks are present, they should be removed to a point at least 2 feet horizontally outside the proposed foundation and pavement areas. Resultant cavities must be backfilled with engineered fill compacted in accordance with the recommendations presented in this report.
3. Following the stripping operations, the areas where shallow foundations are proposed must be overexcavated to a minimum depth of two feet below existing site grades or one foot below the bottom of the footing elevation, whichever is deeper. Over excavation should extend laterally three feet beyond the edge of foundations for shallow footings. After overexcavation, the bottom of the exposed soil should be scarified 12 inches, moisture conditioned to near optimum moisture content, and compacted to 90% of ASTM D1557. We recommend that non-expansive soil (EI < 20) be used below the bottom of shallow foundations.
4. Following the required stripping and overexcavation, in the areas of proposed shallow foundations, the exposed ground surface at the bottom of the overexcavation must be inspected by the Geotechnical Engineer to evaluate if loose or soft zones are present that will require additional overexcavation.
5. Imported soil or native excavated soils, free of organic materials or deleterious substances, may be placed as compacted engineered fill. The material must be free of oversized fragments greater than 3-inches in greatest dimension. Engineered fill must be placed in uniform layers not exceeding 8-inches in loose thickness, moisture conditioned to near optimum moisture content, and compacted to at least 90 percent relative compaction. Engineered fill placed on fill slopes must be placed in uniform layers not exceeding 8-inches in loose thickness, moisture conditioned to near optimum moisture content, and compacted to at least 90 percent of relative compaction.
6. BSK must be called to the site to verify the import material properties through laboratory testing.
7. If possible, earthwork operations should be scheduled during a dry, warm period of the year. Should these operations be performed during or shortly following periods of inclement weather, unstable soil conditions may result in the soils exhibiting a “pumping” condition. This condition is caused by excess moisture in combination with moving construction equipment, resulting in saturation and zero air voids in the soils. If this condition occurs, the adverse soils will need to be over-excavated to the depth at which stable soils are encountered, and replaced with suitable soils compacted as engineered fill. Alternatively, the Contractor may proceed with grading operations after utilizing a method to stabilize the soil subgrade, which should be subject to review and approval by BSK prior to implementation.
8. Import fill materials must be free from organic materials or deleterious substances. The project specifications must require the contractor to contact BSK to review the proposed import fill materials for conformance with these recommendations at least one week prior to importing to the Site, whether from on-site or off-site borrow areas. Imported fill soils must be non-hazardous and derived from a single, consistent soil type source conforming to the following criteria:

Plasticity Index:	< 12
Expansion Index:	< 20 (Very Low Expansion Potential)
Maximum Particle Size:	3 inches
Percent Passing #4 Sieve:	65 - 100
Percent Passing #200 Sieve:	20 - 45
Low Corrosion Potential:	Soluble Sulfates < 1,500 ppm
	Soluble Chlorides < 150 ppm
	Minimum Resistivity > 3,000 ohm-cm

4.4 Foundations

Provided the recommendations contained in this report are implemented during design and construction, it is our opinion that the structures can be supported on shallow or mat foundations or pole-type foundations. A structural engineer should evaluate reinforcement, embedment depth and post diameter based on the requirements for the structural loadings, shrinkage and temperature stresses.

4.4.1 Shallow Foundations

Continuous and isolated spread footings must have a minimum width of 12 inches and 24 inches, respectively. Continuous footing foundations may be designed using a net allowable bearing pressure of 3,000 pounds per square foot (psf). Isolated spread footing foundations may be designed using a net allowable bearing pressure of 3,000 psf. The net allowable bearing pressure applies to the dead load plus live load (DL + LL) condition; it may be increased by 1/3 for wind or seismic loads. Total foundation settlements are expected to be less than 0.5 inches and differential settlements between similarly loaded (DL + LL) and sized footings are anticipated to be less than 0.25 inches. Differential settlement of continuous footings, expressed in terms of angular distortion, is estimated to be approximately 1/600. For slab on grades, a soil modulus of 200 pci may be used for design.

4.4.2 Mat Foundations

We understand that the structure may be supported on a concrete mat foundation. The mat foundation may be designed to impose a maximum allowable pressure of 3,000 psf due to dead plus live loads. This value may be increased by one-third for transient loads such as seismic or wind. The concrete mat foundation should be embedded at least 8 inches below the lowest adjacent grade.

Settlements: Based on the results of our laboratory tests and analyses, total static settlements of the mat foundation under the allowable bearing pressure are expected to be approximately 1-inch, and maximum differential settlements are expected to be about 1/2-inch.

4.4.3 Pole-Type Foundations

It is anticipated that the structures will be supported on driven piles. This type of foundation should be designed in accordance with Section 1807.3.2 of the 2016 CBC. However, it is recommended that an allowable lateral soil bearing pressure of 320 psf per foot of embedment be used to develop parameters S1 and S3 rather than one of the values given in Table 1806.2. This value includes a factor of safety of 2. The upper foot of soil should be ignored when calculating the minimum embedment depth.

The allowable lateral bearing pressure includes a factor of 2 and may be doubled according to the CBC Section 1806.3.4 for pole type foundations not adversely affected by ½ inch of movement at the ground surface. The lateral bearing pressure is permitted to be increased by 1/3 where used with the alternative basic load combinations of CBC Section 1605A.3.2 that include wind or earthquake loads. The lateral bearing pressure shall be permitted to be increased for each additional foot of embedment up to a maximum of 8 times the allowable bearing pressure.

To support vertical loads applied to the pile foundations, an allowable static downward skin friction value of 250 psf may be used, which includes a factor of safety of 1.5, per the 2016 CBC. The total settlement of pole foundations designed in accordance with these recommendations should not exceed one-half inch.

Where uplift is due to wind or seismic loading, an allowable skin friction of 200 psf may be used, which includes a factor of safety of 1.5, to resist transient uplift loads, per the 2016 CBC. Skin friction may be increased by 1/3 where used with the alternative basic load combinations of CBC Section 1605A.3.2 that include wind or earthquake loads. The weight of the pile may be taken into consideration when determining resistance to uplift loads.

Please note, the outside perimeter of the pile may be used in skin friction calculation and the upper 1 (one) foot of soil should be neglected.

We have provided the modulus of subgrade reaction, 120 pci, for the structural designers to use in their LPILE analysis. We recommend using the LPILE's Reese et al., 1974 option for the p-y curve soil model in the Soil Layers dialog box for site. The following soil parameters may be used in the analysis:

Table 2: LPILE Input Parameters	
Soil Type	Silty Sand
p-y curve model	Reese et al., 1974
Internal Friction Angle, degrees	33
Effective Unit Weight, pcf	115
Elastic Subgrade Reaction, pci	120

4.5 Lateral Earth Pressures and Frictional Resistance

Provided the Site is prepared as recommended above, the following earth pressure parameters for footings may be used for design purposes. The parameters shown in the following table are for drained conditions of select engineered fill or undisturbed native soil.

Table 3: Recommended Static Lateral Earth Pressures for Footings	
Lateral Pressure Condition	**Equivalent Fluid Density (pcf) Drained Condition**
Active Pressure	30
At Rest Pressure	40
Passive Pressure	640

The lateral earth pressures listed herein are obtained by the conventional equation for active, at rest, and passive conditions assuming level backfill and a bulk unit weight of 115 pcf for the Site soils. A coefficient of friction of 0.40 may be used between soil sub-grade and the bottom of footings.

The coefficient of friction and passive earth pressure values given above represent ultimate soil strength values. BSK recommends that a safety factor consistent with the design conditions be included in their usage in accordance with Sections 1806.3.1 through 1806.3.3 of the 2016 CBC. For stability against lateral sliding that is resisted solely by the passive earth pressure against footings or friction along the bottom of footings, a minimum safety factor of 1.5 is recommended. For stability against lateral sliding that is resisted by combined passive pressure and frictional resistance, a minimum safety factor of 2.0 is recommended. For lateral stability against seismic loading conditions, a minimum safety factor of 1.2 is recommended.

4.6 Excavation Stability

Soils encountered within the depth explored are generally classified as Type C soils in accordance with OSHA (Occupational Safety and Health Administration). The slopes surrounding or along temporary excavations may be vertical for excavations that are less than five feet deep and exhibit no indication of potential caving, but should be no steeper than 1.5H:1V for excavations that are deeper than five feet, up to a maximum depth of 15 feet. Certified trench shields or boxes may also be used to protect workers during construction in excavations that have vertical sidewalls and are greater than 5 feet deep. Temporary excavations for the project construction should be left open for as short a time as possible and should be protected from water runoff. In addition, equipment and/or soil stockpiles must be maintained at least 10 feet away from the top of the excavations. Because of variability in soils, BSK must be afforded the opportunity to observe and document sloping and shoring conditions at the time of construction. Slope height, slope inclination, and excavation depths (including utility trench excavations) must in no case exceed those specified in local, state, or federal safety regulations, (e.g., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations).

4.7 Trench Backfill and Compaction

Processed on-Site soils, which are free of organic material, are suitable for use as general trench backfill above the pipe envelope. Native soil with particles less than three inches in the greatest dimension may be incorporated into the backfill and compacted as specified above, provided they are properly mixed into a matrix of friable soils. The backfill must be placed in thin layers not exceeding 12 inches in loose thickness, be well-blended and consistent texture, moisture conditioned to at least optimum moisture content, and compacted to at least 90 percent of the maximum dry density as determined by the ASTM

D1557. The uppermost 12 inches of trench backfill below pavement sections must be compacted to at least 95 percent of the maximum dry density as determined by ASTM D1557. Moisture content within two percent of optimum must be maintained while compacting this upper 12-inch trench backfill zone. We recommend that trench backfill be tested for compliance with the recommended Relative Compaction and moisture conditions. Field density testing should conform to ASTM Test Methods D1556 or D6938. We recommend that field density tests be performed in the utility trench bedding, envelope and backfill for every vertical lift, at an approximate longitudinal spacing of not greater than 150 feet. Backfill that does not conform to the criteria specified in this section should be removed or reworked, as applicable over the trench length represented by the failing test so as to conform to BSK recommendations.

4.8 Drainage Considerations

The control surface drainage in the project areas is an important design consideration. BSK recommends that final grading around shallow foundations must provide for positive and enduring drainage away from the structures, and ponding of water must not be allowed around, or near the shallow foundations. Ground surface profiles next to the shallow foundations must have at least a 2 percent gradient away from the structures.

4.9 Pavement Recommendations

BSK performed a R-Value Tests on two soil samples that BSK collected on July 9, 2019 and July 10, 2019. BSK has presented the R-Value test results in Table 4, *R-Value Test Result*.

Table 4: R-Value Test Result

Location	R-Value
B-5 @ 0-5 feet bgs	41
B-13 @ 0-5 feet bgs	37

BSK calculated the conventional pavement section thicknesses using a subgrade R-Value of 37 and Traffic Indices of 4, 5, 6, and 7. BSK has presented a summary of its pavement section thickness' recommendations in Table 5, *Conventional Pavement Section Recommendations*.

Table 5: Conventional Pavement Section Recommendations

Traffic Index	Asphalt Concrete Thickness (inches)	Aggregate Base Thickness (inches)	Total Pavement Section Thickness (inches)
4	2	5	7
5	3	5	8
6	3	6	9
7	4	8	12

BSK recommends the contractor scarify the subgrade soil 8-inches, moisture condition it to within 2% of optimum and recompact it to at least 90% of the maximum dry density per ASTM D1557 prior to placing the new aggregate base section. BSK also recommends the contractor moisture condition the aggregate base within 2% of optimum and compact it to at least 90% of the maximum dry density per ASTM D1557 prior to placing the asphalt pavement section.

4.10 Access Road Pavement

For emergency vehicle access with limited use, BSK recommends a minimum 1-inch layer of aggregate may be spread over the surface of the access road then scarified and mixed into the subgrade soils and compacted to at least 95 percent of the maximum dry density per ASTM D1557.

5. PLANS AND SPECIFICATIONS REVIEW

BSK recommends that it be retained to review the draft plans and specifications for the project, with regard to foundations and earthwork, prior to their being finalized and issued for construction bidding.

6. CONSTRUCTION TESTING AND OBSERVATIONS

Geotechnical testing and observation during construction is a vital extension of this geotechnical investigation. BSK recommends that it be retained for those services. Field review during Site preparation and grading allows for evaluation of the exposed soil conditions and confirmation or revision of the assumptions and extrapolations made in formulating the design parameters and recommendations. BSK's observations must be supplemented with periodic compaction tests to establish substantial conformance with these recommendations. BSK must also be called to the Site to observe foundation excavations, prior to placement of reinforcing steel or concrete, in order to assess whether the actual bearing conditions are compatible with the conditions anticipated during the preparation of this report. BSK must also be called to the Site to observe placement of foundation and slab concrete.

If a firm other than BSK is retained for these services during construction, then that firm must notify the owner, project designers, governmental building officials, and BSK that the firm has assumed the responsibility for all phases (i.e., both design and construction) of the project within the purview of the geotechnical engineer. Notification must indicate that the firm has reviewed this report and any subsequent addenda, and that it either agrees with BSK's conclusions and recommendations, or that it will provide independent recommendations.

7. LIMITATIONS

The analyses and recommendations submitted in this report are based upon the data obtained from the Borings performed at the locations shown on the Boring Location Map, Figure A-2. The report does not reflect variations which may occur between or beyond the Borings. The nature and extent of such variations may not become evident until construction is initiated. If variations then appear, a re-evaluation of the recommendations of this report will be necessary after performing on-Site observations during the excavation period and noting the characteristics of the variations.

The validity of the recommendations contained in this report is also dependent upon an adequate testing and observation program during the construction phase. BSK assumes no responsibility for construction compliance with the design concepts or recommendations unless it has been retained to perform the testing and observation services during construction as described above.

The findings of this report are valid as of the present. However, changes in the conditions of the Site can occur with the passage of time, whether caused by natural processes or the work of man, on this property or adjacent property. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation, governmental policy or the broadening of knowledge.

BSK has prepared this report for the exclusive use of the Client and members of the project design team. The report has been prepared in accordance with generally accepted geotechnical engineering practices which existed in Los Angeles County at the time the report was written. No other warranties either expressed or implied are made as to the professional advice provided under the terms of BSK's agreement with Client and included in this report.

8. REFERENCES

Department of Water Resources. http://www.water.ca.gov/waterdatalibrary/, Water Data Library, August 2019.

Lee, Norman. California Geomorphic Provinces (2012): n. pag. California Department of Conservation. California Geological Survey. <http://www.conservation.ca.gov/cgs/information/publications/cgs_notes/note_36/Documents/note_36.pdf>.

USGS/OSHPD, U.S. Seismic Design Maps, https://seismicmaps.org/. August 2019.

APPENDIX A

FIELD EXPLORATION

APPENDIX A
FIELD EXPLORATION

The field exploration for this investigation was conducted under the oversight of a BSK staff member. A total of fourteen (14) borings were drilled at the site on July 9, 2019 and July 10, 2019 using a CME 75 Drill Rig provided by Baja Exploration. The borings were drilled to a maximum depth of 51.5 feet beneath the existing ground surface (bgs).

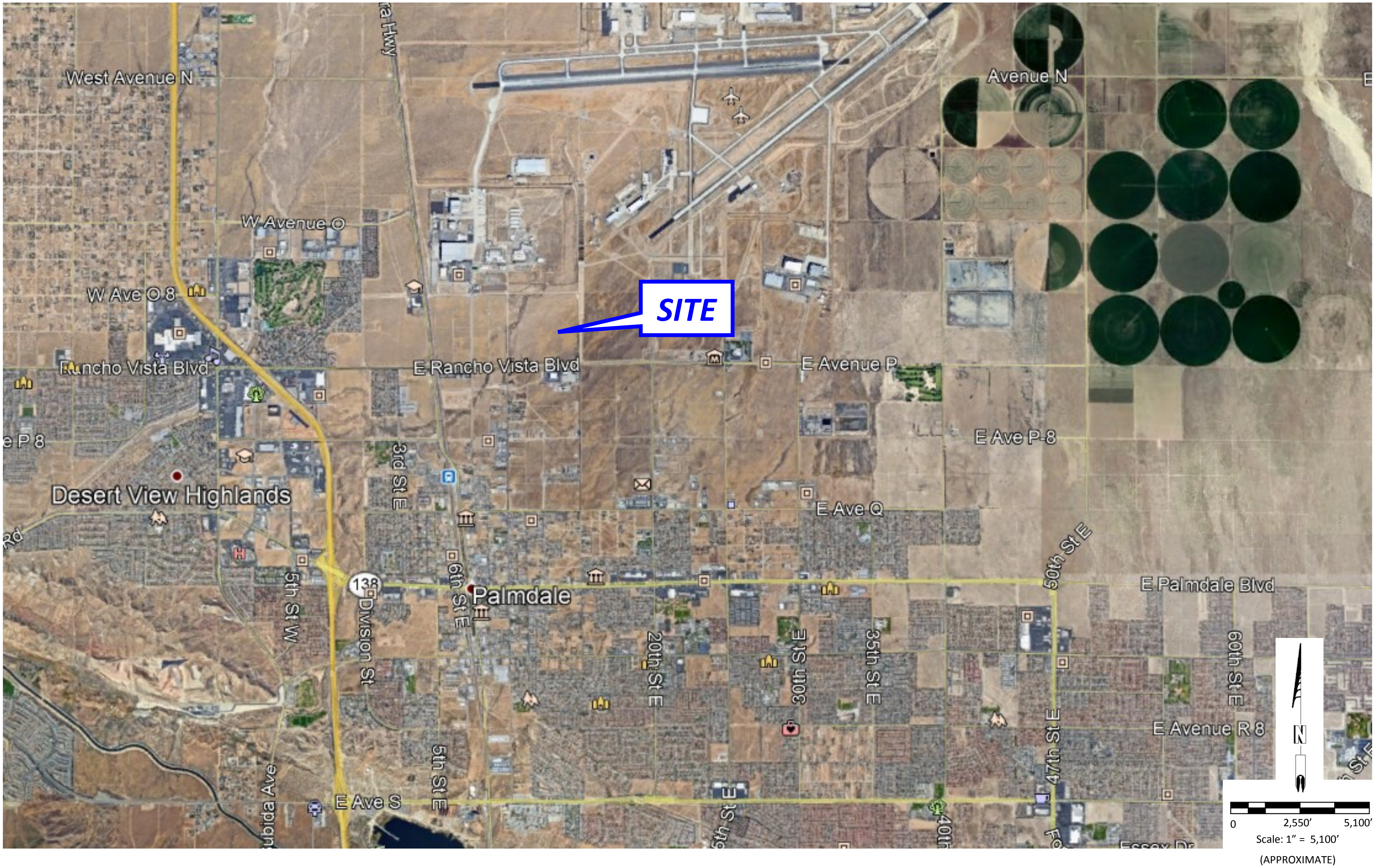
The soil materials encountered in the test borings were visually classified in the field, and the logs were recorded during the drilling and sampling operations. Visual classification of the materials encountered in the test borings was made in general accordance with the Unified Soil Classification System (ASTM D 2488). A soil classification chart is presented herein. Boring logs are presented herein and should be consulted for more details concerning subsurface conditions. Stratification lines were approximated by the field staff based on observations made at the time of drilling, while the actual boundaries between soil types may be gradual and soil conditions may vary at other locations.

Subsurface samples were obtained at the successive depths shown on the boring logs by driving samplers which consisted of a 2.5-inch inside diameter (I.D.) California Sampler and a 1.4-inch I.D. Standard Penetration Test (SPT) Sampler. The samplers were driven 18 inches using a 140-pound hammer dropped from a height of 30 inches by means of either an automatic hammer or a down-hole safety hammer. The number of blows required to drive the last 12 inches was recorded as the blow count (blows/foot) on the boring logs. The relatively undisturbed soil core samples were capped at both ends to preserve the samples at their natural moisture content. Soil samples were also obtained using the SPT Sampler lined with metal tubes or unlined in which case the samples were placed and sealed in polyethylene bags. At the completion of the field exploration, the test borings were backfilled with the excavated soil cuttings.

It should be noted that the use of terms such as “loose”, “medium dense”, “dense” or “very dense” to describe the consistency of a soil is based on sampler blow count and is not necessarily reflective of the in-place density or unit weight of the soils being sampled. The relationship between sampler blow count and consistency is provided in the following Tables A-1 and A-2 for coarse-grained (sandy and gravelly) soils and fine grained (silty and clayey) soils, respectively.

Table A-1: Consistency of Coarse-Grained Soil by Sampler Blow Count		
Consistency Descriptor	**SPT Blow Count (#Blows / Foot)**	**2.5” I.D. California Sampler Blow Count (#Blows / Foot)**
Very Loose	<4	<6
Loose	4 – 10	6 – 15
Medium Dense	10 – 30	15 – 45
Dense	30 – 50	45 – 80
Very Dense	>50	>80

Table A-2: Apparent Relative Density of Fine-Grained Soil by Sampler Blow Count		
Consistency Descriptor	**SPT Blow Count (#Blows / Foot)**	**2.5” I.D. California Sampler Blow Count (#Blows / Foot)**
Very Soft	<2	<3
Soft	2 – 4	3 – 6
Firm	4 – 8	6 – 12
Very Firm	8 – 15	12 – 24
Hard	15 – 30	24 – 45
Very Hard	>30	>45



REFERENCE IMAGE: Google Earth 2019

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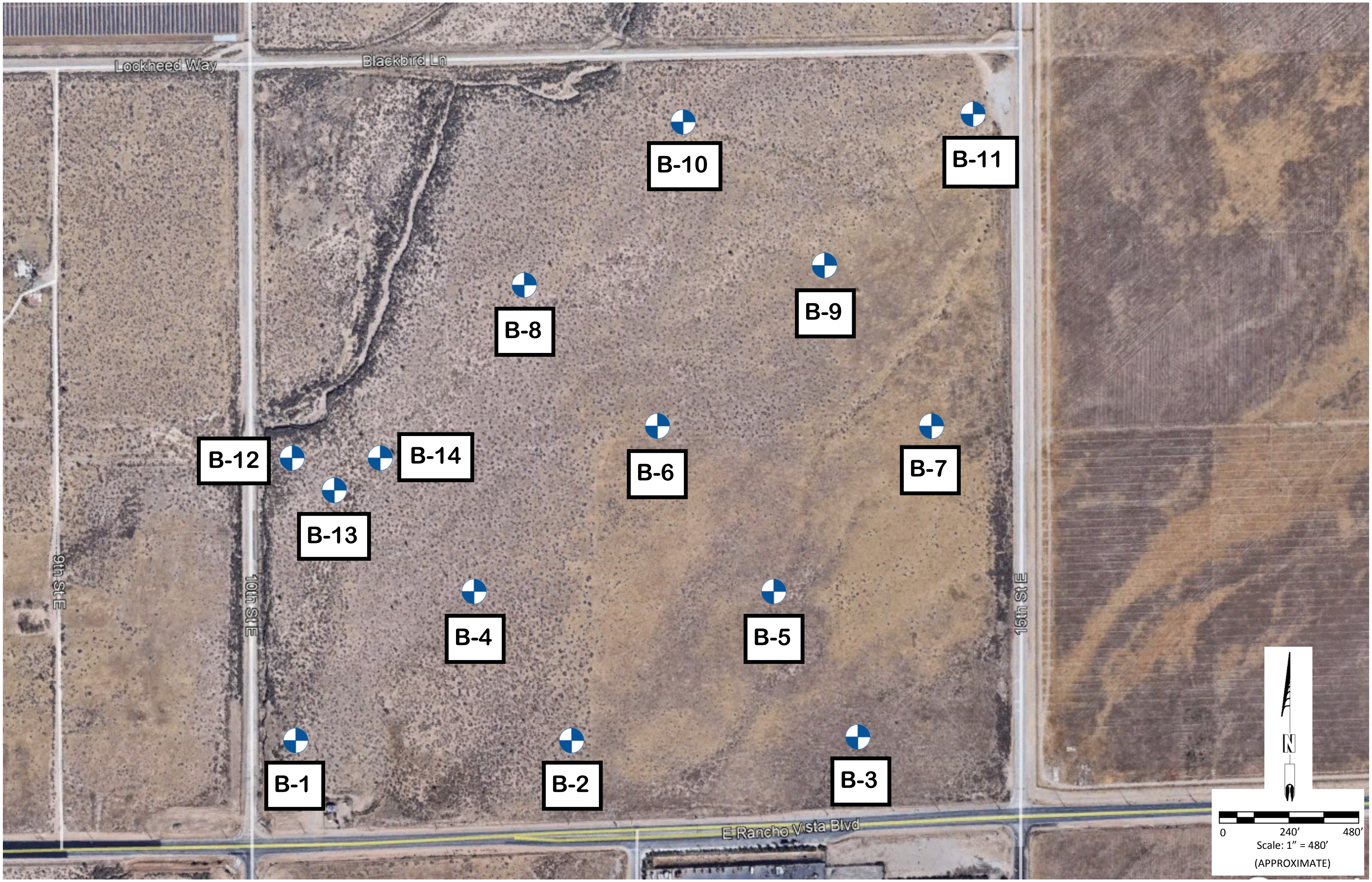
SITE VICINITY MAP

Lockheed Martin Palmdale Solar Project
NE Corner of E Rancho Vista Blvd & 10th Street E
Palmdale, California

FIGURE A-1

JOB NO. G19-139-11B
DATE July 2019
DR. BY LP
CH. BY AXT
SCALE AS SHOWN
SHEET NO. 1
OF 1 SHEETS



REFERENCE IMAGE: Google Earth 2019

LEGEND:

APPROXIMATE BORING LOCATION B-1

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BORING LOCATION MAP

Lockheed Martin Palmdale Solar Project
NE Corner of E Rancho Vista Blvd & 10th Street E
Palmdale, California

FIGURE A-2

JOB NO. G19-139-11B

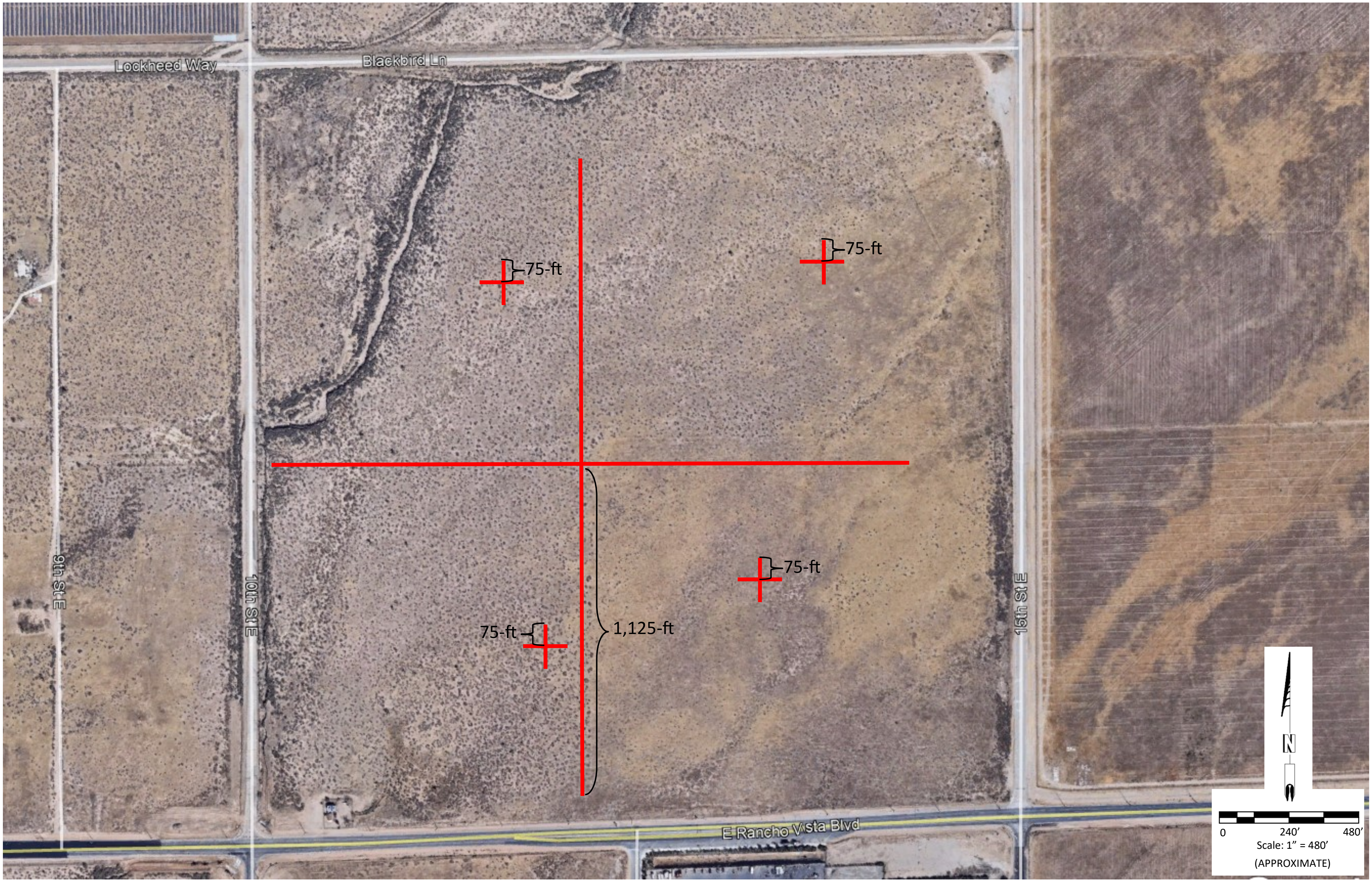
DATE July 2019

DR. BY LP

CH. BY AXT

SCALE AS SHOWN

SHEET NO. 1
OF 1 SHEETS



REFERENCE IMAGE: Google Earth 2019

LEGEND:

APPROXIMATE FIELD RESITIVITY LOCATION

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FIELD RESITIVITY LOCATION MAP

Lockheed Martin Palmdale Solar Project
NE Corner of E Rancho Vista Blvd & 10th Street E
Palmdale, California

FIGURE A-3

JOB NO. G19-139-11B

DATE August 2019

DR. BY AR

CH. BY AXT

SCALE AS SHOWN

SHEET NO. 1
OF 1 SHEETS

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than Half >#200	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL- SAND MIXTURES
		GRAVELS WITH OVER 15% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 15% FINES	SM	SILTY SANDS, POORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS More than Half <#200 sieve	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS , MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

Note: Dual symbols are used to indicate borderline soil classifications.

	Pushed Shelby Tube	RV	R-Value
	Standard Penetration Test	SA	Sieve Analysis
	Modified California	SW	Swell Test
	Auger Cuttings	TC	Cyclic Triaxial
	Grab Sample	TX	Unconsolidated Undrained Triaxial
	Sample Attempt with No Recovery	TV	Torvane Shear
CA	Chemical Analysis	UC	Unconfined Compression
CN	Consolidation	(1.2)	(Shear Strength, ksf)
CP	Compaction	WA	Wash Analysis
DS	Direct Shear	(20)	(with % Passing No. 200 Sieve)
PM	Permeability		Water Level at Time of Drilling
PP	Pocket Penetrometer		Water Level after Drilling (with date measured)

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA
Unified Soil Classification System

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PLATE: Figure A-4

BSK ASSOCIATES

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LOG OF BORING NO. B-01

Project Name: **Lockheed Martin Palmdale Solar Project**
Project Number: **G19-139-11B**
Project Location: **Palmdale, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetro-meter, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Surface: silty sand, light brown, fine to coarse grained.										
		SM: SILTY SAND: light brown, fine to coarse grained, slightly moist, poorly graded, subangular.										
		...loose.			15			110	3			
5		...loose, more coarse, trace of fine gravel.			13				1			
10					53			112	2			
		SP/SM: SAND/ SILTY SAND: reddish brown, fine to coarse grained, dry, dense, poorly graded, angular/ subangular.										
15		...medium dense.			24				2			
		End of boring.										
20												

Completion Depth: 16.5
Date Started: 7/9/19
Date Completed: 7/9/19
California Sampler: 2.4" inner diameter
SPT Sampler: 1.4" inner diameter

Drilling Equipment: CME 75
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with cuttings

LOG OF BORING NO. B-02

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Telephone: (661) 327-0671
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Project Name: **Lockheed Martin Palmdale Solar Project**
Project Number: **G19-139-11B**
Project Location: **Palmdale, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Surface: silty sand, light brown, fine to coarse grained.										
		SM: SILTY SAND: light brown, fine to coarse grained, dry, medium graded, angular/ subangular, trace fine gravel.										
		...loose.			13			118	2			
5		...loose, dry, with fine to coarse gravel, angular, trace cobble.			14				2			
10					20			109	3			
		SM: SILTY SAND: reddish brown, fine to coarse grained, slightly moist, medium dense, poorly graded, subangular, trace fine gravel.										
15		**SM: SILTY SAND:** brown, fine to coarse grained, slightly moist, loose, poorly graded, subangular.			8				4			
		End of boring.										
20												

Completion Depth: 16.5
Date Started: 7/9/19
Date Completed: 7/9/19
California Sampler: 2.4" inner diameter
SPT Sampler: 1.4" inner diameter

Drilling Equipment: CME 75
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with cuttings

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LOG OF BORING NO. B-03

Project Name: **Lockheed Martin Palmdale Solar Project**
Project Number: **G19-139-11B**
Project Location: **Palmdale, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
	Surface: silty sand, light brown, fine to coarse grained.										
	SM: CLAYEY SILTY SAND: brown, fine to coarse grained, moist, poorly graded, subangular.										
	...medium dense.			21			108	4			
5	**SM: SILTY SAND:** light brown, fine to coarse grained, slightly moist, dense, slight cementation.			54			118	3			
10	...medium dense, very light brown, fine grained, slightly moist.			18			103	3			
15	...medium dense, moist.			18				8			
	End of boring.										
20											

Completion Depth: 16.5
Date Started: 7/9/19
Date Completed: 7/9/19
California Sampler: 2.4" inner diameter
SPT Sampler: 1.4" inner diameter

Drilling Equipment: CME 75
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with cuttings

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LOG OF BORING NO. B-04

Project Name: **Lockheed Martin Palmdale Solar Project**
Project Number: **G19-139-11B**
Project Location: **Palmdale, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetro-meter, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Surface: silty sand, light brown, fine to coarse grained.										
		SM: SILTY SAND: light brown, fine to coarse grained, dry, poorly graded, subangular.										
		...medium dense.			29			117	2			
5		...dense, more coarse.			52			125	2			
10					24				1			
		SP: SAND: very light brown, fine to coarse grained, dry, medium dense, medium graded, angular/ subangular.										
15		**SM: SILTY SAND:** light brown, fine to coarse grained, dry, medium dense, poorly graded, subangular.			27				1			
		End of boring.										
20												

Completion Depth: 16.5
Date Started: 7/9/19
Date Completed: 7/9/19
California Sampler: 2.4" inner diameter
SPT Sampler: 1.4" inner diameter

Drilling Equipment: CME 75
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with cuttings

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LOG OF BORING NO. B-05

Project Name: **Lockheed Martin Palmdale Solar Project**
Project Number: **G19-139-11B**
Project Location: **Palmdale, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
0		**Surface:** silty sand, light brown, fine to coarse grained.										
		SM: SILTY SAND: light brown, fine to coarse grained, dry, poorly graded, subangular.										
		...medium dense.			20				3			
5		...medium dense, angular, more coarse.			23			114	2			
10					18				3			
		SP: SAND: reddish brown, fine to coarse grained, dry, medium dense, poorly graded, angular/ subangular.										
15		**SM: SILTY SAND:** reddish brown, fine to coarse grained, dry, medium dense, poorly graded, angular/ subangular.			17				3			
		End of boring.										
20												

Completion Depth: 16.5
Date Started: 7/9/19
Date Completed: 7/9/19
California Sampler: 2.4" inner diameter
SPT Sampler: 1.4" inner diameter

Drilling Equipment: CME 75
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with cuttings

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LOG OF BORING NO. B-06

Project Name: **Lockheed Martin Palmdale Solar Project**
Project Number: **G19-139-11B**
Project Location: **Palmdale, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
0	**Surface:** silty sand, light brown, fine to coarse grained.										
	SM: SILTY SAND: very light brown, fine to medium grained, slightly moist, cemented/ desiccated.										
	...very dense.	■		50/ 6"			119	4			
5	**SM: CLAYEY SILTY SAND:** very light brown, fine grained, slightly moist, poorly graded.	■		28			20	5			
10	**SM: SILTY SAND:** brown, fine to coarse grained, dry, medium dense, poorly graded, subangular.	■		16			29	3			
15	...medium dense, fine grained.	☒		14				2			
16.5	End of boring.										
20											

Completion Depth: 16.5
Date Started: 7/9/19
Date Completed: 7/9/19
California Sampler: 2.4" inner diameter
SPT Sampler: 1.4" inner diameter

Drilling Equipment: CME 75
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with cuttings

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LOG OF BORING NO. B-07

Project Name: **Lockheed Martin Palmdale Solar Project**
Project Number: **G19-139-11B**
Project Location: **Palmdale, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Surface: silty sand, light brown, fine to coarse grained.										
		SM: SILTY SAND: brown, fine to coarse grained, dry, medium graded, subangular.										
		...loose/ medium dense.			15			112	3			
5		...loose, less coarse.			13				3			
10					19			104	3			
		SP/SM: SAND/ SILTY SAND: reddish brown, fine to medium grained, dry, medium dense, poorly graded, subangular.										
15		**SM: SILTY SAND:** reddish brown, fine to coarse grained, slightly moist, medium dense, poorly graded, subangular, trace fine to coarse gravel.			18				4			
		End of boring.										
20												

Completion Depth: 16.5
Date Started: 7/9/19
Date Completed: 7/9/19
California Sampler: 2.4" inner diameter
SPT Sampler: 1.4" inner diameter

Drilling Equipment: CME 75
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with cuttings

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LOG OF BORING NO. B-08

Project Name: **Lockheed Martin Palmdale Solar Project**
Project Number: **G19-139-11B**
Project Location: **Palmdale, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Surface: silty sand, light brown, fine to coarse grained.										
		SM: SILTY SAND: light brown, fine to coarse grained, dry, poorly graded, subangular, trace cementation.										
		...medium dense.			26			117	2			
5		...medium dense, fine grainded.			37			112	3			
10		...medium dense, fine to coarse grained, no cementation.			26			108	2			
15		...medium dense, fine grained.			19				2			
		End of boring.										
20												

Completion Depth: 16.5
Date Started: 7/9/19
Date Completed: 7/9/19
California Sampler: 2.4" inner diameter
SPT Sampler: 1.4" inner diameter

Drilling Equipment: CME 75
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with cuttings

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LOG OF BORING NO. B-09

Project Name: **Lockheed Martin Palmdale Solar Project**
Project Number: **G19-139-11B**
Project Location: **Palmdale, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetro-meter, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
0	**Surface:** silty sand, light brown, fine to coarse grained.										
	SM: SILTY SAND: light reddish brown, fine to coarse grained, dry, poorly graded, subangular.	Grab									
	...medium dense.	California		20			118	2			
5	...medium dense, reddish brown, medium grained, angular, more coarse.	California		18			117	2			
10		California		23			114	2			
11	**SP: SAND:** reddish brown, fine to coarse grained, dry, medium dense, poorly graded, angular.										
15	**SM: SILTY SAND:** reddish brown, fine to coarse grained, moist, medium dense, poorly graded, subangular.	SPT		15				7			
16	End of boring.										
20											

Completion Depth: 16.0
Date Started: 7/9/19
Date Completed: 7/9/19
California Sampler: 2.4" inner diameter
SPT Sampler: 1.4" inner diameter

Drilling Equipment: CME 75
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with cuttings

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LOG OF BORING NO. B-10

Project Name: **Lockheed Martin Palmdale Solar Project**
Project Number: **G19-139-11B**
Project Location: **Palmdale, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
0	**Surface:** silty sand, very light brown, fine to coarse grained.										
	SM: SILTY SAND: very light brown, fine to coarse grained, dry, poorly graded, subangular.										
2	...medium dense.			20			117	3			
5	...medium dense.			23			122	1			
10				39				2			
11	**SP/SM: SAND/ SILTY SAND:** pale brown, fine to coarse grained, dry, medium dense, poorly graded, angular/ subangular.										
15	**SM: SILTY SAND:** light brown, fine to coarse grained, dry, medium dense, poorly graded, subangular.			25				4			
16.5	End of boring.										
20											

Completion Depth: 16.5
Date Started: 7/9/19
Date Completed: 7/9/19
California Sampler: 2.4" inner diameter
SPT Sampler: 1.4" inner diameter

Drilling Equipment: CME 75
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with cuttings

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LOG OF BORING NO. B-11

Project Name: **Lockheed Martin Palmdale Solar Project**
Project Number: **G19-139-11B**
Project Location: **Palmdale, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetro-meter, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
	Surface: silty sand, light yellowish brown, dry, brush.										
	SM: SILTY SAND: very light brown, fine to medium grained, dry, poorly graded, desiccated, cemented.										
	...very dense.			50/ 6"			110	3			
5	**CLAYEY SM: SILTY SAND:** light reddish brown, fine to coarse grained, slightly moist, dense, poorly graded, subangular, cementation.			58			117	4			
10				19				2			
	SP/SM: SAND/ SILTY SAND: light brown, fine to coarse grained, dry, medium dense, medium graded, angular, trace fine gravel.										
15	**SM: SILTY SAND:** strong brown, fine to coarse grained, dry, medium dense, poorly graded, subangular.			23				3			
	End of boring.										
20											

Completion Depth: 16.5
Date Started: 7/9/19
Date Completed: 7/9/19
California Sampler: 2.4" inner diameter
SPT Sampler: 1.4" inner diameter

Drilling Equipment: CME 75
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with cuttings

LOG OF BORING NO. B-12

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Project Name: **Lockheed Martin Palmdale Solar Project**
Project Number: **G19-139-11B**
Project Location: **Palmdale, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetro-meter, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Surface: silty sand, light brown, dry.										
		SM: SILTY SAND: light brown, fine to coarse grained, dry, poorly graded, subangular.										
		...medium dense.			33			116	2			
5		...medium dense, fine grained.			27			109	2			
10		...medium dense.			33			110	1			
15		...medium dense, fine to coarse grained.			25				2			
20												

Completion Depth: 31.5
Date Started: 7/10/19
Date Completed: 7/10/19
California Sampler: 2.4" inner diameter
SPT Sampler: 1.4" inner diameter

Drilling Equipment: CME 75
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with cuttings

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LOG OF BORING NO. B-12

Project Name: **Lockheed Martin Palmdale Solar Project**
Project Number: **G19-139-11B**
Project Location: **Palmdale, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetro-meter, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		SM: SILTY SAND: light brown, fine to coarse grained, dry, poorly graded, subangular.*(continued)* ...dense, increase in coarse sand, trace fine gravel.	X		41				4			
25		...dense, very light brown, angular.	X		47				3			
30		...dense/ very dense.	X		50				2			
		End of boring.										
35												
40												

Completion Depth: 31.5
Date Started: 7/10/19
Date Completed: 7/10/19
California Sampler: 2.4" inner diameter
SPT Sampler: 1.4" inner diameter

Drilling Equipment: CME 75
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with cuttings

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LOG OF BORING NO. B-13

Project Name: **Lockheed Martin Palmdale Solar Project**
Project Number: **G19-139-11B**
Project Location: **Palmdale, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
0	**Surface:** silty sand, light brown, dry.										
	SM: SILTY SAND: light brown, fine to coarse grained, slightly moist, poorly graded, subangular, trace fine gravel.	Bulk									
	...medium dense.	California		17			110	4			
5	...very dense, no gravel, dry	California		50/ 6"			97	3			
10	...medium dense, fine to coarse grained.	California		29			102	2			
15	...medium dense, fine grained.	SPT		26				3			
20											

Completion Depth: 51.5
Date Started: 7/10/19
Date Completed: 7/10/19
California Sampler: 2.4" inner diameter
SPT Sampler: 1.4" inner diameter

Drilling Equipment: CME 75
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with cuttings

LOG OF BORING NO. B-13

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Project Name: **Lockheed Martin Palmdale Solar Project**
Project Number: **G19-139-11B**
Project Location: **Palmdale, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		SM: SILTY SAND: light brown, fine to coarse grained, slightly moist, poorly graded, subangular, trace fine gravel. *(continued)*	X		46				7			
		...dense, strong brown,slightly moist, fine to coarse grained, poorly graded, angular/ subangular, trace fine gravel, cemented.										
25		...dense, less cemented, angular/ subangular.	X		35				4			
30		...medium dense, with fine gravel, angular/ subangular.	X		27				4			
35		...very dense, trace cemented, no gravel, angular/ subangular, dry.	X		58				3			
40												

Completion Depth: 51.5
Date Started: 7/10/19
Date Completed: 7/10/19
California Sampler: 2.4" inner diameter
SPT Sampler: 1.4" inner diameter

Drilling Equipment: CME 75
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with cuttings

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LOG OF BORING NO. B-13

Project Name: **Lockheed Martin Palmdale Solar Project**
Project Number: **G19-139-11B**
Project Location: **Palmdale, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetro-meter, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		SM: SILTY SAND: light brown, fine to coarse grained, slightly moist, poorly graded, subangular, trace fine gravel. *(continued)* ...dense, light brown, not cemented, trace fine gravel, angular/ subangular.	X		39				4			
45		...dense, with fine gravel, angular/ subangular.	X		43				2			
50		...very dense, no gravel, trace cemented, angular/ subangular, slightly moist.	X		58				6			
		End of boring.										
55												
60												

Completion Depth: 51.5
Date Started: 7/10/19
Date Completed: 7/10/19
California Sampler: 2.4" inner diameter
SPT Sampler: 1.4" inner diameter

Drilling Equipment: CME 75
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with cuttings

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LOG OF BORING NO. B-14

Project Name: **Lockheed Martin Palmdale Solar Project**
Project Number: **G19-139-11B**
Project Location: **Palmdale, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetro-meter, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Surface: silty sand, light brown, dry.										
		SM: SILTY SAND: light brown, fine to coarse grained, slightly moist, poorly graded, subangular.										
		...medium dense.			16			106	2			
5		...medium dense.			19				2			
10		...dense, fine to medium grained.			58			111	1			
15		...medium dense, fine grained.			19				4			
20												

Completion Depth: 31.5
Date Started: 7/10/19
Date Completed: 7/10/19
California Sampler: 2.4" inner diameter
SPT Sampler: 1.4" inner diameter

Drilling Equipment: CME 75
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with cuttings

LOG OF BORING NO. B-14

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Project Name: **Lockheed Martin Palmdale Solar Project**
Project Number: **G19-139-11B**
Project Location: **Palmdale, California**
Logged by: **L. Prosser**
Checked by: **A. Terronez**

Surface El.:
Location:

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetro-meter, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		SM/ML: SILTY SAND/ SILT: pale brown, fine grained, slightly moist, dense/ very hard, poorly graded.			31				4			
25		**SM: SILTY SAND:** light brown, fine to coarse grained, slightly moist, very dense, poorly graded, subangular, trace cementation.			50/ 6"				5			
30		...medium dense, strong brown, increase in coarse material.			47				2			
		End of boring.										
35												
40												

Completion Depth: 31.5
Date Started: 7/10/19
Date Completed: 7/10/19
California Sampler: 2.4" inner diameter
SPT Sampler: 1.4" inner diameter

Drilling Equipment: CME 75
Drilling Method: Hollow Stem Auger
Drive Weight: 140 pounds
Hole Diameter: 8 inches
Drop: 30 inches
Remarks: Borings backfilled with cuttings

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Field Resistivty Test

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ASTM G57 (Wenner 4-pin Method)

Project Name: Lockheed Martin Solar Project **Project Number:** G19 139 10B

Test Conducted by	Date	Location	Latitude (degrees)	Longitude (degrees)	Weather	Equipment
Logan Prosser	8/1+7/2019				Sunny, hot	MC Miller 400D

Field Resistance (Ω), measured at each pin spacing

Location	Test Line	Orientation	Pin Spacing (feet) 0.5	1	1.5	2	3	5	7	10	20	30	45	70	100	150	200	300	450	750
FR-1	1	E-W	3300000.00	3000000.00	3100000.00	2900000.00	2000000.00	1600000.00	821000.00	65400.00	31100.00	5550.00	3770.00	138.00	17.00	11.10	6.09	0.69	1.13	1.55
	2	N-S	2890000.00	2810000.00	2800000.00	2730000.00	2660000.00	2510000.00	1410000.00	30700.00	27700.00	7170.00	777.00	40.30	4.73	4.51	11.60	8.99	10.40	2.58

Location	Test Line	Orientation	Pin Spacing (feet) 2.5	5	10	20	50
FR-2 (B-5)	1	E-W	3000000.00	2500000.00	718000.00	47400.00	850.00
	2	N-S	3100000.00	1900000.00	1000000.00	87400.00	43900.00
FR-3 (B-4)	1	E-W	3200000.00	2400000.00	2500000.00	487000.00	341000.00
	2	N-S	3700000.00	3700000.00	3100000.00	2300000.00	418000.00
FR-4 (B-8)	1	E-W	3700000.00	2400000.00	1500000.00	105000.00	50700.00
	2	N-S	3800000.00	2100000.00	1600000.00	94800.00	40100.00
FR-5 (B-9)	1	E-W	5800000.00	4500000.00	527000.00	942000.00	638000.00
	2	N-S	5600000.00	3800000.00	1900000.00	869000.00	599000.00

Field Resistivity (Ω-m)

Location	Test Line	Orientation	Pin Spacing (feet) 0.5	1	1.5	2	3	5	7	10	20	30	45	70	100	150	200	300	450	750
FR-1	1	E-W	3,159,940	5,745,345	8,905,284	11,107,666	11,490,689	15,320,919	11,006,165	1,252,485	1,191,201	318,867	324,899	18,500	3,256	3,189	2,333	396	974	2,226
	2	N-S	2,767,341	5,381,473	8,043,483	10,456,527	15,282,617	24,034,692	18,902,184	587,940	1,060,974	411,941	66,962	5,403	906	1,296	4,443	5,165	8,963	3,706

Location	Test Line	Orientation	Pin Spacing (feet) 2.5	5	10	20	50
FR-2 (B-5)	1	E-W	14,363,362	23,938,936	13,750,525	1,815,529	81,392
	2	N-S	14,842,140	18,193,591	19,151,149	3,347,621	4,203,677
FR-3 (B-4)	1	E-W	15,320,919	22,981,379	47,877,872	18,653,219	32,652,709
	2	N-S	17,714,813	35,429,625	59,368,561	88,095,285	40,025,901
FR-4 (B-8)	1	E-W	17,714,813	22,981,379	28,726,723	4,021,741	4,854,816
	2	N-S	18,193,591	20,108,706	30,641,838	3,631,058	3,839,805
FR-5 (B-9)	1	E-W	27,769,166	43,090,085	10,092,655	36,080,764	61,092,165
	2	N-S	26,811,608	36,387,183	36,387,183	33,284,697	57,357,691

Field Resistivity (Ω-cm)

Location	Test Line	Orientation	Pin Spacing (feet) 0.5	1	1.5	2	3	5	7	10	20	30	45	70	100	150	200	300	450	750
FR-1	1	E-W	3.1599E+08	5.7453E+08	8.9053E+08	1.1108E+09	1.1491E+09	1.5321E+09	1.1006E+09	1.2525E+08	1.1912E+08	31,886,700	32,489,900	1,850,000	325,600	318,900	233,300	39,600	97,400	222,600
	2	N-S	2.7673E+08	5.3815E+08	8.0435E+08	1.0457E+09	1.5283E+09	2.4035E+09	1.8902E+09	5.8794E+07	1.0610E+08	41,194,100	6,696,200	540,300	90,600	129,600	444,300	516,500	896,300	370,600

Location	Test Line	Orientation	Pin Spacing (feet) 2.5	5	10	20	50
FR-2 (B-5)	1	E-W	1.436E+09	2.394E+09	1.375E+09	1.816E+08	8.139E+06
	2	N-S	1.484E+09	1.819E+09	1.915E+09	3.348E+08	4.204E+08
FR-3 (B-4)	1	E-W	1.532E+09	2.298E+09	4.788E+09	1.865E+09	3.265E+09
	2	N-S	1.771E+09	3.543E+09	5.937E+09	8.810E+09	4.003E+09
FR-4 (B-8)	1	E-W	1.771E+09	2.298E+09	2.873E+09	4.022E+08	4.855E+08
	2	N-S	1.819E+09	2.011E+09	3.064E+09	3.631E+08	3.840E+08
FR-5 (B-9)	1	E-W	2.777E+09	4.309E+09	1.009E+09	3.608E+09	6.109E+09
	2	N-S	2.681E+09	3.639E+09	3.639E+09	3.328E+09	5.736E+09

Figure A-5

APPENDIX B

LABORATORY TESTING RESULTS

APPENDIX B
LABORATORY TESTING RESULTS

Moisture-Density Tests

The field moisture content, as a percentage of dry weight of the soils, was determined by weighing the samples before and after oven drying in accordance with ASTM D 2216 test procedures. Test results are presented on the boring logs in Appendix A.

Direct Shear Test

Two (2) Direct Shear Tests were performed on a relatively undisturbed soil sample obtained at the time of drilling in the area of planned construction. The tests were conducted to determine the soil strength characteristics. The standard test method is ASTM D3080, Direct Shear Test for Soil under Consolidated Drained Conditions. The direct shear tests results are presented graphically on Figures B-1 and B-2.

Consolidation Test

Two (2) Consolidation Tests were performed on a relatively undisturbed soil sample to evaluate compressibility and collapse potential characteristics. The tests were performed in general accordance with ASTM D2435. The samples were initially loaded under as-received moisture content to a selected stress level, were then saturated, and then incrementally loaded up to a maximum load of 1,300 psf. The tests result is presented on Figures B-3 and B-4.

R-Value Test

The Resistance-Value result of two (2) samples of the surficial soil was obtained in accordance with California Department of Transportation's Test Method CA 301. The result of the R-Value tests are presented on Figures B-5 and B-6.

Sieve Analysis Test

Four (4) Sieve Analysis Tests were performed on representative bulk samples were obtained from the Site at the time of drilling. The tests were performed in general accordance with Test Method ASTM D477. The results of the tests are presented on Figures B-7 through B-10.

Soil Corrosivity

Ten (10) Corrosivity Evaluations were performed on bulk soil samples obtained at the time of drilling in the area of planned construction. The soil was evaluated for minimum resistivity (ASTM G57), sulfate ion concentration (CT 417), chloride ion concentration (CT 422), and pH of soil (ASTM D4972). The tests results are presented in Table B-1.

Table B-1: Summary of Corrosion Test Results				
Sample Location	**pH**	**Sulfate, ppm**	**Chloride, ppm**	**Minimum Resistivity, ohm-cm**
B-4 @ 0 feet bgs	5.19	Not Detected	Not Detected	17,000
B-4 @ 5 feet bgs	7.44	Not Detected	25	15,000
B-4 @ 8 feet bgs	6.32	Not Detected	Not Detected	1,200
B-5 @ 0 feet bgs	5.91	50	25	7,700
B-8 @ 0 feet bgs	5.84	50	25	15,000
B-8 @ 5 feet bgs	7.14	50	25	1,200
B-8 @ 10 feet bgs	7.53	100	100	610
B-9 @ 0 feet bgs	5.10	Not Detected	Not Detected	8,800
B-9 @ 5 feet bgs	7.05	Not Detected	Not Detected	880
B-9 @ 10 feet bgs	7.21	50	25	4,500

BSK ASSOCIATES

Direct Shear Test

ASTM D 3080

700 22nd St
Bakersfield, CA
Ph: (661) 327-0671
Fax: (661) 324-4218

Project Name:	**LM SOLAR PROJECT**	**Sample Date:**	7/9/2019
Project Number:	G19-139-11B	**Test Date:**	7/17/2019
Lab Tracking ID:	B19-158	**Report Date:**	7/23/2019
Sample Location:	B-6 @ 6.0-6.5 feet bgs	**Sampled By:**	L.PROSSER
Sample Description:	SM: CLAYEY SILTY SAND: very light brown, fine grained, slightly moist.	**Tested By:**	M. REYES

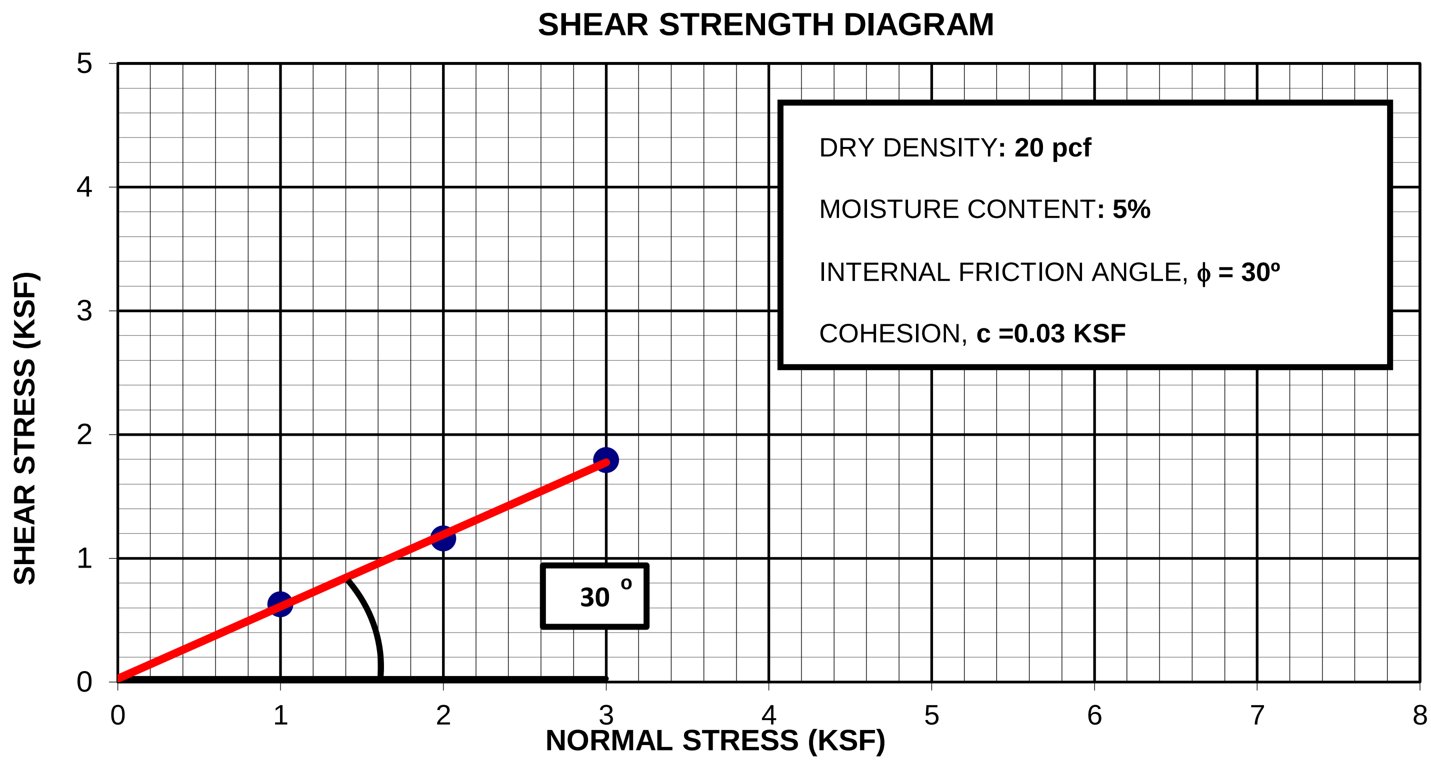


Figure B-1

Reviewed By: *Ian Remotique*

700 22nd St
Bakersfield, CA
Ph: (661) 327-0671
Fax: (661) 324-4218

Direct Shear Test

ASTM D 3080

Project Name:	Lockheed Martin Solar Project	**Sample Date:**	7/10/2019
Project Number:	G19-139-11B	**Test Date:**	7/17/2019
Lab Tracking ID:	B19-159	**Report Date:**	8/6/2019
Sample Location:	B-13 @ 3.0-3.5 feet bgs	**Sampled By:**	L. Prosser
Sample Description:	SM: SILTY SAND: light brown, fine to coarse grained, slightly moist, trace fine gravel.	**Tested By:**	E. Lopez

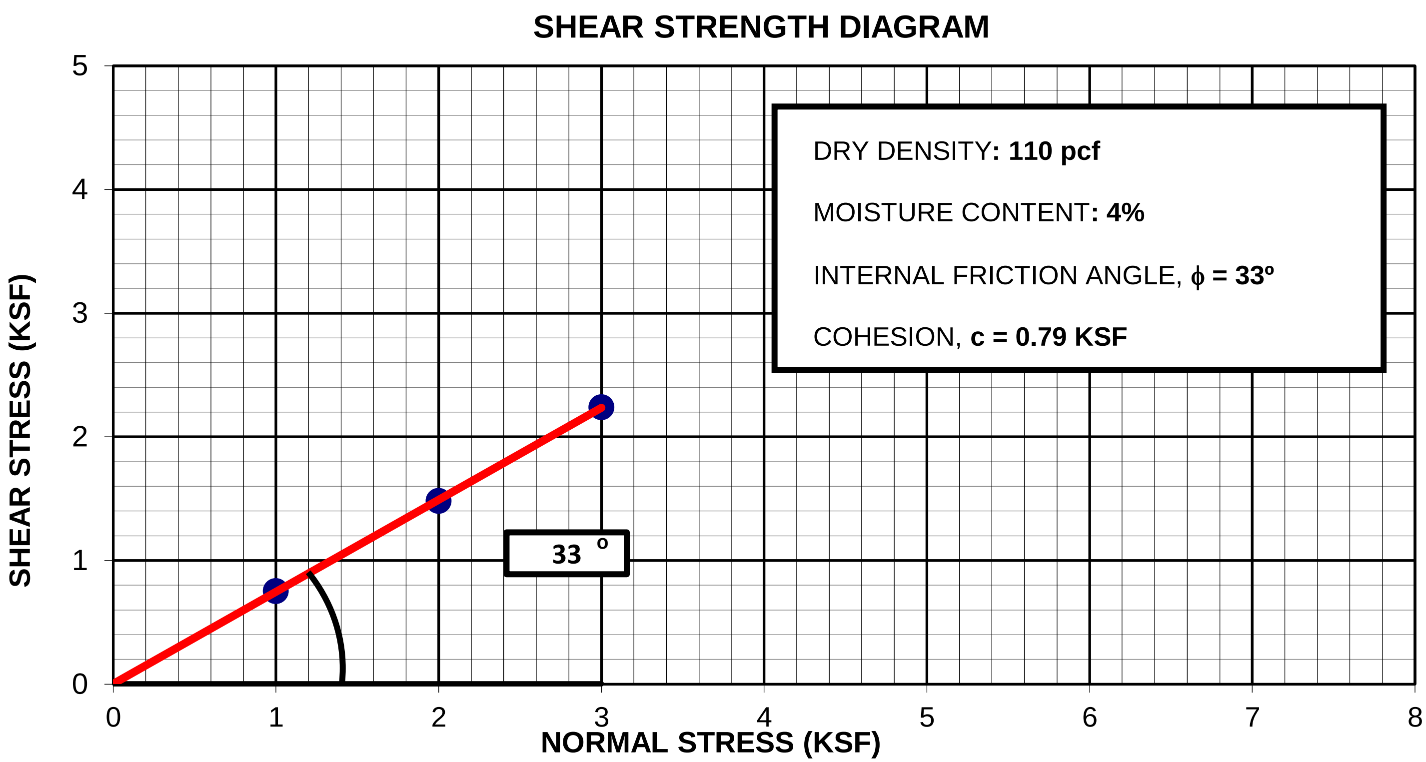


Figure B-2

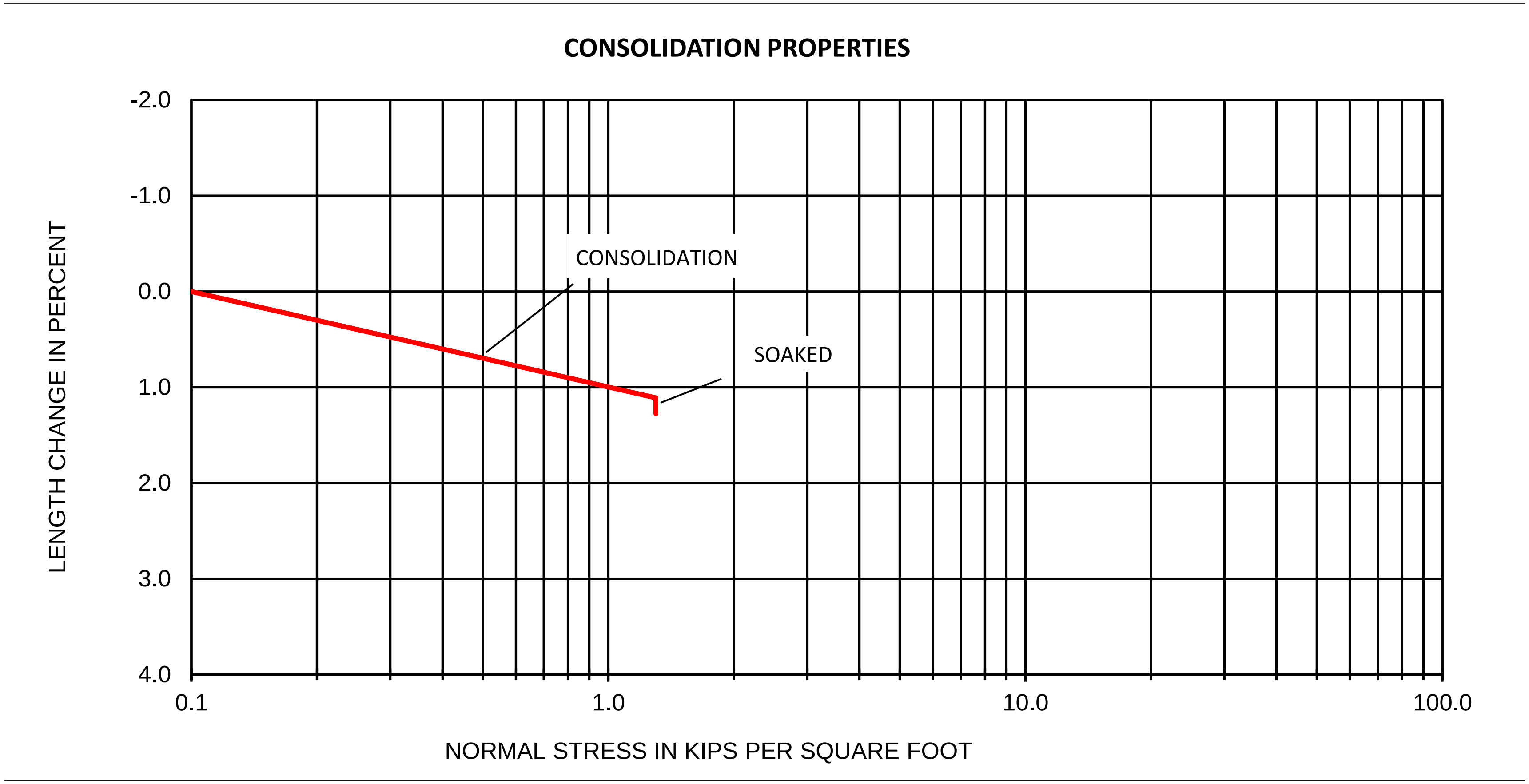
Reviewed By: *Ian Remotique*

BSK ASSOCIATES
700 22nd St
Bakersfield, CA
Ph: (661) 327-0671
Fax: (661) 324-4218

Collapse Potential

ASTM D 2435, One-Dimensional Analysis

Project Name:	Lockheed Martin Solar Project	**Sample Date:**	7/10/2019
Project Number:	G19-139-11B	**Test Date:**	7/18/2019
Sample Location:	B-12 @ 11.0-11.5 feet bgs	**Sampled By:**	L. Prosser
Sample Description:	SM: SILTY SAND: light brown, fine grained, dry, poorly graded.	**Tested By:**	M. Reyes
Collapse Potential:	0.17 percent collapse at 1300 psf	**Dry Density (pcf):**	110
Peak Load (psf):	1300	**Initial Moisture Content (%):**	1



Reviewed by: I. Remotigue

Figure B-3

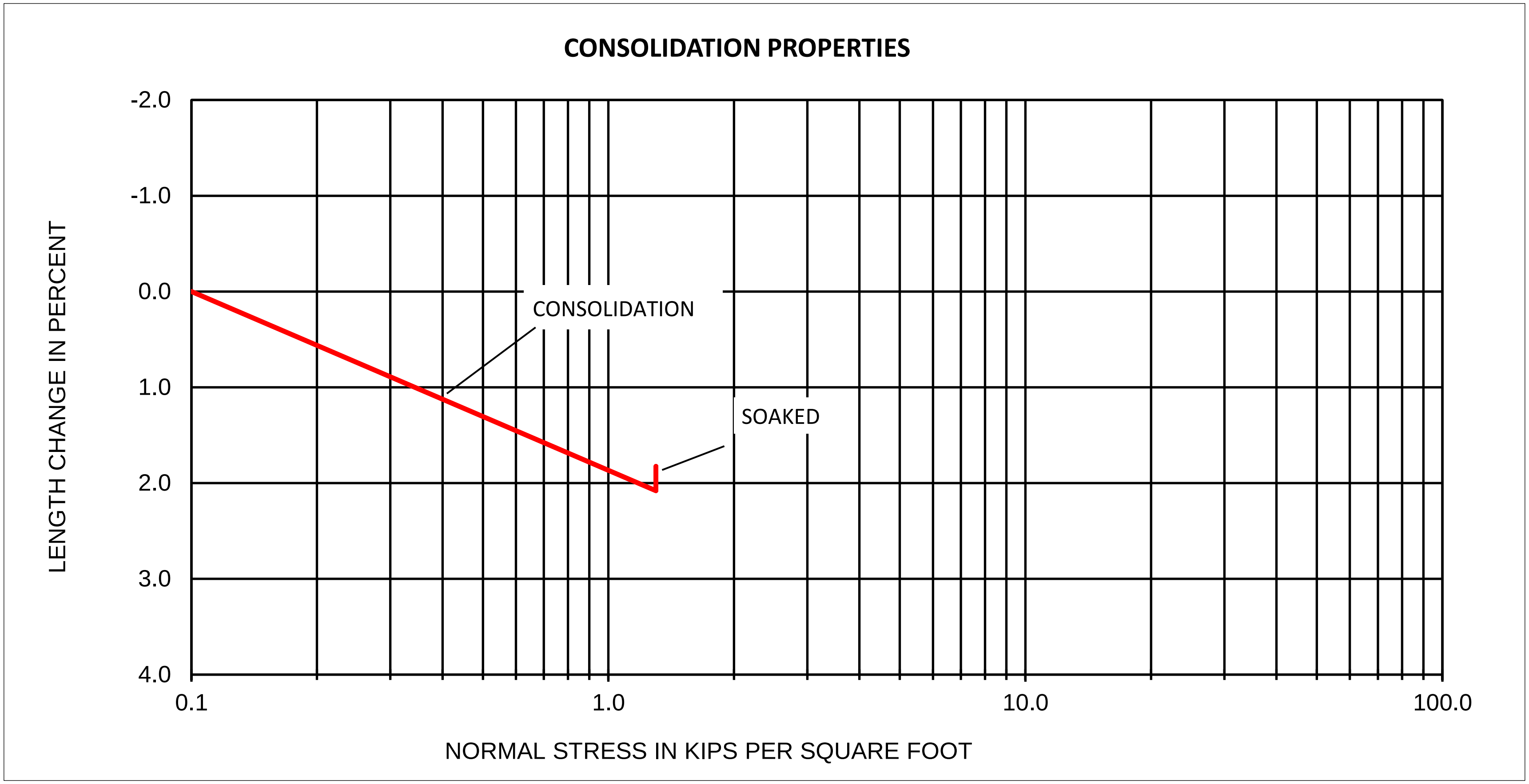
Collapse Potential

BSK ASSOCIATES
700 22nd St
Bakersfield, CA
Ph: (661) 327-0671
Fax: (661) 324-4218

ASTM D 2435, One-Dimensional Analysis

Project Name:	Lockheed Martin Solar Project	**Sample Date:**	7/10/2019
Project Number:	G19-139-11B	**Test Date:**	7/18/2019
Sample Location:	B-14 @ 11.0-11.5 feet bgs	**Sampled By:**	L. Prosser
Sample Description:	SM: SILTY SAND: light brown, fine to medium grained, slightly moist.	**Tested By:**	M. Reyes

Collapse Potential:	-0.25 percent collapse at 1300 psf	**Dry Density (pcf):**	111
Peak Load (psf):	1300	**Initial Moisture Content (%):**	2



Reviewed by: I. Remotigue

Figure B-4

BSK ASSOCIATES

700 22nd St.
Bakersfield, CA 93301
Ph: (661) 327-0671
Fax: (661) 324-4218

Sieve Analysis

○ CTM 202 ○ D422 ○ T88 ○ T27 ○ T30 ◉ C136

Project Name: Lockheed Martin Palmdale Solar Project
Project Number: G19-139-11B
Lab Tracking ID: B19-158
Sample Location: B-4 @ 0-5.0 feet bgs
Sample Source: Native

Sample Date: 7/9/2019
Sample by: L. Prosser
Test Date: 7/18/2019
Tested By: M. Zavala

A. Total Wt of Sample(g):		2551.8	Wt. Before 200 Wash(g):		522.5		% Gravel:		
			Wt. After 200 Wash (g):		332.9		% Coarse:		
							% Fine:		
Sieve Size	Sieve Size (mm)	WT. RETAINED		% RETAINED			Combined	Project	Pass/Fail
		Ind.	Cumulative	Ind.	Cumulative	Passing	% Passing	Specification	
3"	75mm	0.0	0.0	0.0	0.0	0.0	100	-	-
$2^1/_2$"	63mm	0.0	0.0	0.0	0.0	0.0	100	-	-
2"	50mm	0.0	0.0	0.0	0.0	0.0	100	-	-
1 ½"	37.5mm	0.0	0.0	0.0	0.0	0.0	100	-	-
1"	25mm	0.0	0.0	0.0	0.0	0.0	100	-	-
3/4"	19mm	0.0	0.0	0.0	0.0	0.0	100	-	-
1/2"	12.5mm	0.0	0.0	0.0	0.0	0.0	100	-	-
3/8"	9.5mm	1.1	1.1	0.0	0.0	100.0	100	-	-
#4	4.75mm	20.4	21.5	0.8	0.8	99.2	99	-	-
#8	2.36mm		0.0		0.0		100	-	-
#10	2.00mm								
#16	1.18mm		32.2		6		93	-	-
#20	850mm								
#30	600mm		81.4		16		84	-	-
#40	425mm								
#50	300mm		149.6		29		71	-	-
#80	180mm								
#100	150mm		237.5		45		54	-	-
#200	75mm		326.0		62		38	-	-
PAN			330.9						
Weight after sieving									

Remarks:

Figure B-5

ASSOCIATES

Sieve Analysis

700 22nd St.
Bakersfield, CA 93301
Ph: (661) 327-0671
Fax: (661) 324-4218

○ CTM 202 ○ D422 ○ T88 ○ T27 ○ T30 ◉ C136

Project Name:	Lockheed Martin Palmdale Solar Project	**Sample Date:**	7/9/2019
Project Number:	G19-139-11B	**Sample by:**	L. Prosser
Lab Tracking ID:	B19-158		
Sample Location:	B-5 @ 0.0-5.0 feet bgs	**Test Date:**	7/18/2019
Sample Source:	Native	**Tested By:**	M. Zavala

A. Total Wt of Sample(g):		2559.4	Wt. Before 200 Wash(g):			494.7		% Gravel:	
			Wt. After 200 Wash (g):			297.1		% Coarse:	
								% Fine:	
Sieve Size	Sieve Size (mm)	WT. RETAINED		% RETAINED		Passing	Combined % Passing	Project Specification	Pass/Fail
		Ind.	Cumulative	Ind.	Cumulative				
3"	75mm	0.0	0.0	0.0	0.0	0.0	100	-	-
$2^1/_2$"	63mm	0.0	0.0	0.0	0.0	0.0	100	-	-
2"	50mm	0.0	0.0	0.0	0.0	0.0	100	-	-
1 ½"	37.5mm	0.0	0.0	0.0	0.0	0.0	100	-	-
1"	25mm	0.0	0.0	0.0	0.0	0.0	100	-	-
3/4"	19mm	0.0	0.0	0.0	0.0	0.0	100	-	-
1/2"	12.5mm	9.0	9.0	0.4	0.4	99.6	100	-	-
3/8"	9.5mm	6.1	15.1	0.2	0.6	99.4	99	-	-
#4	4.75mm	63.7	78.8	2.5	3.1	96.9	97	-	-
#8	2.36mm		0.2		0.0		100	-	-
#10	2.00mm								
#16	1.18mm		43.2		9		88	-	-
#20	850mm								
#30	600mm		97.7		20		78	-	-
#40	425mm								
#50	300mm		162.2		33		65	-	-
#80	180mm								
#100	150mm		230.4		47		52	-	-
#200	75mm		292.6		59		41	-	-
PAN			296.6						
Weight after sieving									

Remarks:

Figure B-6

BSK ASSOCIATES

700 22nd St.
Bakersfield, CA 93301
Ph: (661) 327-0671
Fax: (661) 324-4218

Sieve Analysis

○ CTM 202 ○ D422 ○ T88 ○ T27 ○ T30 ◉ C136

Project Name:	Lockheed Martin Palmdale Solar Project	**Sample Date:**	7/9/2019
Project Number:	G19-139-11B	**Sample by:**	L. Prosser
Lab Tracking ID:	B19-158		
Sample Location:	B-8 @ 0.0-5.0 feet bgs	**Test Date:**	7/18/2019
Sample Source:	Native	**Tested By:**	M. Zavala

A. Total Wt of Sample(g):	2540.7	Wt. Before 200 Wash(g):		521.7			% Gravel:	
		Wt. After 200 Wash (g):		371.6			% Coarse:	
							% Fine:	

Sieve Size	Sieve Size (mm)	WT. RETAINED Ind.	WT. RETAINED Cumulative	% RETAINED Ind.	% RETAINED Cumulative	Passing	Combined % Passing	Project Specification	Pass/Fail
3"	75mm	0.0	0.0	0.0	0.0	0.0	100	-	-
$2^1/_2$"	63mm	0.0	0.0	0.0	0.0	0.0	100	-	-
2"	50mm	0.0	0.0	0.0	0.0	0.0	100	-	-
1 ½"	37.5mm	0.0	0.0	0.0	0.0	0.0	100	-	-
1"	25mm	0.0	0.0	0.0	0.0	0.0	100	-	-
3/4"	19mm	0.0	0.0	0.0	0.0	0.0	100	-	-
1/2"	12.5mm	7.1	7.1	0.3	0.3	99.7	100	-	-
3/8"	9.5mm	1.6	8.7	0.1	0.3	99.7	100	-	-
#4	4.75mm	20.4	24.9	0.8	1.0	99.0	99	-	-
#8	2.36mm		0.1		0.0		100	-	-
#10	2.00mm								
#16	1.18mm		46.8		9		90	-	-
#20	850mm								
#30	600mm		105.8		20		79	-	-
#40	425mm								
#50	300mm		178.9		34		65	-	-
#80	180mm								
#100	150mm		270.6		52		48	-	-
#200	75mm		362.5		69		31	-	-
PAN			369.6						
Weight after sieving									

Remarks:

Figure B-7

BSK ASSOCIATES

Sieve Analysis

700 22nd St.
Bakersfield, CA 93301
Ph: (661) 327-0671
Fax: (661) 324-4218

○ CTM 202 ○ D422 ○ T88 ○ T27 ○ T30 ◉ C136

Project Name:	Lockheed Martin Palmdale Solar Project	**Sample Date:**	7/10/2019
Project Number:	G19-139-11B	**Sample by:**	L. Prosser
Lab Tracking ID:	B19-159		
Sample Location:	B-13 @ 0.0-5.0 feet bgs	**Test Date:**	7/17/2019
Sample Source:	Native	**Tested By:**	M. Zavala

A. Total Wt of Sample(g):		3284.0	Wt. Before 200 Wash(g):			514.5		% Gravel:	
			Wt. After 200 Wash (g):			326.1		% Coarse:	
								% Fine:	
Sieve Size	Sieve Size (mm)	WT. RETAINED Ind.	WT. RETAINED Cumulative	% RETAINED Ind.	% RETAINED Cumulative	Passing	Combined % Passing	Project Specification	Pass/Fail
3"	75mm	0.0	0.0	0.0	0.0	0.0	100	-	-
$2^1/_2$"	63mm	0.0	0.0	0.0	0.0	0.0	100	-	-
2"	50mm	0.0	0.0	0.0	0.0	0.0	100	-	-
1 ½"	37.5mm	0.0	0.0	0.0	0.0	0.0	100	-	-
1"	25mm	0.0	0.0	0.0	0.0	0.0	100	-	-
3/4"	19mm	0.0	0.0	0.0	0.0	0.0	100	-	-
1/2"	12.5mm	4.7	4.7	0.1	0.1	99.9	100	-	-
3/8"	9.5mm	14.6	19.3	0.4	0.6	99.4	99	-	-
#4	4.75mm	60.4	80.8	1.8	2.5	97.5	98	-	-
#8	2.36mm		0.1		0.0		100	-	-
#10	2.00mm								
#16	1.18mm		49.8		10		88	-	-
#20	850mm								
#30	600mm		109.5		21		77	-	-
#40	425mm								
#50	300mm		188.5		37		62	-	-
#80	180mm								
#100	150mm		266.3		52		47	-	-
#200	75mm		322.6		63		37	-	-
PAN			323.7						
Weight after sieving									

Remarks: ______

Figure B-8

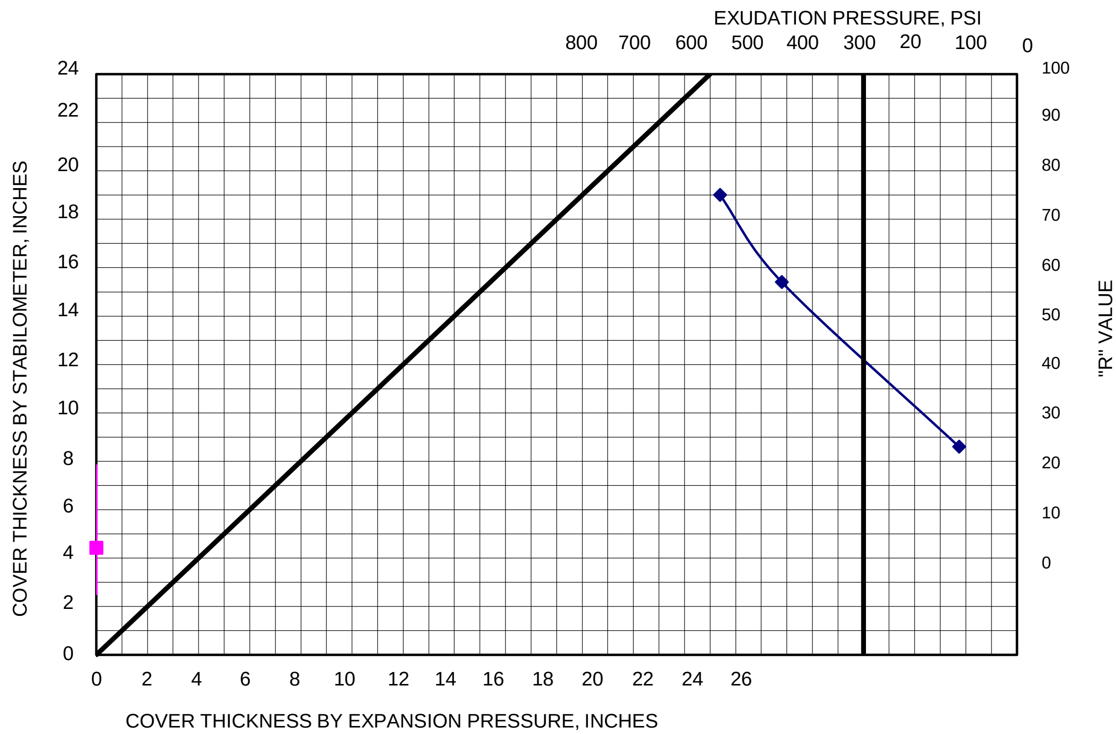
700 22nd St.
Bakersfield, CA 93301
Ph: (661) 327-0670
Fax: (661) 324-4217

R-Value Test

Caltrans Test Method 301

Project Name: Lockheed Martin Solar Project
Project Number: G19-139-11B
Lab Tracking ID: B19-158
Sample Location: B-5 @ 0.0-5.0 feet bgs

Sample Date: 7/10/2019
Test Date: 8/7/2019
Report Date: 8/8/2019
Tested By: ILT Remotigue



Sample Description: SM:SILTY SAND; brown; fine to Coarse; moist.

SPECIMEN	A	B	C
EXUDATION PRESSURE, LOAD (lb)	7290.1	5772	1422
EXUDATION PRESSURE, PSI	580	460	113
EXPANSION, * 0.0001 IN	-0.004	0.0001	-0.0053
EXPANSION PRESSURE, PSF	0	0	0
STABILOMETER PH AT 2000 LBS	26	50	108
DISPLACEMENT	4.19	4.18	3.92
RESISTANCE VALUE "R"	75	57	23
"R" VALUE CORRECTED FOR HEIGHT	75	57	23
% MOISTURE AT TEST	7.9	8.9	9.9
DRY DENSITY AT TEST, PCF	129.6	128.8	123.6
"R" VALUE AT 300 PSI EXUDATION PRESSURE	**41**		
"R" VALUE BY EXPANSION PRESSURE TI = 4.0, GF=1.50	**N/A**		

Reviewed By: *Ian Leo T. Remotigue*

Figure B-9

BSK ASSOCIATES

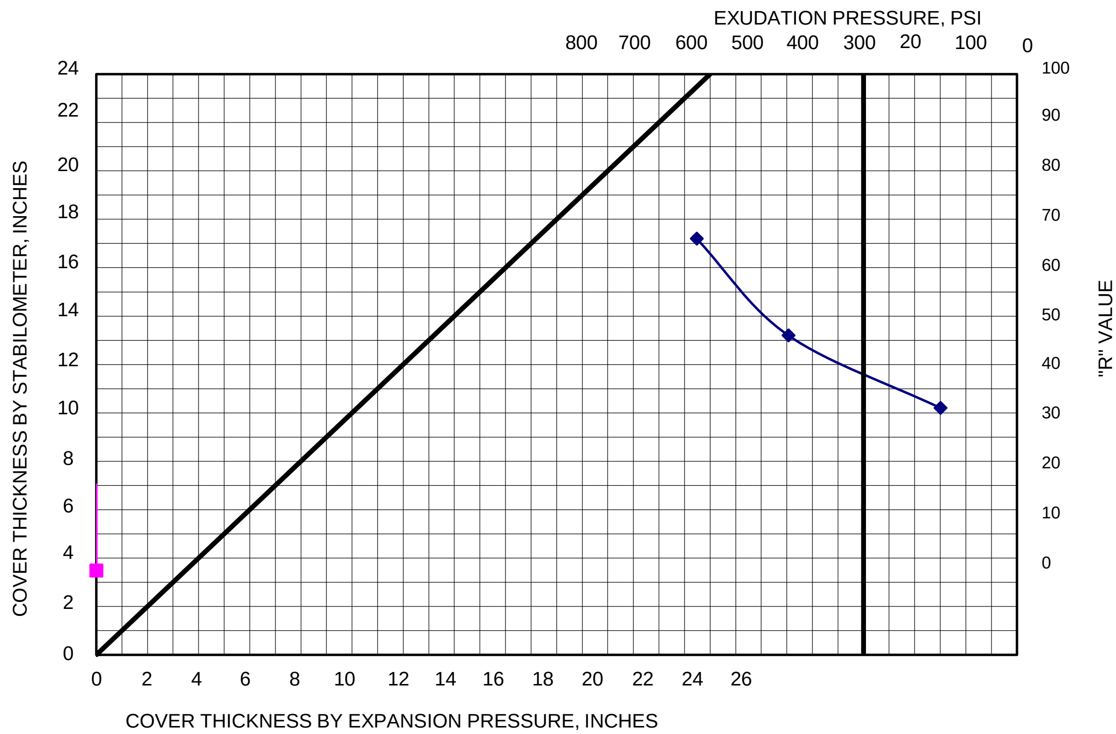
R-Value Test

Caltrans Test Method 301

700 22nd St.
Bakersfield, CA 93301
Ph: (661) 327-0670
Fax: (661) 324-4217

Project Name: Lockheed Martin Solar Project
Project Number: G19-139-11B
Lab Tracking ID: B19-159
Sample Location: B-13 @ 0.0-5.0 feet bgs

Sample Date: 7/10/2019
Test Date: 8/7/2019
Report Date: 8/8/2019
Tested By: ILT Remotigue



Sample Description: SM:SILTY SAND; brown; fine to Coarse; moist.

SPECIMEN	A	B	C
EXUDATION PRESSURE, LOAD (lb)	7866	5613	1876.9
EXUDATION PRESSURE, PSI	626	447	149
EXPANSION, * 0.0001 IN	0.0023	-0.0055	-0.0053
EXPANSION PRESSURE, PSF	0	0	0
STABILOMETER PH AT 2000 LBS	42	68	94
DISPLACEMENT	3.62	3.96	3.86
RESISTANCE VALUE "R"	66	46	31
"R" VALUE CORRECTED FOR HEIGHT	66	46	31
% MOISTURE AT TEST	7.1	7.6	8.1
DRY DENSITY AT TEST, PCF	131.2	125.6	125.1
"R" VALUE AT 300 PSI EXUDATION PRESSURE	**37**		
"R" VALUE BY EXPANSION PRESSURE TI = 4.0, GF=1.50	**N/A**		

Reviewed By: *Ian Leo T. Remotigue*

APPENDIX C

GEOLOGIC/ SEISMIC HAZARDS EVALUATION

Appendix C

Geologic/Seismic Hazard Evaluation
Lockheed Martin Palmdale Solar Project
NE Corner of E Rancho Vista Blvd & 10th Street E
Palmdale, California
BSK Project G19-139-11B

August 15, 2019

Table of Contents

TABLES

FIGURES

C1.0 INTRODUCTION

This report presents the geologic and seismic hazards evaluation prepared in accordance with 2016 California Building Code (CBC), CCR Title 24, Chapters 16 and 18 requirements for a Geotechnical/Engineering Geologic Report.

C1.1 Objective and Scope of Services

The objective of the geologic and seismic hazards assessment is to provide the Client with an evaluation of potential geologic or seismic hazards that may be present at the site or due to regional influences. BSK's scope of services for this assessment included the following: a review of published geologic literature; an evaluation of the data collected; determination of site class and seismic design parameters; updated liquefaction and seismic settlement analyses.

C1.2 Site Location

The Lockheed Martin Palmdale Solar Project is located at the NE Corner of E Rancho Vista Blvd & 10th Street E in Palmdale, Los Angeles County, California (Site). The Site coordinates of the center of the property are:

Latitude 34.60568ºN
Longitude -118.10769ºW

C1.3 Site Topography

As shown on Figure C-1, the Site and surrounding area topography is relatively flat with a ground surface elevation between 2,580 feet and 2,590 feet msl, USGS datum. The Site and surrounding area slopes down slightly to the southwest. An intermittent stream is mapped along the wester portion of the Site.

C1.4 Groundwater Conditions

The Site is within the Antelope Valley Groundwater Basin. This groundwater basin includes approximately the area south of the Tehachapi Mountains and north of the San Gabriel Mountains. The primary water-bearing materials are Pleistocene and Holocene age unconsolidated alluvial and lacustrine deposits that consist of compact gravels, sand, silt, and clay.

At the time of the field exploration in July 2019, groundwater was not encountered in our soil borings completed to a depth of 51.5 below the ground surface (bgs). To ascertain groundwater levels for the area during other time periods, groundwater elevation data from the California Department of Water Resources (DWR) were obtained for the period 1955 to 1980. Water level hydrographs from wells in the vicinity Site are presented on Figure C-2. The hydrographs indicate that, in the vicinity of the Site, the historical shallowest depth to groundwater was approximately 290 feet below the ground surface (bgs).

C2.0 GEOLOGIC SETTING

The Site is located in Mojave Desert geomorphic province. The Mojave Desert is characterized by block-faulted mountain ranges and intervening valleys. Broad alluvial fans have formed along the transition of the ranges and valleys. The western part of the Mohave Desert is bounded by two major active faults, the Garlock Fault to the north and the San Andreas Fault to the south.

South of the Site are the San Gabriel Mountains that generally consist of Mesozoic granitic rocks and minor Cenozoic volcanic Rocks. The Tehachapi Mountains consisting of Mesozoic metamorphic and granitic rocks are located west of the Site. As shown on Figure C-3, the Site is situated on alluvial fan deposits originating from the hills located to the south.

C2.1 Subsurface Soil Conditions

Subsurface conditions are described in the main body of the report. The Site was the subject of a field investigation program in July 2019 consisting of 14 soil borings. The subsurface units consist of predominately sand and silty sand.

C3.0 GEOLOGIC/SEISMIC HAZARDS

The types of geologic and seismic hazards assessed include surface ground fault rupture, liquefaction, seismically induced settlement, slope failure, flood hazards and inundation hazards.

C3.1 Flood and Inundation Hazards

An evaluation of flooding at the Site includes review of potential hazards from flooding during periods of heavy precipitation. Federal Emergency Management Agency (FEMA) flood hazard data was obtained to present information regarding the potential for flooding at the Site. As shown on Figure C-4, according to FEMA Flood Hazard Map Layer GIS data, NFHL_06037C, Dated 2/4/2018, the Site lies in Zone X: areas with a 0.2% chance of flooding each year (500 year flood zone).

C3.2 Flooding Scour

The intermittent stream channels and arroyos may experience significant flow volumes and velocities during flooding events. Scour may occur on structures placed near channels undermining and causing damage to the structure or foundation.

C3.3 Fault Rupture Hazard Zones in California

The purpose of the Alquist-Priolo Geologic Hazards Zones Act, as summarized in CDMG Special Publication 42 (SP 42), is to "prohibit the location of most structures for human occupancy across the traces of active faults and to mitigate thereby the hazard of fault-rupture." As indicated by SP 42, "the State Geologist is required to delineate "earthquake fault zones" (EFZs) along known active faults in California. Cities and counties affected by the zones must regulate certain development 'projects' within the zones. They must withhold development permits for sites within the zones until geologic investigations demonstrate that the sites are not threatened by surface displacement from future faulting.

As shown on Figure C-5, the Site is not located in a Fault-Rupture Hazard Zone. The closest Fault-Rupture Hazard Zone is associated with the San Andreas Fault located approximately 2.5 miles south of the Site.

C3.4 State of California Seismic Hazard Zones (Liquefaction and Landslides)

Zones of Required Investigation referred to as "Seismic Hazard Zones" in CCR Article 10, Section 3722, are areas shown on Seismic Hazard Zone Maps where site investigations are required to determine the need for mitigation of potential liquefaction and/or earthquake-induced landslide ground displacements. As shown on Figure C-5, the Site is not located in a Seismic Hazard Zone.

C3.5 Slope Stability and Potential for Slope Failure

The Site and surrounding areas are essentially flat and the potential hazard due to landslides from adjacent properties is not applicable.

C3.6 Land Subsidence

Land subsidence in California generally occurs in areas of fluid removal (petroleum and groundwater) and in arid areas due to hydrocompaction of loose near-surface soils.

The Site is not located in an area susceptible to significant subsidence due to petroleum or groundwater withdrawal. The Antelope Valley Groundwater Basin has reported ground subsidence due to groundwater withdrawal in the area to the north near Lancaster. The area of identified current and historical subsidence in the Antelope Valley Groundwater Basin is approximately 4 miles north of the Site (USGS). Given that the current groundwater usage at the Site remains at current levels, subsidence at the Site would not be significant.

Hydrocompaction is the consolidation of loose dry surface soils from the infiltration of water. Materials of unusually low density deposited in areas of low rainfall undergo significant compaction when they become thoroughly wetted. Laboratory testing of soil samples for collapse potential indicate that the site soils would not settle significantly due to hyrdrocompaction.

C3.7 Frost Heave

Frost heave is the result of water forming ice layers due to the freezing of soil causing an increase in volume. The increase in volume can damage to surface improvements such as concrete slab-on-grade floors and exterior walkways. According to the Maximum Depth of Frost Penetration Map (Sowers, 1979), the depth of frost penetration in the site area is less than six inches.

C4.0 SEISMIC HAZARD ASSESSMENT

C4.1 Seismic Source Deaggregation

Figure C-6 presents fault maps showing the major faults that may impact the Site in the future. Seismically induced ground motion at a Site can be caused by earthquakes on any of the sources surrounding the site. Deaggregation of the seismic hazard was performed by using the USGS Interactive Deaggregation website. The deaggregation determination, at the maximum considered earthquake (MCE) hazard level, results in distance, magnitude and epsilon (ground-motion uncertainty) for each source that contributes to the hazard. Each source has a corresponding epsilon, which is the probabilistic value relative to the mean value of ground motion for that source.

Deaggregation based on a probabilistic model developed by the USGS indicates that the extreme seismic source with the highest magnitude that contributes to the peak ground acceleration (PGA) is a magnitude 7.93 earthquake from the San Andreas Fault. For liquefaction and seismic settlement, the modal magnitude (Mw) of 7.90 would be appropriate for probabilistic input parameter that is consistent with the design earthquake ground motion.

C4.2 Earthquake Ground Motion, 2016 California Building Code

C4.2.1 Site Class

Based on Section 1613A.3.2 of the 2016 California Building Code (CBC), the Site shall be classified as Site Class A, B, C, D, E or F based on the Site soil properties and in accordance with Chapter 20 of ASCE 7-10. Based on the "N" values from our soil borings, as per Table 20.3-1 of ASCE 7-10, the Site is Class D ($15 < N < 50$).

C4.2.2 Seismic Design Criteria

The 2016 California Building Code (CBC) utilizes ground motion based on the Risk-Targeted Maximum Considered Earthquake (MCE_R) that is define in the 2016 CBC as the most severe earthquake effects considered by this code, determined for the orientation that results in the largest maximum response to horizontal ground motions and with adjustment for targeted risk. Ground motion parameters in the 2016 CBC are based on ASCE 7-10, Chapter 11.

The United States Geologic Survey (USGS) has prepared maps presenting the Risk-Targeted MCE spectral acceleration (5% damping) for periods of 0.2 seconds (SS) and 1.0 seconds (S1). The values of SS and S1 can be obtained from the OSHPD Seismic Design Maps Application available at:
https://seismicmaps.org/

The USGS Ground Motion Parameter Application and Chapter 16A of 2016 CBC based on ASCE 7-10 produced the following values based on Site Class D conditions:

TABLE C-1
SPECTRAL ACCELERATION PARAMETERS
RISK TARGETED MAXIMUM CONSIDERED EARTHQUAKE

Criteria	Value		Reference
MCE Mapped Spectral Acceleration (g)	$S_S = 1.924$	$S_1 = 0.915$	USGS Mapped Value
Site Coefficients (Site Class D)	Fa = 1.00	Fv = 1.500	ASCE Table 11.4
Site Adjusted MCE Spectral Acceleration (g)	$S_{MS} = 1.924$	$S_{M1} = 1.373$	ASCE Equations 11.4.1-2
Design Spectral Acceleration (g)	$S_{DS} = 1.283$	$S_{D1} = 0.915$	ASCE Equations 11.4.3-4

C4.2.3 Geometric Mean Peak Ground Acceleration

As per Section 1803A.5.12 of the CBC, peak ground acceleration (PGA) utilized for dynamic lateral earth pressures and liquefaction, shall be based on a site-specific study (ASCE 7-10, Section 21.5) or ASCE 7-10, Section 11.8.3. The USGS Ground Motion Parameter Application based on ASCE 7-10, Section11.8.3 produced the values shown in Table C-2, based on Site Class D conditions.

TABLE C-2 GEOMETRIC MEAN PEAK GROUND ACCELERATION MAXIMUM CONSIDERED EARTHQUAKE		
Criteria	**Value**	**Reference**
Mapped Peak Ground Acceleration (g)	PGA = 0.754	USGS Mapped Value
Site Coefficients (Site Class D)	F_{PGA} = 1.000	ASCE Table 11.8-1
Geometric Mean PGA (g)	PGA_M = 0.754	ASCE Equations 11.8-1

For liquefaction analysis and seismic settlement calculations a PGA of 0.754g should be used.

C4.2.4 Seismic Design Category

As shown above, the short period design spectral response acceleration coefficient, S_{DS}, is greater than 0.50, therefore the Site lies in Seismic Design Category D as specified in Section 1613A.3.5 of the 2016 CBC. The long period spectral response acceleration coefficient, S_1, is greater than 0.75, therefore the Site lies in Seismic Design Category E, based on Risk Category II. When S_1 is greater than or equal to 0.75g, the Seismic Design Category is E for buildings in Risk Categories I, II, and III, and F for those in Risk Category IV.

C4.4 Liquefaction

Liquefaction describes a condition in which a saturated, cohesionless soil loses shear strength during earthquake shocks. Ground motion from an earthquake may induce cyclic reversals of shearing strains of large amplitude. Lateral and vertical movements of the soil mass, combined with loss of bearing strength, usually result from this phenomenon. Historically, liquefaction of soils has caused severe damage to structures, berms, levees and roads. Seed and Idriss (1971) demonstrated that liquefaction potential depends on soil type, void ratio, depth to groundwater, duration of shaking and confining pressures over the potentially liquefiable soil mass. Fine, well-sorted, loose sand, shallow groundwater, severe seismic ground motion and particularly long durations of ground shaking are conditions conducive for liquefaction.

The historical and current depth to groundwater is greater than 50 feet bgs, therefore, the potential for liquefaction is low.

C4.5 Seismically-Induced Settlement

Settlement of the ground surface with consequential differential movement of structures is a major cause of seismic damage for buildings founded on alluvial deposits. Vibration settlement of relatively dry and loose granular deposits beneath structures can be readily induced by the horizontal components of ground shaking associated with even moderate intensity earthquakes. Silver and Seed (1971) have demonstrated that settlement of dry sands due to cyclic loading is a function of: 1) the relative density of the soil; 2) the magnitude of the cyclic shear stress; and, 3) the number of strain cycles. As indicated above, seismically-induced ground settlement can also occur due to the liquefaction of relatively loose, saturated granular deposits.

A seismic settlement analysis was performed using the program Liquefy Pro version 5.8k Input parameters for the liquefaction and settlement analysis were based upon:

- Boring data from B-13.
- PGA based on ASCE 7-10 value of PGAM = 0.754g.
- Modal magnitude 7.90 from Deaggregation of the seismic hazard.
- Assumed depth to groundwater of greater than 50 feet bgs.
- A Factor-of-Safety of 1.3 was used for analysis.

Based on the analysis using the above parameters using data from B-13, the total estimated settlement is 1.4 inches with differential settlement estimated to be 0.7 inch.

C5.0 REFERENCES

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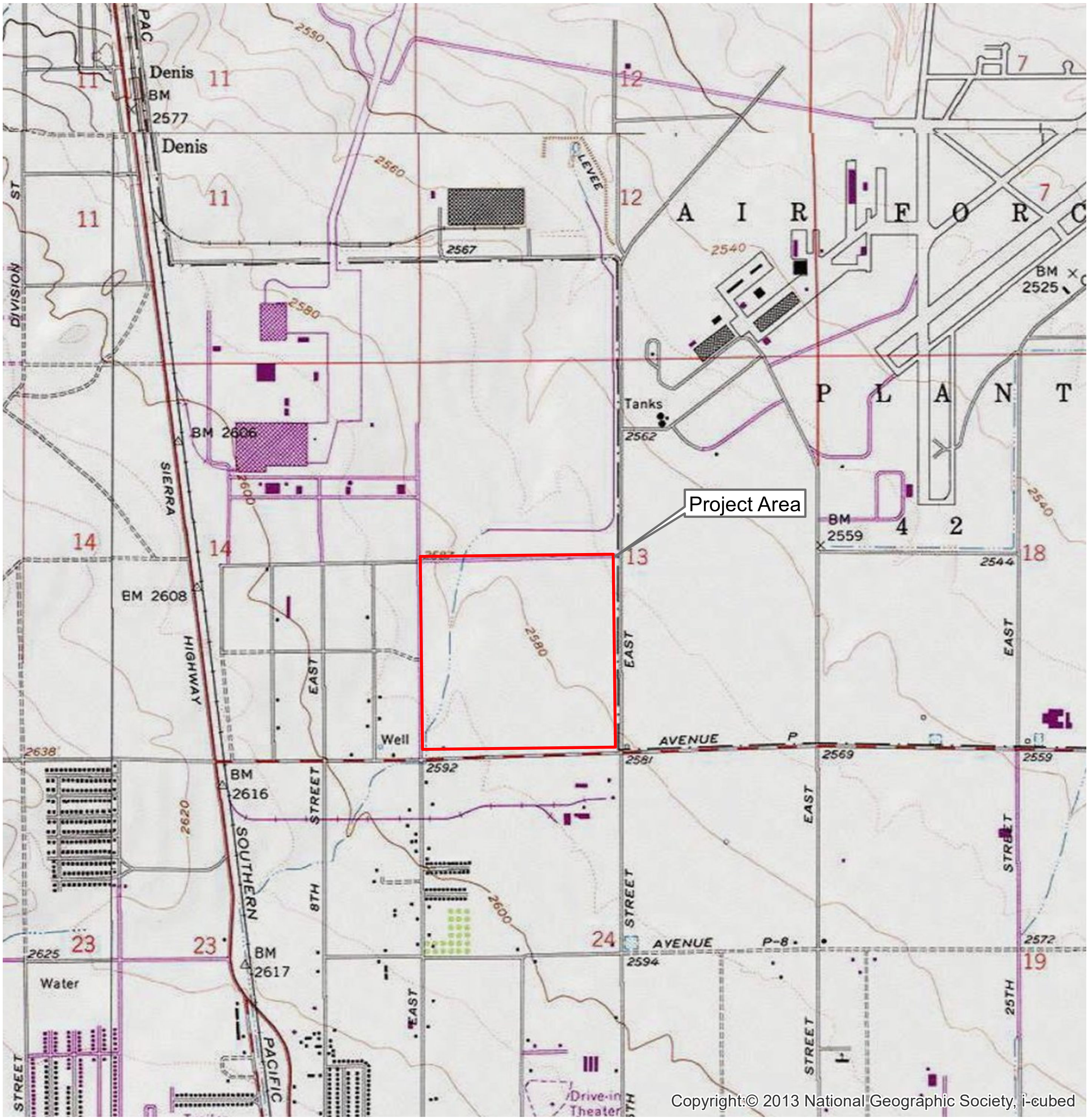

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Feet

Map Date: 8/8/2019

Reference: http://atlas.ca.gov/quads/

BSK ASSOCIATES

Lockheed Martin Palmdale Solar Project
NE Corner of E Rancho Vista Blvd &
10th Street E
Palmdale, California

Figure C-1
Topographic Map
BSK Project G1913911B

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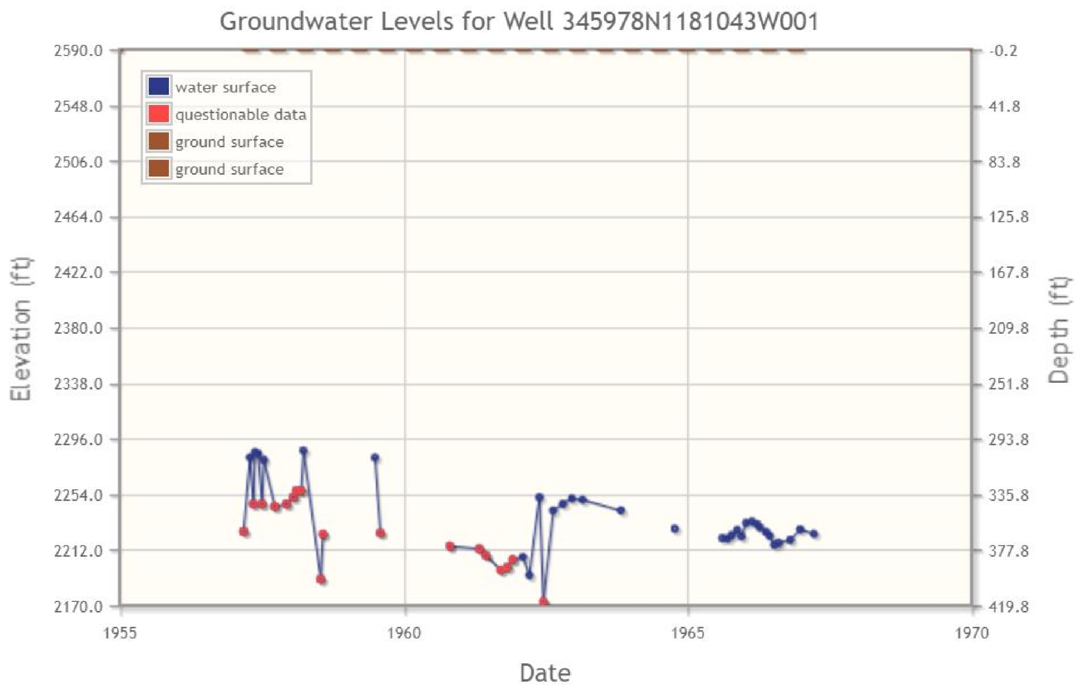
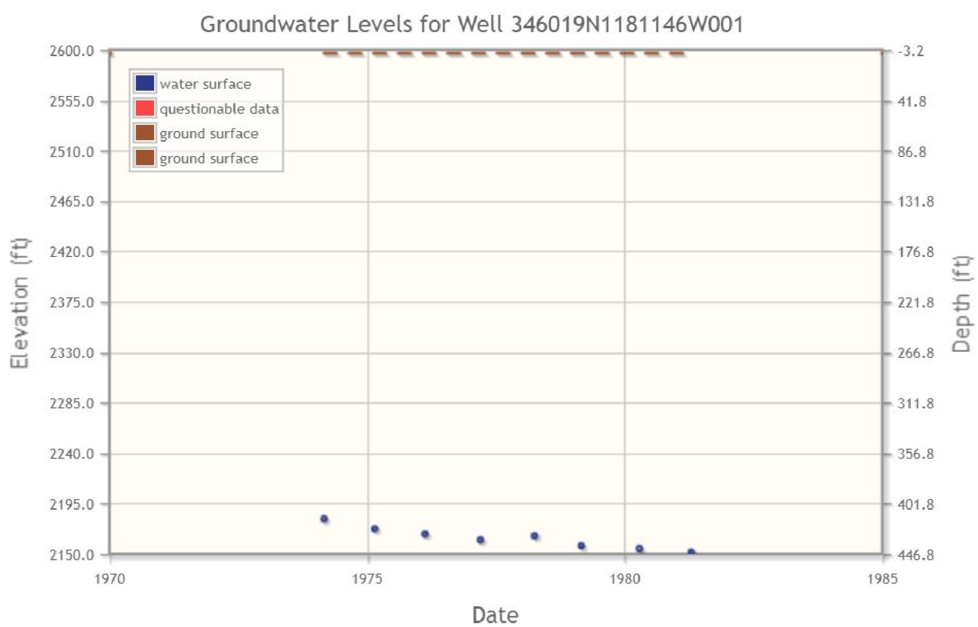


State Well Number: 06N12W24F001S
Latitude (NAD83): 34.597800
Longitude (NAD83): -118.1043
Groundwater Basin (code): Antelope Valley (6-044)
Reference Point Elevation (NAVD88 ft): 2589.800
Ground Surface Elevation (NAVD88 ft): 2589.800



State Well Number: 06N12W14R001S
Latitude (NAD83): 34.601900
Longitude (NAD83): -118.1146
Groundwater Basin (code): Antelope Valley (6-044)
Reference Point Elevation (NAVD88 ft): 2596.800
Ground Surface Elevation (NAVD88 ft): 2596.800

Map Date: 8/8/2019

Reference: http://www.water.ca.gov/waterdatalibrary/index.cfm

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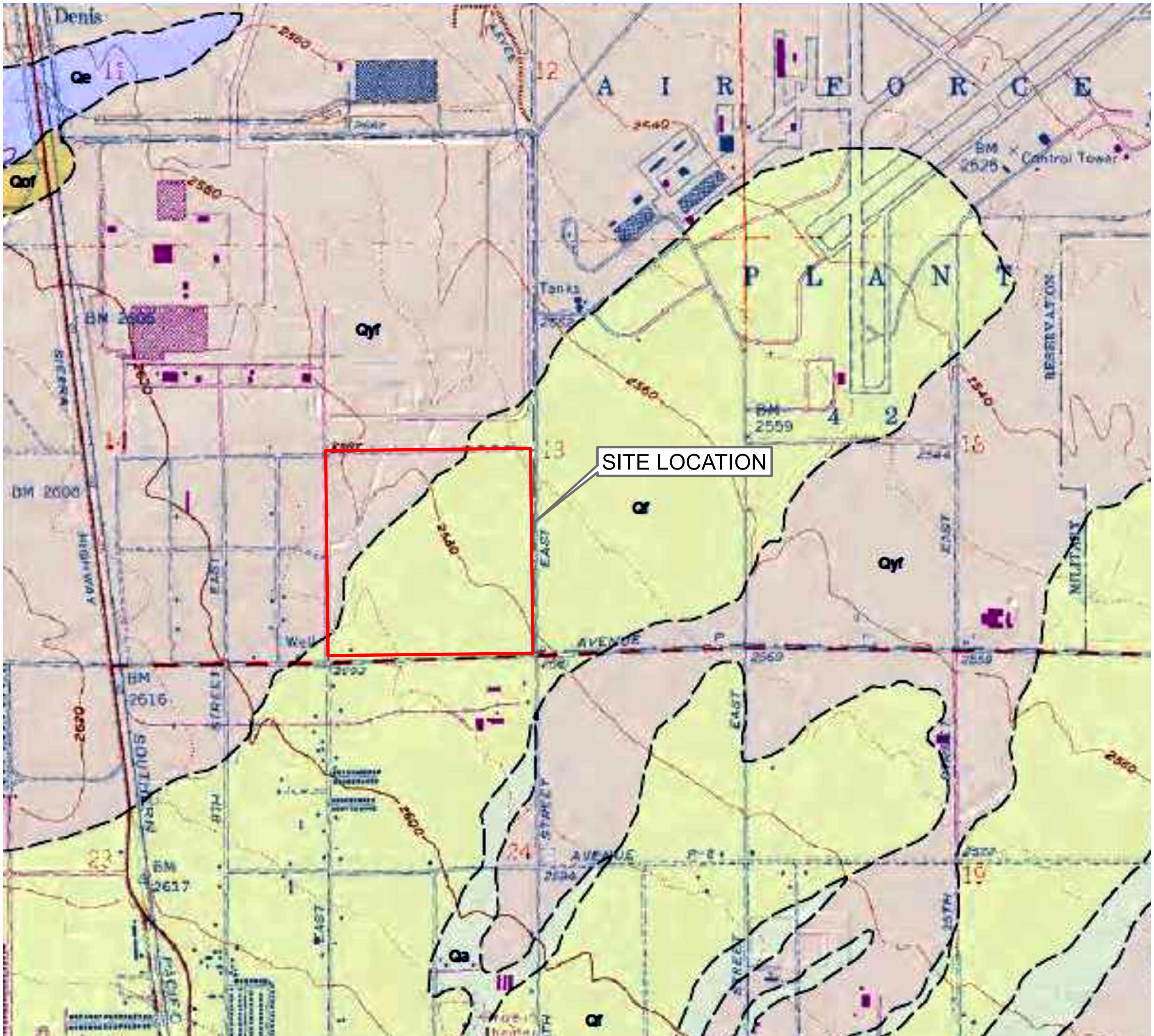
Lockheed Martin Palmdale Solar Project
NE Corner of E Rancho Vista Blvd &
10th Street E
Palmdale, California

Figure C-2
Area Hydrographs
BSK Project G1913911B



Legend

Qa - Modern alluvium (Holocene) – Unconsolidated to weakly consolidated, mostly undissected, fluvial gravel, sand, and silt.
Qe - Eolian deposits (late Holocene) – Unconsolidated, generally well-sorted wind-blown sand; occurs as sheet sand.
Qf - Modern alluvial fan deposits (Holocene) – Unconsolidated to weakly consolidated, poorly sorted, gravel, sand, and silt deposits forming active, essentially undissected, alluvial fans.
Qyf - Young alluvial fan deposits (middle to early Holocene) – Unconsolidated to weakly consolidated, dark yellowish-brown, fine to medium arkosic sand with fine gravel.
Qof - Older fan deposits (late to middle Pleistocene) – Slightly to moderately consolidated, poorly sorted, coarse gravel and boulder fan deposit.

0 0.175 0.35 0.7
Miles

N W E S

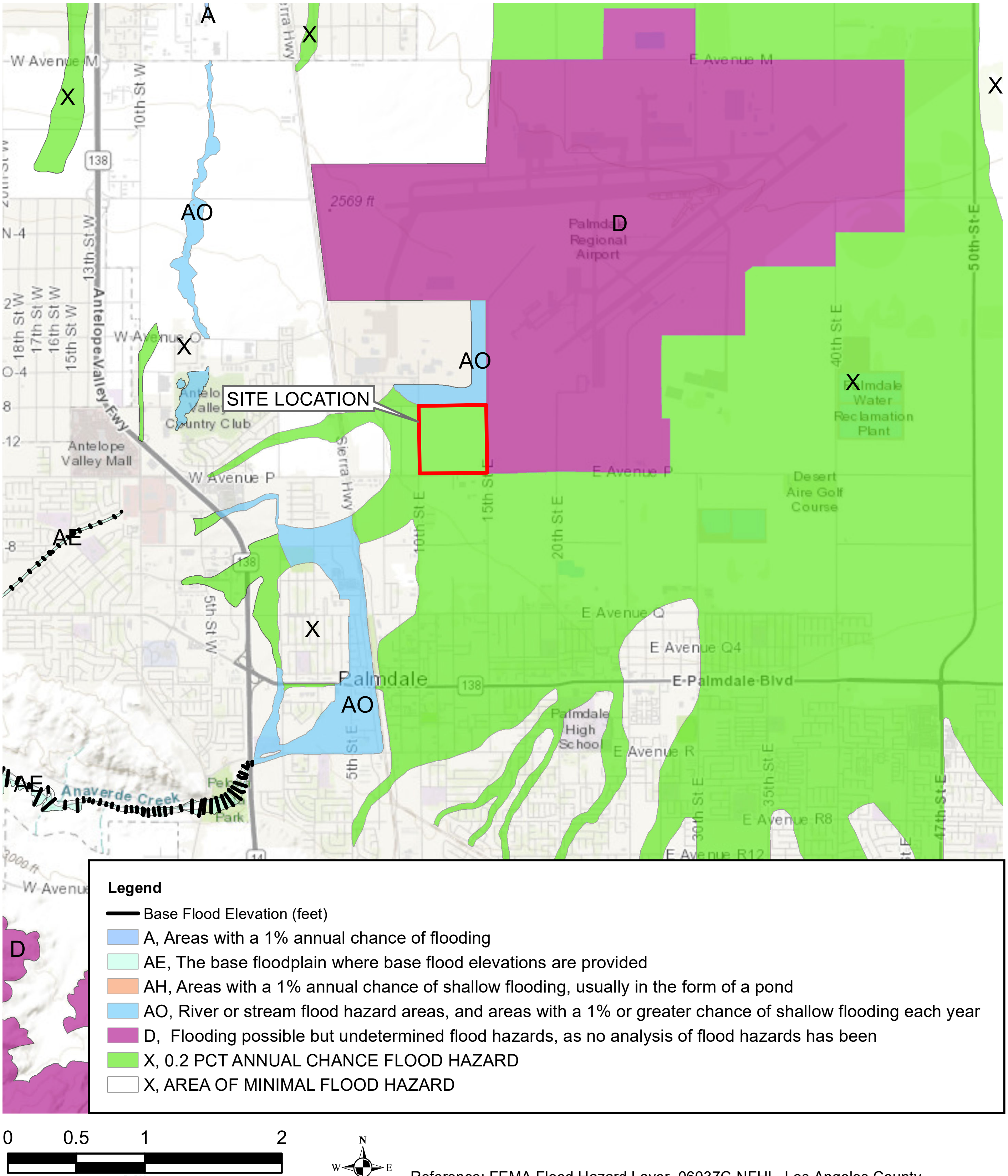
Reference: Soutehrn California Surfical Deposits, California Geological Survey
Special Report Issue, SR 217, 2010

Document Path: T:\GIS-Files\Project-Files\Geotech\G1913911B - Lockeed Martin Solar\Figure C-3 Geology.mxd

Map Date: 8/9/2019

BSK ASSOCIATES

Lockheed Martin Palmdale Solar Project NE Corner of E Rancho Vista Blvd & 10th Street E Palmdale, California	Figure C-3 Geologic Map BSK Project G1913911B



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Map Date: 8/12/2019

Reference: FEMA Flood Hazard Layer, 06037C-NFHL, Los Angeles County, California NFHL Extract, 2/4/2018

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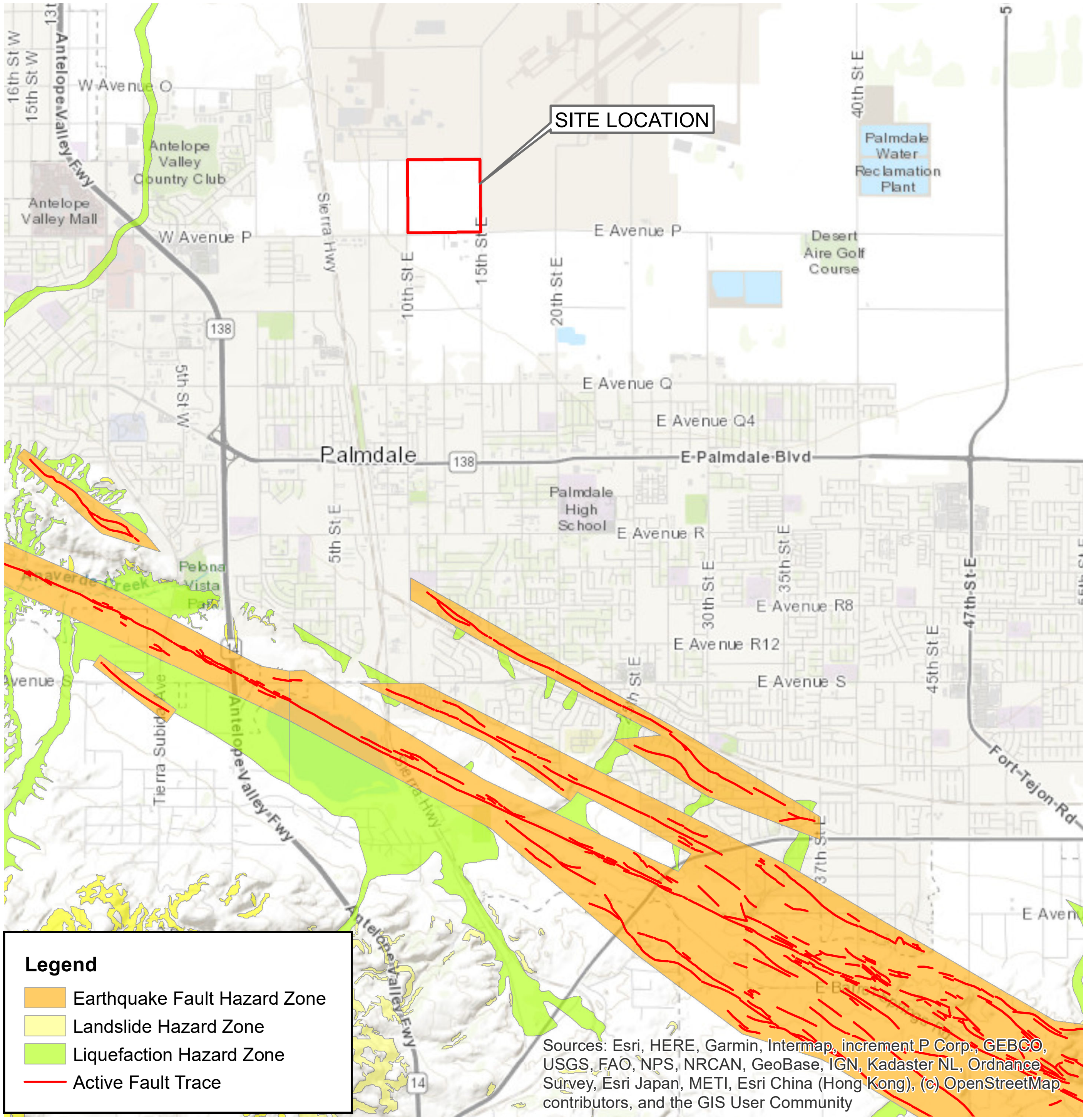
Lockheed Martin Palmdale Solar Project NE Corner of E Rancho Vista Blvd & 10th Street E Palmdale, California	Figure C-4 Flood Hazard Map BSK Project G1913911B



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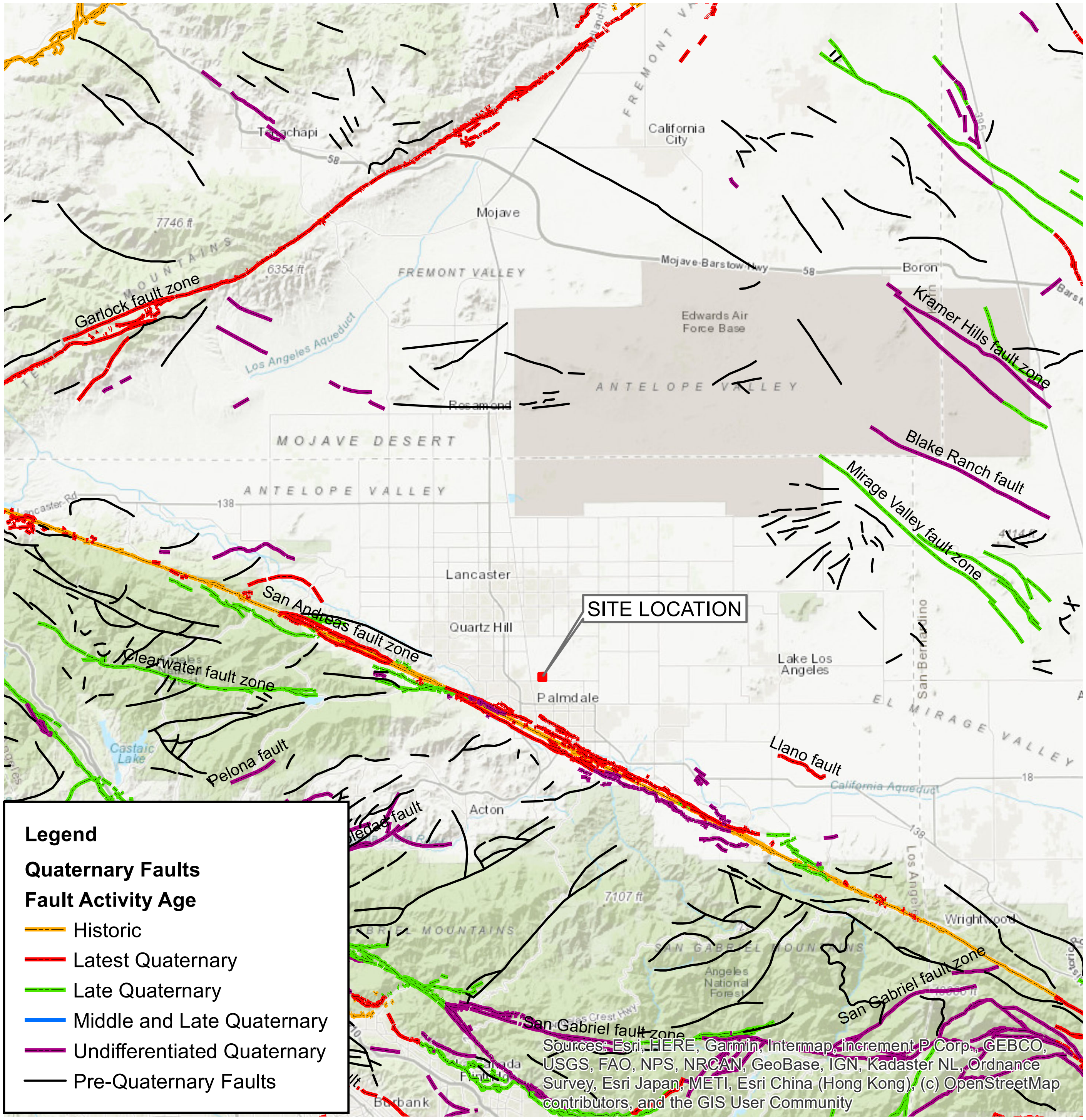
Reference: California Geologic Survey, 2018, Regulatory Maps Portal, accessed April 2018, from CGS web site: http://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=regulatorymaps

Map Date: 8/12/2019

BSK ASSOCIATES

Lockheed Martin Palmdale Solar Project NE Corner of E Rancho Vista Blvd & 10th Street E Palmdale, California	Figure C-5 A-P Earthquake Fault and Seismic Hazard Zones BSK Project G1913111B

Document Path: T:\GIS-Files\Project-Files\Geotech\G1913911B - Lockeed Martin Solar\Figure C-5 AP Faults.mxd



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Reference: Quaternary Faults=USGS Quaternary Fault Database
ftp://hazards.cr.usgs.gov/maps/qfault/
Pre-Quarternary Faults= Fault Activity Map of California (2010) California Geological Survey
https://maps.conservation.ca.gov/cgs/fam/app/

Document Path: T:\GIS-Files\Project-Files\Geotech\G1913911B - Lockeed Martin Solar\Figure C-6 fault map.mxd

Map Date: 8/9/2019

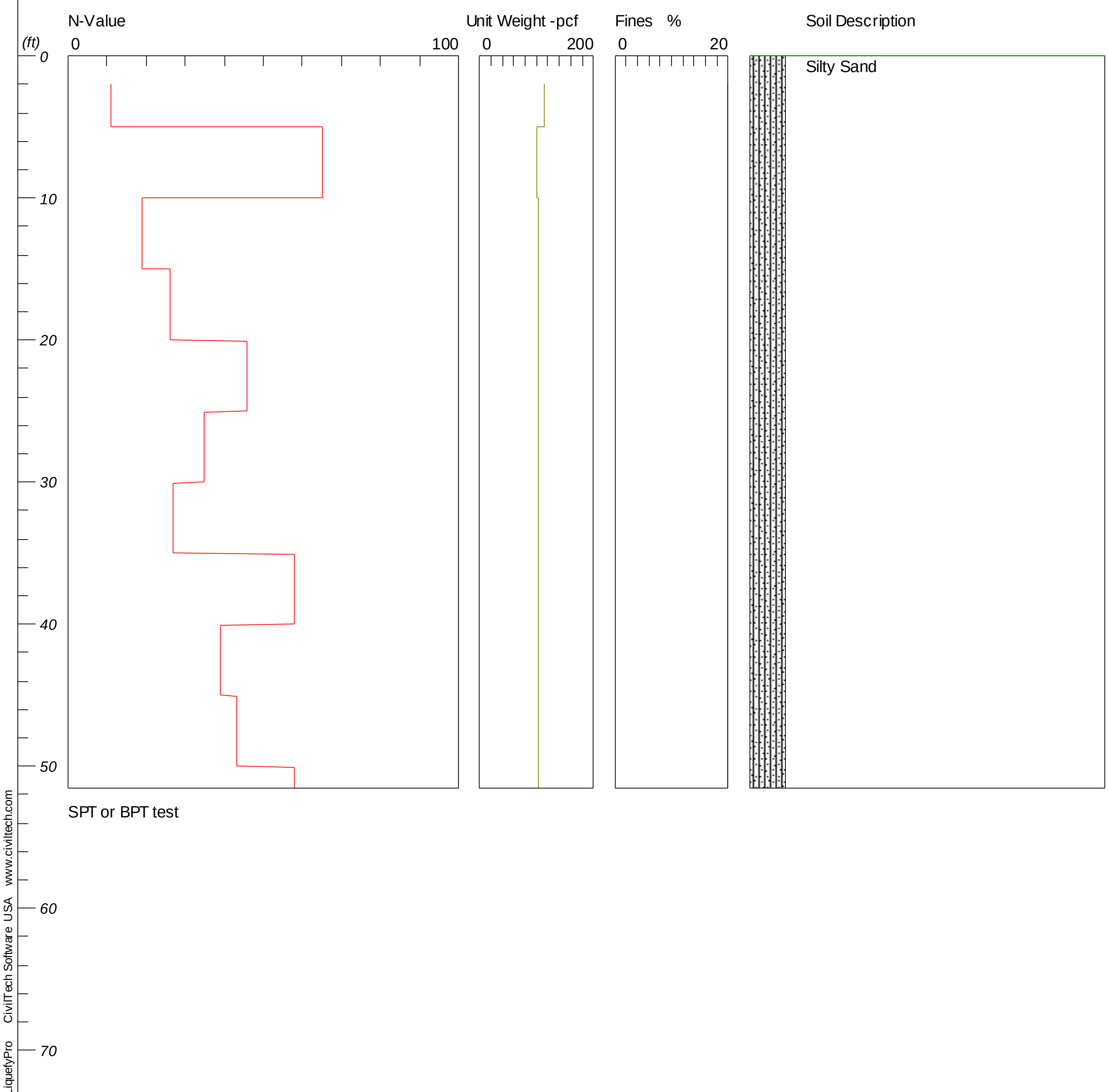
BSK ASSOCIATES

Lockheed Martin Palmdale Solar Project NE Corner of E Rancho Vista Blvd & 10th Street E Palmdale, California	Figure C-6 Area Fault Map BSK Project G1913111B

LIQUEFACTION ANALYSIS

Lockheed Martin Palmdale Solar Project

Hole No.=B-13 Water Depth=100 ft ***Magnitude=7.90***
Acceleration=0.754g

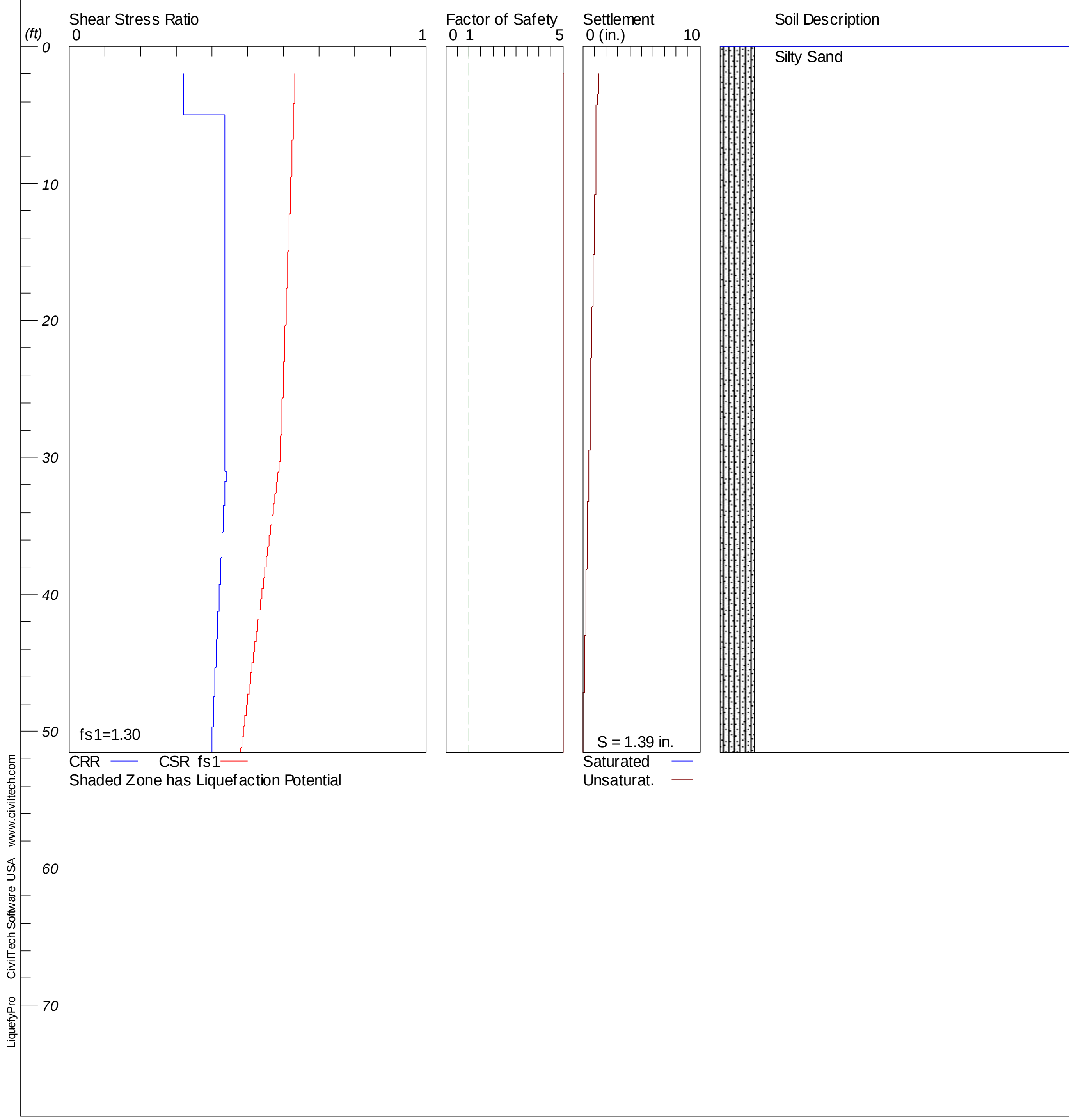


BSK Associates

LIQUEFACTION ANALYSIS
Lockheed Martin Palmdale Solar Project

Hole No.=B-13   Water Depth=100 ft

Magnitude=7.90
Acceleration=0.754g



BSK Associates

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LIQUEFACTION ANALYSIS SUMMARY
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Input File Name: T:\Project Docs\G1913811B - Lockhead Martin Solar - Palmdale\B-13.liq
Title: Lockheed Martin Palmdale Solar Project
Subtitle:

Surface Elev.=
Hole No.=B-13
Depth of Hole= 51.50 ft
Water Table during Earthquake= 100.00 ft
Water Table during In-Situ Testing= 100.00 ft
Max. Acceleration= 0.75 g
Earthquake Magnitude= 7.90

Input Data:

Surface Elev.=
Hole No.=B-13
Depth of Hole=51.50 ft
Water Table during Earthquake= 100.00 ft
Water Table during In-Situ Testing= 100.00 ft
Max. Acceleration=0.75 g
Earthquake Magnitude=7.90
No-Liquefiable Soils: Based on Analysis

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Tokimatsu, M-correction
3. Fines Correction for Liquefaction: Stark/Olson et al.*
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
6. Hammer Energy Ratio, Ce = 1.3
7. Borehole Diameter, Cb= 1.15
8. Sampling Method, Cs= 1.2
9. User request factor of safety (apply to CSR) , User= 1.3
   Plot one CSR curve (fs1=User)
10. Use Curve Smoothing: No

* Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
2.00	11.00	114.00	20.00
5.00	65.00	100.00	20.00
10.00	19.00	104.00	20.00
15.00	26.00	104.00	20.00
20.00	46.00	104.00	20.00
25.00	35.00	104.00	20.00
30.00	27.00	104.00	20.00
35.00	58.00	104.00	20.00
40.00	39.00	104.00	20.00
45.00	43.00	104.00	20.00
50.00	58.00	104.00	20.00

Output Results:

Settlement of Saturated Sands=0.00 in.
Settlement of Unsaturated Sands=1.39 in.
Total Settlement of Saturated and Unsaturated Sands=1.39 in.
Differential Settlement=0.694 to 0.916 in.

APPENDIX D

THERMAL RESISTIVITY TEST RESULTS

Laboratory Report for
BSK Associates Engineers & Laboratories

LM Solar Project, G19-139-11B

August 8, 2019

Daniel B. Stephens & Associates, Inc.

4400 Alameda Blvd. NE, Suite C • Albuquerque, New Mexico 87113

August 8, 2019

Adam Terronez
BSK Associates Engineers & Laboratories
700 22nd Street
Bakersfield, CA 93301
(661) 327-0671

Re: DBS&A Laboratory Report for the BSK Associates Engineers & Laboratories LM Solar Project, G19-139-11B

Dear Mr. Terronez:

Enclosed is the report for the BSK Associates Engineers & Laboratories LM Solar Project, G19-139-11B samples. Please review this report and provide any comments as samples will be held for a maximum of 30 days. After 30 days samples will be returned or disposed of in an appropriate manner.

All testing results were evaluated subjectively for consistency and reasonableness, and the results appear to be reasonably representative of the material tested. However, DBS&A does not assume any responsibility for interpretations or analyses based on the data enclosed, nor can we guarantee that these data are fully representative of the undisturbed materials at the field site. We recommend that careful evaluation of these laboratory results be made for your particular application.

The testing utilized to generate the enclosed report employs methods that are standard for the industry. The results do not constitute a professional opinion by DBS&A, nor can the results affect any professional or expert opinions rendered with respect thereto by DBS&A. You have acknowledged that all the testing undertaken by us, and the report provided, constitutes mere test results using standardized methods, and cannot be used to disqualify DBS&A from rendering any professional or expert opinion, having waived any claim of conflict of interest by DBS&A.

We are pleased to provide this service to BSK and look forward to future laboratory testing on other projects. If you have any questions about the enclosed data, please do not hesitate to call.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.
SOIL TESTING & RESEARCH LABORATORY

Joleen Hines
Joleen Hines
Laboratory Manager

Enclosure

Summaries

Summary of Tests Performed

Laboratory Sample Number	Initial Soil Properties[1]			Saturated Hydraulic Conductivity[2]			Moisture Characteristics[3]								Particle Size[4]			Specific Gravity[5]		Air Perm-eability	Atterberg Limits	Thermal Properties
	G	VM	VD	CH	FH	FW	HC	PP	FP	DPP	RH	EP	WHC	K_{unsat}	DS	WS	H	F	C			
B-13 @ 6.0-6.5 feet bgs	X	X																				X
B-13 @ 11.0-11.5 feet bgs	X	X																				X

[1] G = Gravimetric Moisture Content, VM = Volume Measurement Method, VD = Volume Displacement Method
[2] CH = Constant Head Rigid Wall, FH = Falling Head Rigid Wall, FW = Falling Head Rising Tail Flexible Wall
[3] HC = Hanging Column, PP = Pressure Plate, FP = Filter Paper, DPP = Dew Point Potentiometer, RH = Relative Humidity Box, EP = Effective Porosity, WHC = Water Holding Capacity, Kunsat = Calculated Unsaturated Hydraulic Conductivity
[4] DS = Dry Sieve, WS = Wet Sieve, H = Hydrometer
[5] F = Fine (<4.75mm), C = Coarse (>4.75mm)

Notes

Sample Receipt:
Two samples, each in a 2.5" x 6" stainless steel sleeve sealed with end caps, were received on July 30, 2019. The samples were delivered inside a cardboard box with packing material and were received in good order.

Sample Preparation and Testing Notes:
Intact sub-samples were obtained from the bottom of each sleeve by extruding the sample material from their respective sleeve into a sleeve of the same diameter with a shorter length. Each sample was subjected to thermal properties testing at the initial moisture content, the saturated moisture content, and at the oven dry state.

Each thermal properties reading was obtained in the same location, whenever possible.

Summary of Sample Preparation/Volume Changes

	Initial Sample Data[1]		Volume Change Post Saturation[2]		
Sample Number	Moisture Content (%, g/g)	Dry Bulk Density (g/cm^3)	Dry Bulk Density (g/cm^3)	% Volume Change (%)	% of Initial Density (%)
B-13 @ 6.0-6.5 feet bgs	4.3	1.55	1.55	---	100.0%
B-13 @ 11.0-11.5 feet bgs	10.0	1.57	1.57	---	100.0%

[1]Initial Sample Data: The 'as received' dry bulk density and moisture content.

[2]Volume Change Post Saturation: Volume change measurements were obtained after saturated hydraulic conductivity testing.

Notes:
"+" indicates sample swelling, "-" indicates sample settling, and "---" indicates no volume change occurred.

Summary of Thermal Properties

Sample	Reading	Gravimetric Moisture Content (g/g, %)	Volumetric Moisture Content[1] (vol/vol, %)	Dry Bulk Density[1] (g/cm^3)	Temp °C	K W/(m·K)	ρ °C·cm/W	C $MJ/(m^3 \cdot K)$	D mm^2/s
B-13 @ 6.0-6.5 feet bgs	Initial	4.30	6.66	1.55	22.49	0.517	193.2	1.290	0.401
B-13 @ 6.0-6.5 feet bgs	Saturated	24.82	38.42	1.55	22.55	1.426	70.1	2.809	0.508
B-13 @ 6.0-6.5 feet bgs	Oven Dry	0	0	1.55	23.38	0.335	298.6	1.760	0.190
B-13 @ 11.0-11.5 feet bgs	Initial	10.03	15.76	1.57	22.64	1.172	85.3	2.739	0.428
B-13 @ 11.0-11.5 feet bgs	Saturated	25.90	40.67	1.57	22.26	1.413	70.8	3.360	0.420
B-13 @ 11.0-11.5 feet bgs	Oven Dry	0	0	1.57	23.39	0.263	379.9	1.318	0.200

[1]Adjusted for volume changes during testing.

Thermal Properties

Summary of Thermal Properties

Sample	Reading	Gravimetric Moisture Content (g/g, %)	Volumetric Moisture Content[1] (vol/vol, %)	Dry Bulk Density[1] (g/cm^3)	Temp °C	K W/(m·K)	ρ °C·cm/W	C $MJ/(m^3·K)$	D mm^2/s
B-13 @ 6.0-6.5 feet bgs	Initial	4.30	6.66	1.55	22.49	0.517	193.2	1.290	0.401
B-13 @ 6.0-6.5 feet bgs	Saturated	24.82	38.42	1.55	22.55	1.426	70.1	2.809	0.508
B-13 @ 6.0-6.5 feet bgs	Oven Dry	0	0	1.55	23.38	0.335	298.6	1.760	0.190
B-13 @ 11.0-11.5 feet bgs	Initial	10.03	15.76	1.57	22.64	1.172	85.3	2.739	0.428
B-13 @ 11.0-11.5 feet bgs	Saturated	25.90	40.67	1.57	22.26	1.413	70.8	3.360	0.420
B-13 @ 11.0-11.5 feet bgs	Oven Dry	0	0	1.57	23.39	0.263	379.9	1.318	0.200

[1]Adjusted for volume changes during testing.

Thermal Properties Results Sheet for Sample: B-13 @ 6.0-6.5 feet bgs

Job Name: BSK Associates Engineers & Laboratories
Job Number: DB19.1238.00
Sample Number: B-13 @ 6.0-6.5 feet bgs
Project Number: G19-139-11B
Project Name: LM Solar Project

Instrument Description: Decagon KD2 Pro
Probe:
- ☐ KS-1, 6 cm length, 1.3 mm diameter, single needle
- ☐ TR-1, 10 cm length, 2.4 mm diameter, single needle
- ☑ SH-1, 3 cm length, 1.3 mm diameter, dual needle, 6 mm spacing

Test Start Date: 7/31/19

Reading	Water Potential (-cm water)	Gravimetric Moisture Content (g/g, %)	Volumetric Moisture Content[1] (vol/vol, %)	Dry Bulk Density[1] (g/cm^3)	Test Temperature (°C)	K Thermal Conductivity W/(m·K)	ρ Thermal Resistivity °C·cm/W	C Specific Heat Capacity MJ/(m^3·K)	D Thermal Diffusivity (mm^2/s)
Initial	---	4.30	6.66	1.55	22.49	0.517	193.2	1.290	0.401
Saturated	0	24.82	38.42	1.55	22.55	1.426	70.1	2.809	0.508
Oven Dry	---	0	0	1.55	23.38	0.335	298.6	1.760	0.190

--- = Value not measured.

[1] Adjusted for volume changes during testing, if applicable.

Thermal Properties Data

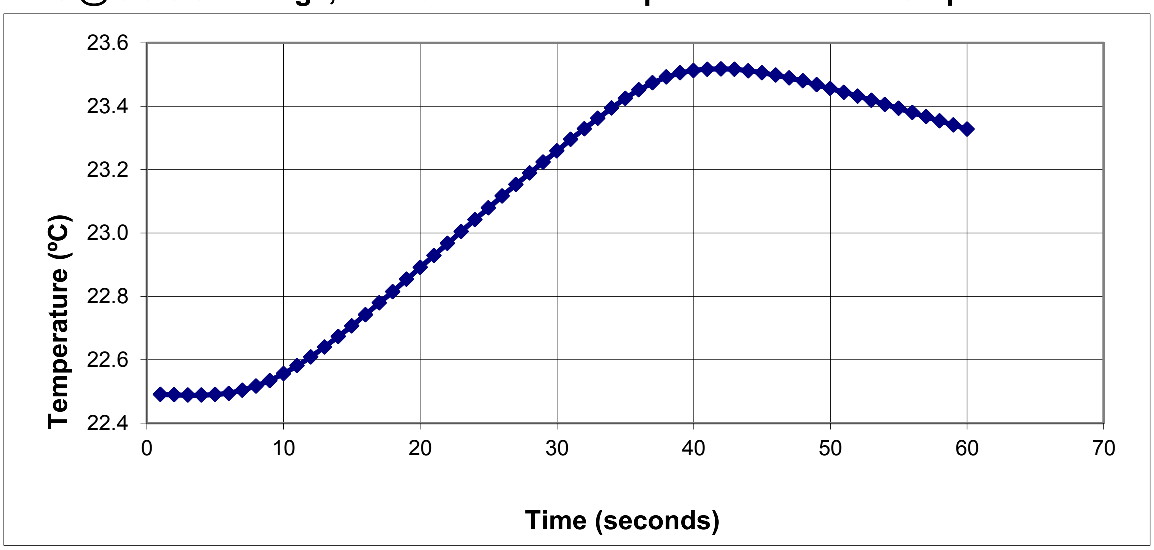
Sample Number: B-13 @ 6.0-6.5 feet bgs
Potential (-cm water): Initial

Test Date/Time:	7/31/2019 12:10 PM	*K (W/(m·K)):*	0.517
Sensor:	SH-1	*ρ (°C·cm/W):*	193.2
Test Temp.(°C):	22.5	*C (MJ/(m³·K)):*	1.290
KD2 Pro Sample ID:	B-6-AR	*D (mm²/s):*	0.401
Power (W/m):	17.020	*Err:*	0.0012
Current (amps):	0.128		

Raw Data

Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)
1	22.490	16	22.742	31	23.295	46	23.498
2	22.489	17	22.779	32	23.329	47	23.489
3	22.488	18	22.815	33	23.362	48	23.480
4	22.488	19	22.854	34	23.394	49	23.468
5	22.490	20	22.891	35	23.425	50	23.456
6	22.494	21	22.929	36	23.452	51	23.444
7	22.504	22	22.967	37	23.474	52	23.432
8	22.517	23	23.005	38	23.492	53	23.419
9	22.534	24	23.042	39	23.505	54	23.406
10	22.556	25	23.079	40	23.513	55	23.393
11	22.581	26	23.117	41	23.517	56	23.380
12	22.609	27	23.153	42	23.518	57	23.367
13	22.640	28	23.189	43	23.517	58	23.354
14	22.673	29	23.224	44	23.512	59	23.341
15	22.707	30	23.259	45	23.506	60	23.328

B-13 @ 6.0-6.5 feet bgs,Potential: Initial - Temperature vs. Time Graph



Laboratory analysis by: D. O'Dowd
Data entered by: A. Albay-Yenney
Checked by: J. Hines

Thermal Properties Data

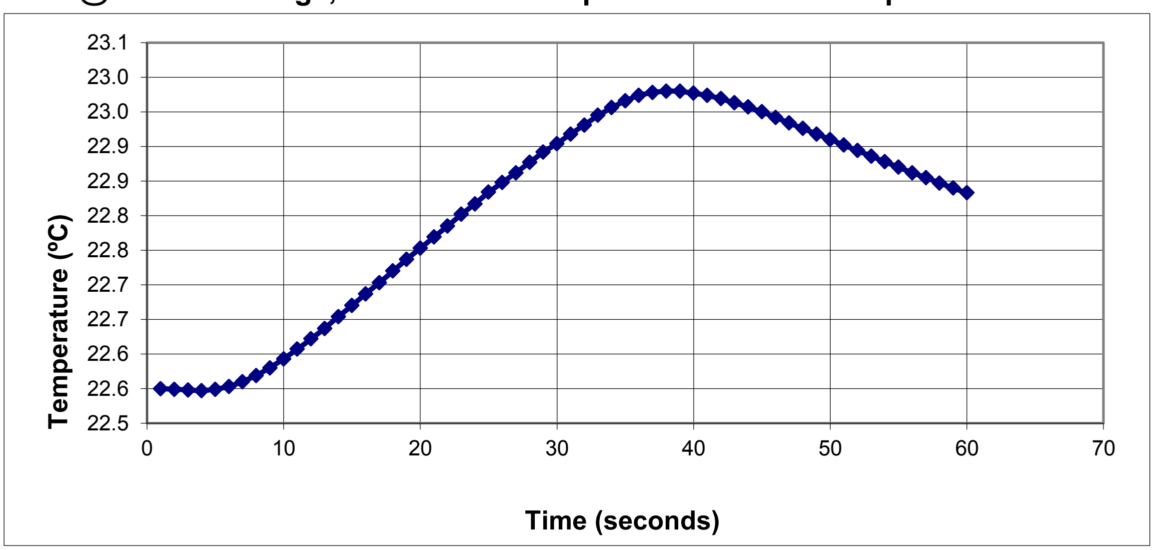
Sample Number: B-13 @ 6.0-6.5 feet bgs
Potential (-cm water): 0

Test Date/Time:	8/1/2019 10:23 AM	*K (W/(m·K)):*	1.426
Sensor:	SH-1	*ρ (°C·cm/W):*	70.1
Test Temp.(°C):	22.6	*C (MJ/(m³·K)):*	2.809
KD2 Pro Sample ID:	B-6-SA	*D (mm²/s):*	0.508
Power (W/m):	17.010	*Err:*	0.0018
Current (amps):	0.128		

Raw Data

Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)
1	22.550	16	22.687	31	22.918	46	22.942
2	22.549	17	22.703	32	22.931	47	22.934
3	22.548	18	22.720	33	22.945	48	22.926
4	22.547	19	22.737	34	22.956	49	22.918
5	22.549	20	22.753	35	22.966	50	22.910
6	22.553	21	22.769	36	22.974	51	22.902
7	22.560	22	22.785	37	22.978	52	22.894
8	22.569	23	22.802	38	22.980	53	22.886
9	22.580	24	22.817	39	22.980	54	22.878
10	22.593	25	22.834	40	22.977	55	22.870
11	22.607	26	22.848	41	22.974	56	22.862
12	22.622	27	22.862	42	22.969	57	22.855
13	22.637	28	22.877	43	22.963	58	22.847
14	22.654	29	22.892	44	22.957	59	22.840
15	22.670	30	22.904	45	22.950	60	22.833

B-13 @ 6.0-6.5 feet bgs,Potential: 0 - Temperature vs. Time Graph



Laboratory analysis by: D. O'Dowd
Data entered by: A. Albay-Yenney
Checked by: J. Hines

Thermal Properties Data

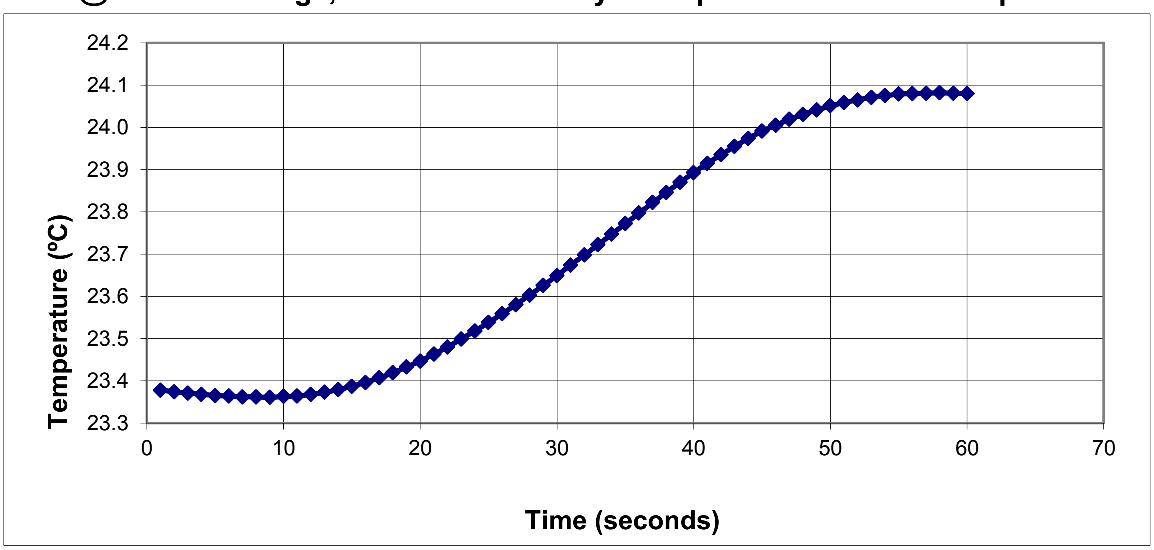
Sample Number: B-13 @ 6.0-6.5 feet bgs
Potential (-cm water): Oven Dry

Test Date/Time:	8/5/2019 2:44 PM	*K (W/(m·K)):*	0.335
Sensor:	SH-1	*ρ (°C·cm/W):*	298.6
Test Temp.(°C):	23.4	*C (MJ/(m³·K)):*	1.760
KD2 Pro Sample ID:	B-6-OD	*D (mm²/s):*	0.190
Power (W/m):	17.000	*Err:*	0.0005
Current (amps):	0.128		

Raw Data

Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)
1	23.378	16	23.396	31	23.674	46	24.005
2	23.374	17	23.407	32	23.698	47	24.019
3	23.371	18	23.419	33	23.722	48	24.031
4	23.368	19	23.433	34	23.747	49	24.041
5	23.365	20	23.447	35	23.772	50	24.051
6	23.364	21	23.463	36	23.797	51	24.059
7	23.362	22	23.480	37	23.822	52	24.065
8	23.362	23	23.499	38	23.846	53	24.071
9	23.361	24	23.518	39	23.870	54	24.075
10	23.363	25	23.538	40	23.893	55	24.079
11	23.364	26	23.559	41	23.915	56	24.080
12	23.368	27	23.580	42	23.935	57	24.081
13	23.373	28	23.603	43	23.955	58	24.082
14	23.379	29	23.626	44	23.974	59	24.081
15	23.387	30	23.649	45	23.991	60	24.080

B-13 @ 6.0-6.5 feet bgs,Potential: Oven Dry - Temperature vs. Time Graph



Laboratory analysis by: D. O'Dowd
Data entered by: A. Albay-Yenney
Checked by: J. Hines

Thermal Properties Results Sheet for Sample: B-13 @ 11.0-11.5 feet bgs

Job Name: BSK Associates Engineers & Laboratories
Job Number: DB19.1238.00
Sample Number: B-13 @ 11.0-11.5 feet bgs
Project Number: G19-139-11B
Project Name: LM Solar Project

Instrument Description: Decagon KD2 Pro
Probe:
- ☐ KS-1, 6 cm length, 1.3 mm diameter, single needle
- ☐ TR-1, 10 cm length, 2.4 mm diameter, single needle
- ☑ SH-1, 3 cm length, 1.3 mm diameter, dual needle, 6 mm spacing

Test Start Date: 7/31/19

Reading	Water Potential (-cm water)	Gravimetric Moisture Content (g/g, %)	Volumetric Moisture Content[1] (vol/vol, %)	Dry Bulk Density[1] (g/cm^3)	Test Temperature (°C)	K Thermal Conductivity W/(m·K)	ρ Thermal Resistivity °C·cm/W	C Specific Heat Capacity MJ/(m^3·K)	D Thermal Diffusivity (mm^2/s)
Initial	---	10.03	15.76	1.57	22.64	1.172	85.3	2.739	0.428
Saturated	0	25.90	40.67	1.57	22.26	1.413	70.8	3.360	0.420
Oven Dry	---	0	0	1.57	23.39	0.263	379.9	1.318	0.200

--- = Value not measured.

[1] Adjusted for volume changes during testing, if applicable.

Thermal Properties Data

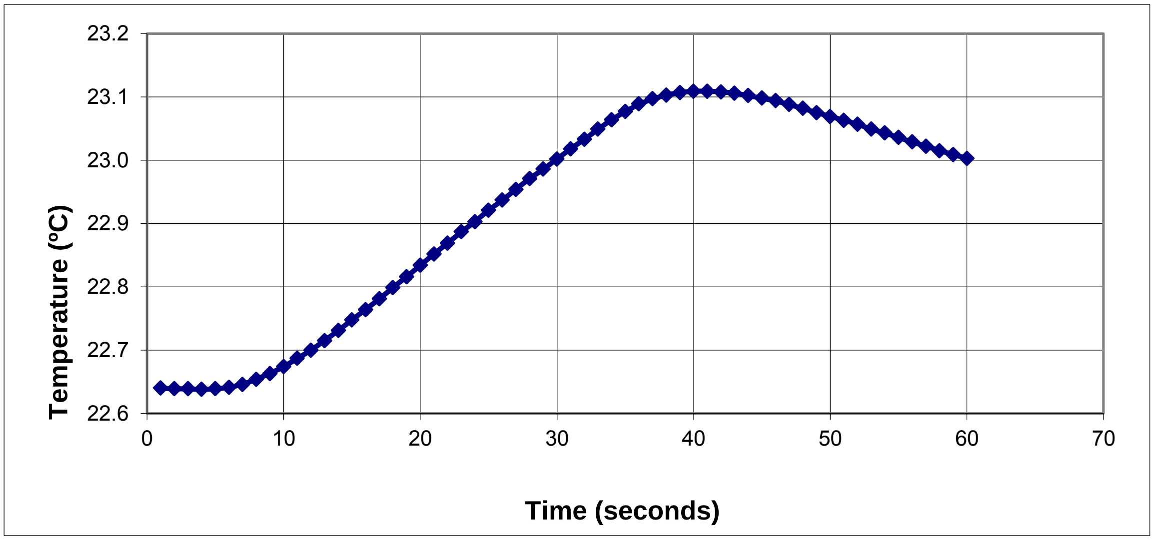
Sample Number: B-13 @ 11.0-11.5 feet bgs
Potential (-cm water): Initial

Test Date/Time:	7/31/2019 12:00 PM	*K (W/(m·K)):*	1.172
Sensor:	SH-1	*ρ (°C·cm/W):*	85.3
Test Temp.(°C):	22.6	*C (MJ/(m³·K)):*	2.739
KD2 Pro Sample ID:	B-11-AR	*D (mm²/s):*	0.428
Power (W/m):	16.950	*Err:*	0.0011
Current (amps):	0.128		

Raw Data

Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)
1	22.640	16	22.764	31	23.018	46	23.094
2	22.639	17	22.781	32	23.033	47	23.088
3	22.639	18	22.799	33	23.049	48	23.082
4	22.638	19	22.816	34	23.064	49	23.075
5	22.639	20	22.834	35	23.077	50	23.069
6	22.641	21	22.852	36	23.089	51	23.063
7	22.646	22	22.869	37	23.097	52	23.057
8	22.654	23	22.887	38	23.103	53	23.049
9	22.663	24	22.903	39	23.107	54	23.043
10	22.674	25	22.921	40	23.109	55	23.036
11	22.687	26	22.937	41	23.109	56	23.029
12	22.700	27	22.954	42	23.108	57	23.022
13	22.715	28	22.971	43	23.106	58	23.015
14	22.731	29	22.986	44	23.102	59	23.009
15	22.748	30	23.002	45	23.098	60	23.003

B-13 @ 11.0-11.5 feet bgs,Potential: Initial - Temperature vs. Time Graph



Laboratory analysis by: D. O'Dowd
Data entered by: A. Albay-Yenney
Checked by: J. Hines

Thermal Properties Data

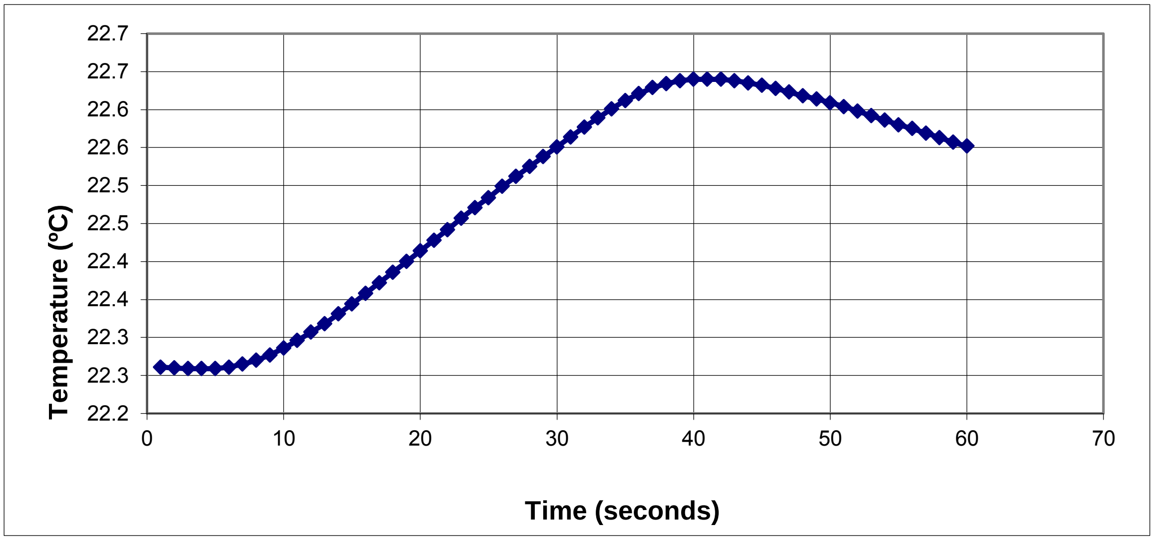
Sample Number: B-13 @ 11.0-11.5 feet bgs
Potential (-cm water): 0

Test Date/Time:	8/1/2019 10:36 AM	*K (W/(m·K)):*	1.413
Sensor:	SH-1	*ρ (°C·cm/W):*	70.8
Test Temp.(°C):	22.3	*C (MJ/(m³·K)):*	3.360
KD2 Pro Sample ID:	B-11-SA	*D (mm²/s):*	0.420
Power (W/m):	16.990	*Err:*	0.0014
Current (amps):	0.128		

Raw Data

Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)
1	22.261	16	22.358	31	22.564	46	22.628
2	22.260	17	22.372	32	22.577	47	22.623
3	22.259	18	22.386	33	22.589	48	22.618
4	22.259	19	22.400	34	22.601	49	22.614
5	22.259	20	22.414	35	22.612	50	22.609
6	22.261	21	22.428	36	22.621	51	22.604
7	22.265	22	22.442	37	22.629	52	22.598
8	22.270	23	22.457	38	22.634	53	22.592
9	22.277	24	22.471	39	22.638	54	22.586
10	22.286	25	22.484	40	22.640	55	22.580
11	22.296	26	22.499	41	22.640	56	22.575
12	22.307	27	22.512	42	22.640	57	22.569
13	22.318	28	22.525	43	22.638	58	22.563
14	22.331	29	22.538	44	22.635	59	22.557
15	22.344	30	22.551	45	22.632	60	22.552

B-13 @ 11.0-11.5 feet bgs,Potential: 0 - Temperature vs. Time Graph



Laboratory analysis by: D. O'Dowd
Data entered by: A. Albay-Yenney
Checked by: J. Hines

Thermal Properties Data

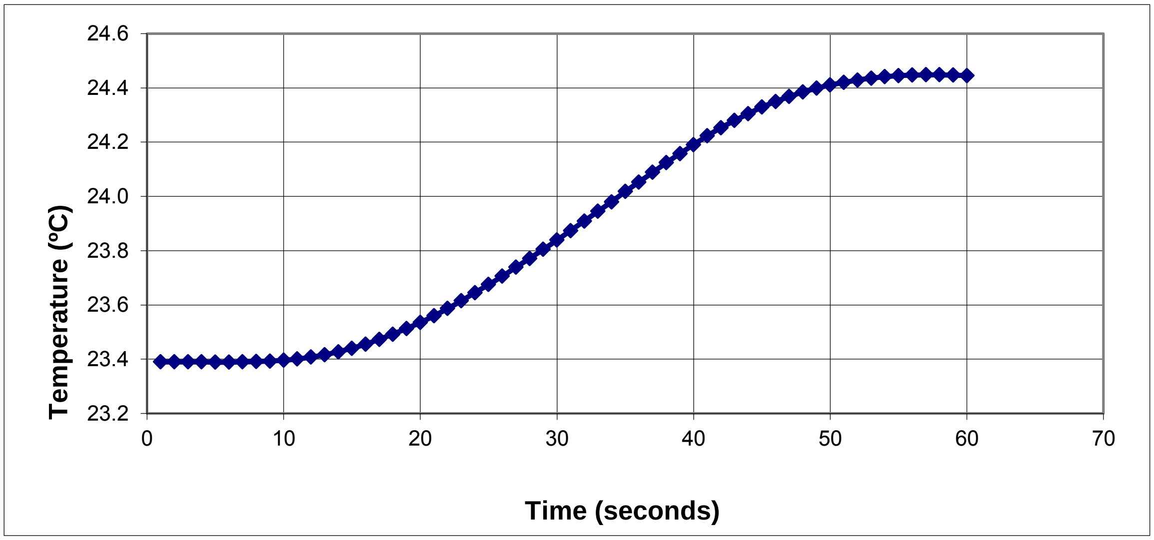
Sample Number: B-13 @ 11.0-11.5 feet bgs
Potential (-cm water): Oven Dry

Test Date/Time:	8/5/2019 2:48 PM	*K (W/(m·K)):*	0.263
Sensor:	SH-1	*ρ (°C·cm/W):*	379.9
Test Temp.(°C):	23.4	*C (MJ/(m³·K)):*	1.318
KD2 Pro Sample ID:	B-11-OD	*D (mm²/s):*	0.200
Power (W/m):	17.000	*Err:*	0.0011
Current (amps):	0.128		

Raw Data

Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)	Second	Temp.(°C)
1	23.390	16	23.455	31	23.874	46	24.350
2	23.390	17	23.473	32	23.909	47	24.368
3	23.390	18	23.492	33	23.945	48	24.385
4	23.390	19	23.513	34	23.980	49	24.399
5	23.389	20	23.535	35	24.018	50	24.411
6	23.389	21	23.560	36	24.053	51	24.420
7	23.390	22	23.587	37	24.089	52	24.429
8	23.391	23	23.615	38	24.124	53	24.436
9	23.393	24	23.645	39	24.158	54	24.441
10	23.396	25	23.675	40	24.191	55	24.445
11	23.401	26	23.706	41	24.223	56	24.447
12	23.408	27	23.739	42	24.253	57	24.448
13	23.416	28	23.771	43	24.280	58	24.448
14	23.427	29	23.805	44	24.305	59	24.447
15	23.440	30	23.839	45	24.329	60	24.445

B-13 @ 11.0-11.5 feet bgs,Potential: Oven Dry - Temperature vs. Time Graph



Laboratory analysis by: D. O'Dowd
Data entered by: A. Albay-Yenney
Checked by: J. Hines

Laboratory Tests and Methods

Tests and Methods

Dry Bulk Density:	ASTM D7263
Moisture Content:	ASTM D7263, ASTM D2216
Calculated Porosity:	ASTM D7263
Thermal Properties:	ASTM D5334

APPENDIX G PALEONOTOLOGICAL REPORT (CONFIDENTIAL)

APPENDIX H PRELIMINARY HYDROLOGY REPORT

BURNS AND McDONNELL

Preliminary Drainage Study

Lockheed Martin Solar Development

Project No. 116869

04/17/20

Preliminary Drainage Study

prepared for

Lockheed Martin

Palmdale, CA

Project No. 116869

04/17/20

prepared by

Burns & McDonnell Engineering Company, Inc.
Brea, CA

INDEX AND CERTIFICATION

Lockheed Martin Solar Project
Preliminary Drainage Study Project No.116869

Report Index

Certification

I hereby certify, as a Professional Engineer in the state of California, that the information in this document was assembled under my direct personal charge. This report is not intended or represented to be suitable for reuse by Lockheed Martin or others without specific verification or adaptation by the Engineer.

Tanner Dowell, PE C66555
Date: April 17, 2020

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
AC-FT	Acre-Feet
BMcD	Burns & McDonnell
CFS	Cubic feet per second
FEMA	Federal Emergency Management Agency
MW	Megawatt
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
PV	Photovoltaic
Q	Flow Rate
SWMP	Storm Water Management Plan
USDA	United States Department of Agriculture
USGS	United States Geological Survey
V	Volume
WQMP	Water Quality Management Plan

1.0 INTRODUCTION / PURPOSE

Burns and McDonnell Engineering Company Inc. has been retained by Lockheed Martin to provide engineering and permitting support for the Palmdale Solar Project. The purpose of this drainage study is to describe and document drainage management and to support a Major Modification through the City of Palmdale, CA.

The Project is a planned 20-Megawatt AC (MWac) solar photovoltaic (PV) power plant and will be located in the northwest portion of the City of Palmdale, California. In addition to the PV arrays, the development will include internal access roads, equipment pads, chain link perimeter security fences, and an overhead transmission line (gen-tie) to the point of interconnection. The project site is approximately 132 acres and is located east of the intersection of Rancho Vista Blvd and 15th St E (Figure 2-1).

2.0 SITE DISCUSSION

The project site is located in the Mojave Desert. The Mojave Desert is bounded to the east by the Colorado River and the California-Nevada border, on the north by the Garlock fault and on the south-west by San Gabriel and San Bernardino Mountains and the San Andreas fault. Locally, the project site and an unnamed drainage is located in undeveloped desert habitat and is characterized as generally level terrain with a gentle gradient trending from the southeast to the northwest at 0-5%. The Assessor Parcel Numbers are 3022-027-016 and 3022-027-017. The project site is bounded by Blackbird Way on the northern side, 10th Street on the western side, Avenue P/Rancho Vista Boulevard on the southern side and 15th Street on the eastern side. The project site is located at the LM Aero Plant 10 in Palmdale, Los Angeles County, California.

The property and surrounding areas are mostly vacant desert terrain with sparse, native desert scrub. However, the site also contains a pump station for a water line located in the far SW corner of the site. Additionally, there are several overhead transmission and distribution lines surrounding the site on three sides. One line running east/west in the ROW for E Rancho Vista Blvd, one line running north/south in 15th St E as well one line in the 10th St E ROW.

The soils information was gathered through the United States Department of Agriculture's (USDA) Web Soil Survey. The site consists of National Resource Conservation Service (NRCS) soil groups A and B. A further report of the site's properties may be found in Appendix A

For the hydrologic analysis, the site was divided into three (3) separate subareas. Topographical features such as flowlines, ridges, etc. and post-developed roads determined how the subareas were divided. See Figure 2-2 for the division of subareas. A topographical survey with 1' contours was used to analyze entire site. Offsite areas were supplemented with 20' USGS contours.

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), Number 06037C0700F covers the Project. The effective date is September 26, 2008. The entire Project site falls within Zone X, which is defined as "areas determined to be outside the 0.2% annual chance floodplain." The Zone X is not regulated by FEMA nor the local floodplain administrator. The FEMA MAP can be found in Appendix C.

In its pre-developed state, the site has little impervious surfaces. The net gain of impervious areas due to the construction of the solar farm was estimated to be less than 0.5%, a minimal increase to the pre-developed site conditions.

Figure 2-1: Aerial View

(not to scale)

Figure 2-2 Subarea & Topography View

(not to scale)

3.0 RAINFALL DATA

Rainfall data for the site was selected for City of Palmdale, Los Angeles County from the Autodesk software.

4.0 ONSITE RUNOFF

The site was subdivided into three separate drainage areas based on the site characteristics explained in Section 2.0, each with their respective downstream outlets (Figure 4-1). Technical Release (TR) 55 was used to estimate the peak flow rates across the site.

TR55 METHOD

The methodology for calculating peak flow discharge and runoff volume was performed utilizing the TR55 method. This method is preferred for sites less than 500 acres when determining the peak flow discharge.

Autodesk Storm and Sanitary Analysis was used to perform the hydrology and hydraulic modeling and analysis with the TR-55 method. A time of concentration (Tc) was calculated for each subarea by using the length of the most distant point from the outlet. The time of concentration was then used as the rainfall durations to find the intensities. A runoff coefficient was estimated for each subarea using the methods of technical release.

Columns 3 and 4 of Tables 4-1 and 4-2 show the results of the Rational Method peak flow rate results. The tables show the peak flow rates generated from the 132 acres site under both pre- and post- developed conditions for the 2, 10, 25 & 50-year storm events in respect to the time of concentration estimated for each subarea. The results for the 50-year storm event are provided in accordance with the City of Palmdale's requirements.

Table 4-1: Pre-developed Characteristics

PRE-DEVELOPMENT STORMWATER 24-HOUR VOLUMES

SUB AREA	AREA (ACRE)	50-YR V (ACRE-FT)	25-YR V (ACRE-FT)	10-YR V (ACRE-FT)	2-YR V (ACRE-FT)
1	121.60	17.36	15.26	8.0	1.76
2	85.81	9.45	7.18	3.88	0.66
3	41.58	6.11	5.39	2.85	0.57

PRE-DEVELOPMENT STORMWATER PEAK RUNOFF

SUB AREA	AREA (ACRE)	50-YR Q (CFS)	25-YR Q (CFS)	10-YR Q (CFS)	2-YR Q (CFS)
1	121.60	64.39	55.11	23.14	1.85
2	85.81	31.92	26.10	7.94	0.63
3	41.58	22.17	18.96	8.22	0.70

Q = Peak flow rate
V = Volume
cfs = cubic feet per second ac-ft = acre-feet

Table 4-2: Post-developed Characteristics

POST-DEVELOPMENT STORMWATER 24-HOUR VOLUMES

SUB AREA	AREA (ACRE)	50-YR V (ACRE-FT)	25-YR V (ACRE-FT)	10-YR V (ACRE-FT)	2-YR V (ACRE-FT)
1	131.60	11.61	17.04	9.03	2.07
2	85.81	9.45	8.17	3.88	0.57
3	31.58	4.24	3.72	1.90	0.39

POST-DEVELOPMENT STORMWATER PEAK RUNOFF

SUB AREA	AREA (ACRE)	50-YR Q (CFS)	25-YR Q (CFS)	10-YR Q (CFS)	2-YR Q (CFS)
1	131.60	79.36	68.05	29.36	2.21
2	85.81	31.92	26.10	7.94	0.63
3	31.58	13.19	11.16	4.43	0.39

Q = Peak flow rate
V = Volume
cfs = cubic feet per second ac-ft = acre-feet

Site Plan

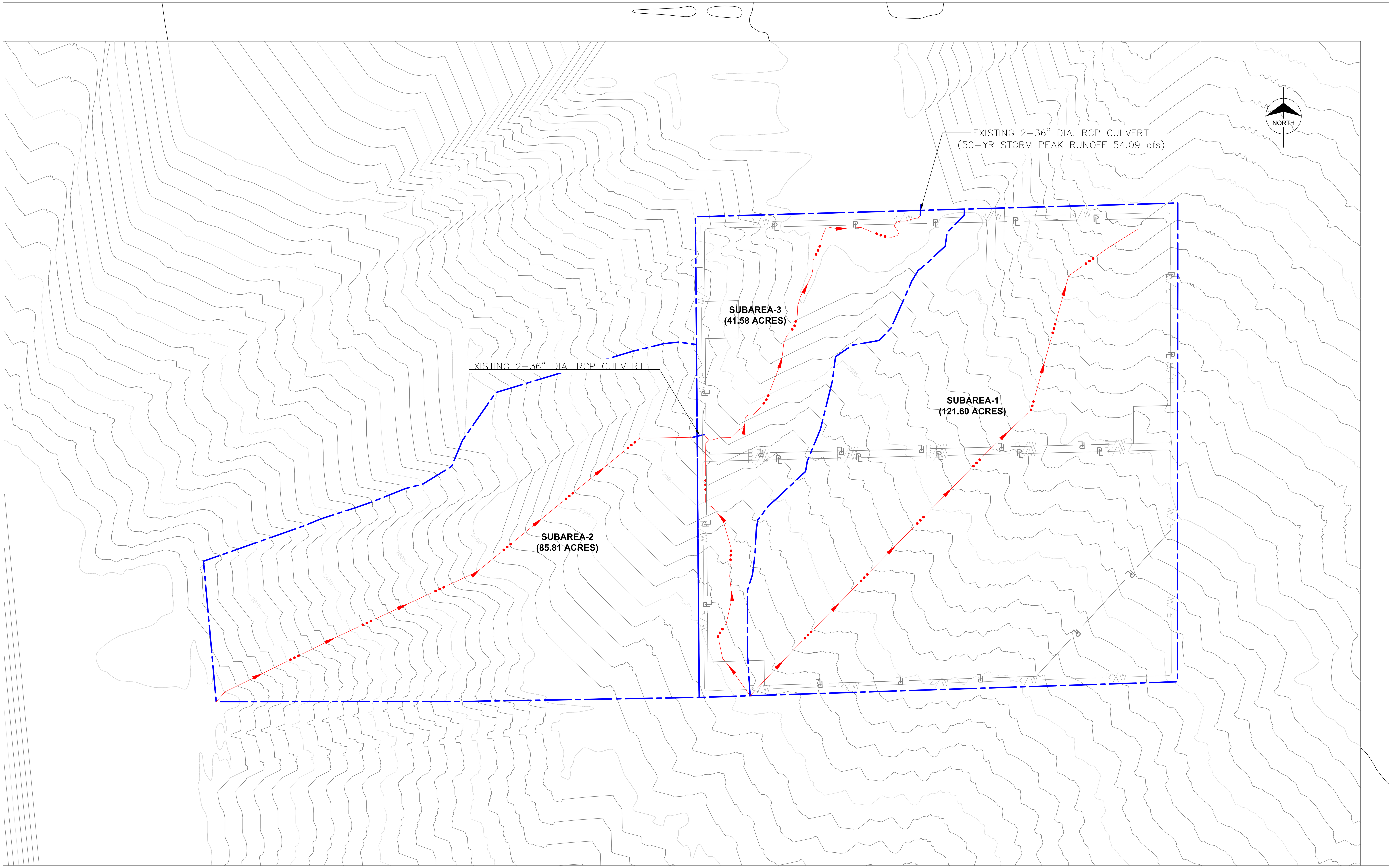
The civil sitework will primarily consist of minimal grading focusing on the northwestern portion of the site, installation of compacted dirt roads with an aggregate base cap and construction of a chain link fence around the perimeter of the site.

Because the site is relatively flat, slopes generally less than 1%, it is conducive to solar development. Existing drainage patterns will be maintained across the site with minimal grading occurring within the solar arrays. Grading will be focused in thein the northwest and northeast portions of the site for installation of stormwater retention basins. Existing vegetation on the site will be cut and crushed as necessary to facilitate construction of the solar arrays. This method will keeps the roots intact, so that the vegetation will continue to grow to ensure erosion mitigation. The existing vegetation will remain in place throughout the life of the project with operations and maintenance trimming the vegetation under the solar arrays. The maintenance plan for the site will include trimming the existing vegetation every 6 months or as necessary to prevent shading of the panels.

The solar racking system throughout the site will be elevated above the ground, supported on vertical posts driven into the ground with no excavation nor concrete foundations. The ground surfaces beneath the solar cells will remain as natural ground, consisting of the native vegetation and on-site soil. Precipitation will fall on the solar cells, run off the lower edges onto the ground surface, sheet flow across the site under the solar cells, and infiltrate into the ground similar to the pre-developed conditions. Concrete equipment foundations for inverter skids and substation equipment will be located sporadically throughout the site. Excess runoff will primarily be shallow sheet-like flows across the surfaces of the site in a manner similar to pre- project conditions. Retention basins will be built at the far NE and NW ends of the site to capture this flow. As part of final designs, erosion control will be designed where flows enter and exit the retention basins.

In general, existing runoff locations and characteristics entering and leaving the site will be preserved to the greatest extent practical.

Figure 4-1: Pre-Development Drainage Map



DRAINAGE BOUNDARY

STORMWATER FLOW LINE

PROPERTY LINE

RIGHT OF WAY LINE

0 200' 400'
SCALE IN FEET

PREPARED BY ____ DATE ____
(Representative Of Firm Doing Architectural and Engineering Work)
RECOMMENDED BY ____ DATE ____
(Representative of Lessee)
RECOMMENDED BY ____ DATE ____
(Lessee Fire Protection Engineer)
APPROVED BY ____ DATE ____
(Air Force Supervising Engineer, Cognizant Command)

REVISIONS

REV	DESCRIPTION	BY	DATE

PRE-DEVELOPMENT DRAINAGE MAP

LOCKHEED MARTIN
FACILITIES ENGINEERING DEPT.
PALMDALE, CA

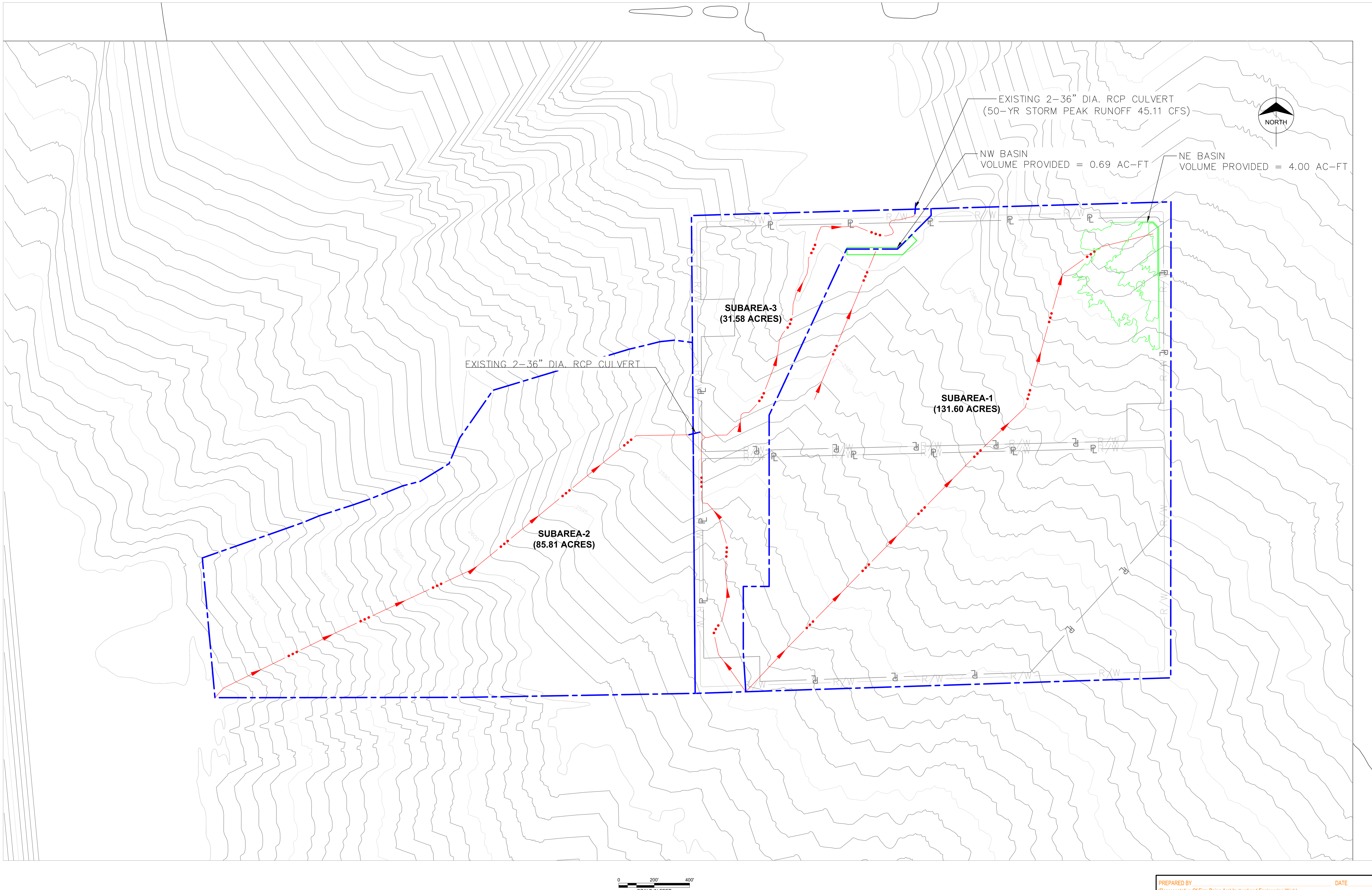
BURNS McDONNELL

DWN
ENG
CHK
GC NAME BURNS & MCDONNELL
LMC ENG. WILLIE BERMUDEZ
FSR P488962
PROJ. NUM. P488962

A&E PROJ. NUM.

DWG. NO. SHT OF REV

Figure 4-2: Post-Development Drainage Map



DRAINAGE BOUNDARY

STORMWATER FLOW LINE

PROPERTY LINE

PROPOSED DETENTION POND

RIGHT OF WAY LINE

PREPARED BY (Representative Of Firm Doing Architectural and Engineering Work)	DATE
RECOMMENDED BY (Representative of Lessee)	DATE
RECOMMENDED BY (Lessee Fire Protection Engineer)	DATE
APPROVED BY (Air Force Supervising Engineer, Cognizant Command)	DATE

REVISIONS

REV	DESCRIPTION	BY	DATE

POST-DEVELOPMENT DRAINAGE MAP

LOCKHEED MARTIN
FACILITIES ENGINEERING DEPT.
PALMDALE, CA

BURNS McDONNELL

DWN
ENG
CHK
GC NAME BURNS & MCDONNELL
LMC ENG. WILLIE BERMUDEZ
FSR P488962
PROJ. NUM. P488962

A&E PROJ. NUM.

DWG. NO. SHT OF REV

5.0 Offsite Flows

Figure 2-2 provides an overview of the existing conditions outside the project site. Offsite runoff comes from two subareas. One is the area to the west of 10th St and the other subarea is the west portion of the same Section of proposed site. The offsite flow concentrates to the existing culvert crossing 10th St and continues meandering through a natural wash towards the north to another culvert crossing at Blackbird Ln and discharges to the north. See appendix B for existing culvert details. All of the off-site flow will follow its historical flow path across the site. In post-development condition, 10 acres of area originally tributary to the exiting wash will be minorly graded and drain in the northeast direction towards the Northwest retention basin. The TR-55 Method was used to calculate the offsite flows, similar to the method used in Section 4.0. The approximate existing 50-YR, 24-HR flow rate is 54.09 CFS at the outfall of the two 36" culverts at the northern boundary. This flow rate will be reduced to 45.11 CFS in the post developed condition which will help with the existing culvert functioning at the outfall.

6.0 Retention Basin Design

The following provides the approach for sizing the proposed retention basin located at the NE and NW corners of the site:

Per the City of Palmdale requirements and based on model analysis, the pre-development area of the site (121.60 acres). The 50-yr 24-hour total runoff volume is 17.36 ac-ft. The Post-development area of the site (131.60 acres). The 50-yr 24-hr total runoff volume is 19.35 ac-ft. Per City of Palmdale requirements that only 85% of pre-development flows can be discharged. This provides a required pond volume of **19.35-(17.36x85%)=4.59 ac-ft.**

This will be captured using two retention basins; the largest being in the NE corner of the site and a smaller basin in the NW corner. The NE basin will be formed by constructing a berm approximately 2-3 feet tall along the NE site perimeter which will cause runoff to back up and pond underneath the solar arrays. This NE berm will provide 4.00 ac-ft detention volume. The NW basin will have a footprint of 400' x 50' x 1.5' and will provide 0.69 ac-ft.

The retention basins will be evacuated via soil infiltration within 72-hours in accordance with County requirements. Based on other projects in the area, an infiltration rate of 2.0 in/hr has been assumed. Based on this rate, it is anticipated that the NE basin will infiltrate in 9 hours and the NW basin would infiltrate in 18 hours. Infiltration testing will be performed for the site prior to final design to verify actual rates.

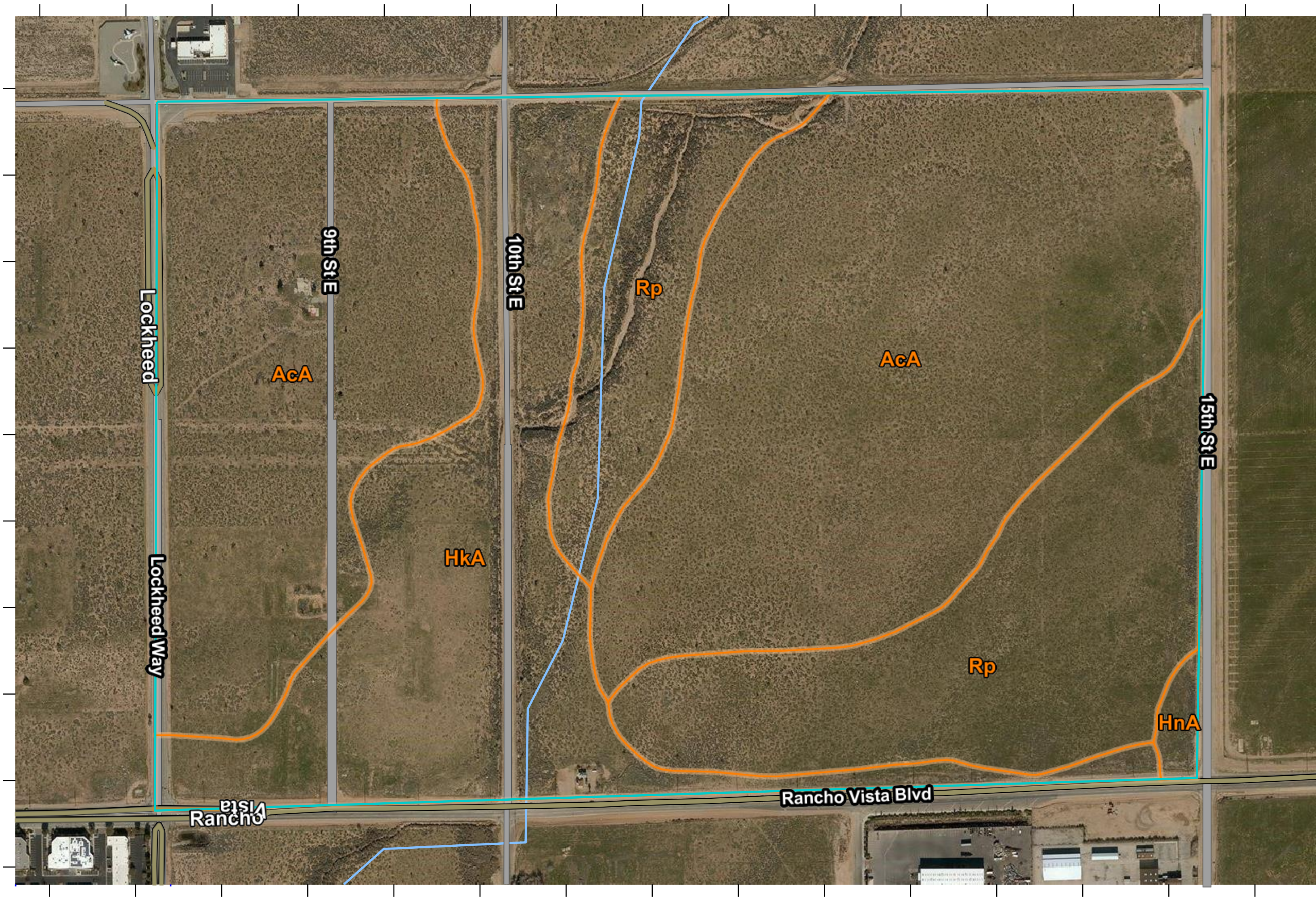
7.0 CONCLUSION

The increase in total combined peak flow between pre- and post- development conditions for the proposed Lockheed Martin Solar site for the 50yr – 24hr design storm event will be 14.97 CFS. These flows will be mitigated by routing them to retention basins located at the historic discharge locations at the northwest and northeast corners of the site. The total retention provided for the Project is approximately 4.69 acre-ft. The preliminary grading design and retention areas were designed to maintain the pre-developed flow rates, volumes, locations, and characteristics leaving the site in order to avoid adverse impacts downstream.

Grading will be minimized to the greatest extent practical; and existing drainage patterns on the site will be kept as close as possible to their existing conditions. Roughly 10 acres will be graded to route flows to the proposed NE retention basin to avoid any runoff impacts to the existing swale that cuts through the site. Existing site vegetation will be cut and crushed to preserve the root balls to reduce erosion. All increased post-developed flows will be handled with the proposed retention basins. It is anticipated that stormwater will be evacuated from the basins within 72-hours via infiltration. There are no proposed drywells. This approach will allow the project to comply with the City's Master Plan of Drainage.

APPENDICES

APPENDIX A – SITE CONDITIONS



Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AcA	Adelanto coarse sandy loam, 2 to 5 percent slopes	134.4	55.2%
HkA	Hesperia fine sandy loam, 0 to 2 percent slopes	51.5	21.1%
HnA	Hesperia loam, 0 to 2 percent slopes	1.5	0.6%
Rp	Rosamond loam	56.3	23.1%
Totals for Area of Interest		**243.6**	**100.0%**

APPENDIX B-Existing Culverts INFO


Blackbird Drive
Blackbird Drive
Blackbird Drive
kheed Way
10th St E
10th St E
15th St E
15th St E
15th St E
(2) 36" CMP Squashed
U/S INV: 2571.68 D/S INV: 2570.88 Length: 65.5887'
U/S INV: 2571.38 D/S INV: 2570.60 Length: 65.7100'
(2) 36" CMP Squashed
Inv: 2584.90'
Top of head wall: 2587.40
18" RCP Inv: 2591.98'
18" RCP Inv: 2592.02'
24" RCP Inv: 2591.96'
Top of Headwall: 2595.81' to 2596.75'
H&R Block
E Ave P
E Ave P
rch

APPENDIX C-FEMA MAP

National Flood Hazard Layer FIRMette

FEMA

34°36'33.17"N

118°6'40.33"W

118°6'2.87"W

34°36'3.55"N

Feet 0 250 500 1,000 1,500 2,000

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

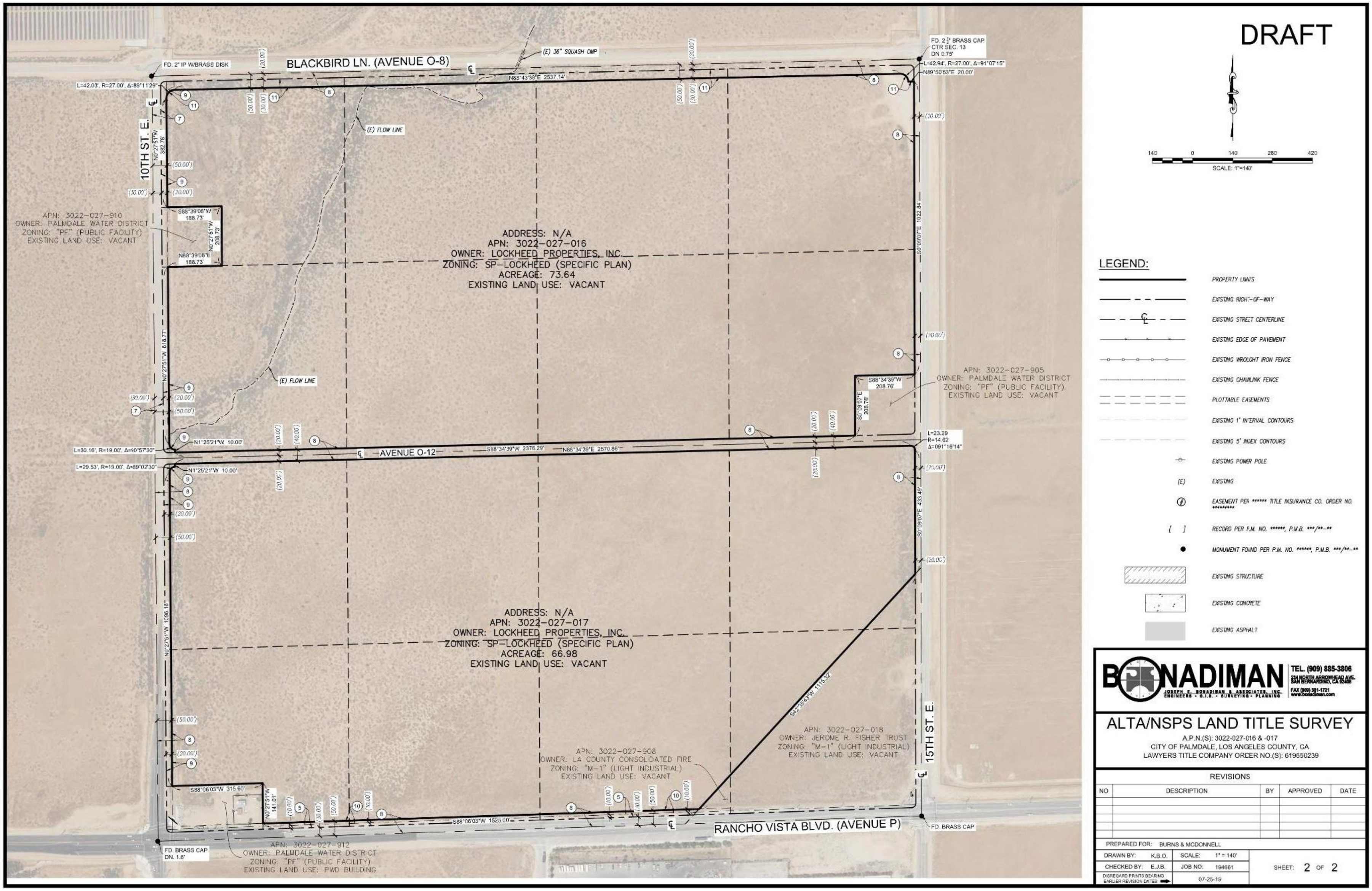
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/2/2019 at 4:36:50 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX D-PARCEL MAPS

APPENDIX D – PARCEL MAPS



PRE-DEVELOPMENT 50-YR STORM HYDROLOGY SUMMARY

Project Description

File Name .... Pre-Development.SPF

Project Options

Flow Units .... CFS
Elevation Type .... Elevation
Hydrology Method .... SCS TR-55
Time of Concentration (TOC) Method .... SCS TR-55
Link Routing Method .... Kinematic Wave
Enable Overflow Ponding at Nodes .... YES
Skip Steady State Analysis Time Periods .... NO

Analysis Options

Start Analysis On	Aug 02, 2019	00:00:00
End Analysis On	Aug 03, 2019	00:00:00
Start Reporting On	Aug 02, 2019	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins...	3
Nodes...	5
Junctions	5
Outfalls	0
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links..	3
Channels	1
Pipes	2
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	TS-01	Cumulative	inches	California	Los Angeles (Palmdale)	50	4.70	SCS Type I 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-01	121.60	68.60	4.70	1.71	208.29	64.39	0 00:47:48
2	Sub-02	85.81	63.00	4.70	1.32	113.44	31.92	0 00:44:16
3	Sub-03	41.58	69.30	4.70	1.76	73.35	22.17	0 00:51:04

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Jun-01	Junction	2586.00	2588.00	2586.00	0.00	0.00	31.82	2586.83	0.00	2.17	0 00:00	0.00	0.00
2	Jun-02	Junction	2584.90	2587.40	2584.90	0.00	0.00	31.81	2586.69	0.00	2.21	0 00:00	0.00	0.00
3	Jun-03	Junction	2571.68	2576.00	2571.68	0.00	0.00	52.65	2574.78	0.00	2.22	0 00:00	0.00	0.00
4	Jun-04	Junction	2570.88	2576.00	2570.88	0.00	0.00	52.64	2576.00	0.00	0.00	0 00:00	0.00	0.00
5	Jun-05	Junction	2574.00	2574.50	2574.00	0.00	0.00	64.37	2574.00	0.00	0.50	0 00:00	0.00	0.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
1	Link-01	Pipe	Jun-01	Jun-02	63.92	2586.00	2584.90	1.7200	36.000	0.0120	31.81	189.58	0.17	9.95	0.83	0.28	0.00	Calculated
2	Link-03	Pipe	Jun-03	Jun-04	65.60	2571.68	2570.88	1.2200	36.000	0.0120	52.64	159.59	0.33	10.12	1.18	0.40	0.00	Calculated
3	Link-02	Channel	Jun-02	Jun-03	2150.00	2582.00	2573.00	0.4200	48.000	0.0300	31.07	271.10	0.11	3.41	1.77	0.44	0.00	

Subbasin Hydrology

Subbasin : Sub-01

Input Data

Area (ac) 121.60
Weighted Curve Number 68.60
Rain Gage ID .... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Natural western desert	72.96	A	63.00
Natural western desert	48.64	B	77.00
Composite Area & Weighted CN	121.60		68.60

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.13	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	0.75	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.90	0.00	0.00
Velocity (ft/sec) :	0.10	0.00	0.00
Computed Flow Time (min) :	16.79	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	1400	0.00	0.00
Slope (%) :	0.75	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	1.40	0.00	0.00
Computed Flow Time (min) :	16.67	0.00	0.00

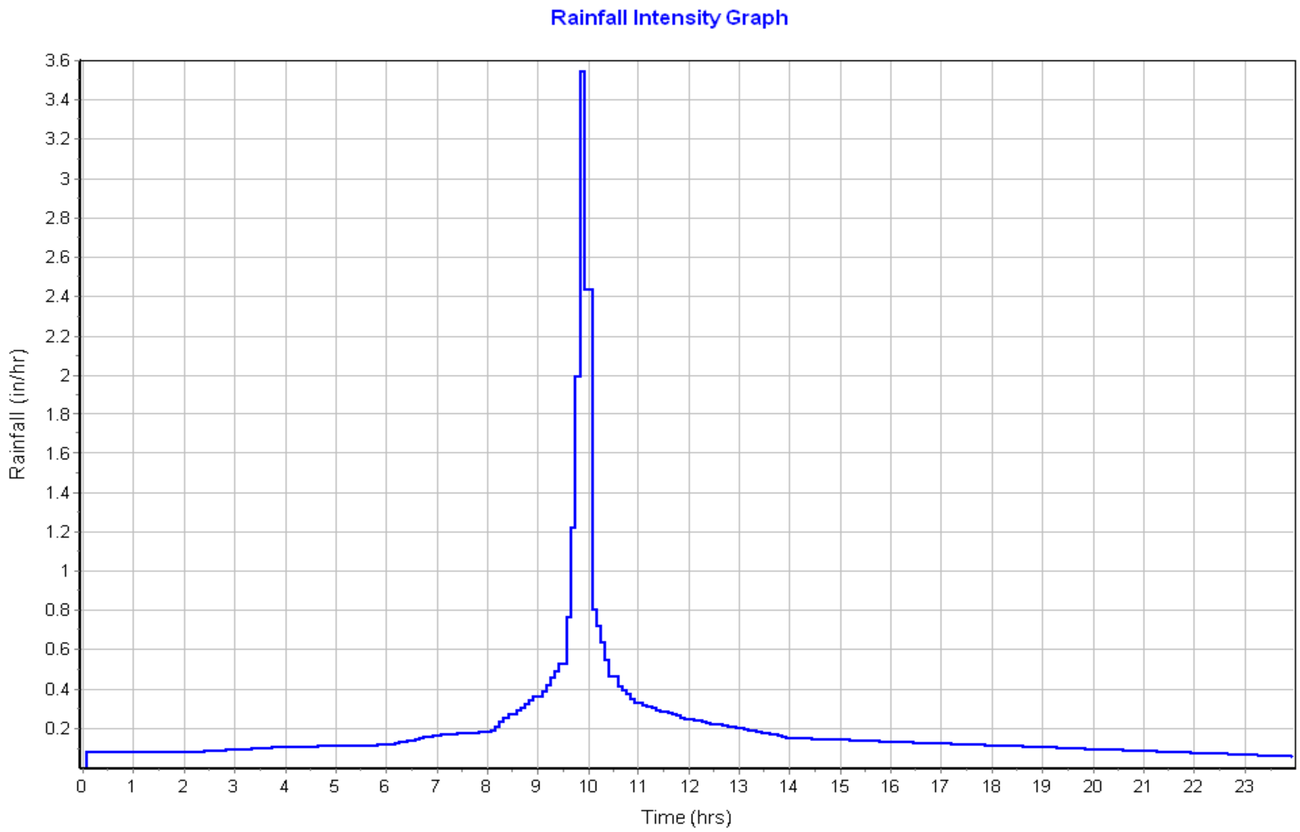
Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.030	0.00	0.00
Flow Length (ft) :	1990	0.00	0.00
Channel Slope (%) :	0.633	0.00	0.00
Cross Section Area (ft²) :	2	0.00	0.00
Wetted Perimeter (ft) :	4.47	0.00	0.00
Velocity (ft/sec) :	2.31	0.00	0.00
Computed Flow Time (min) :	14.35	0.00	0.00

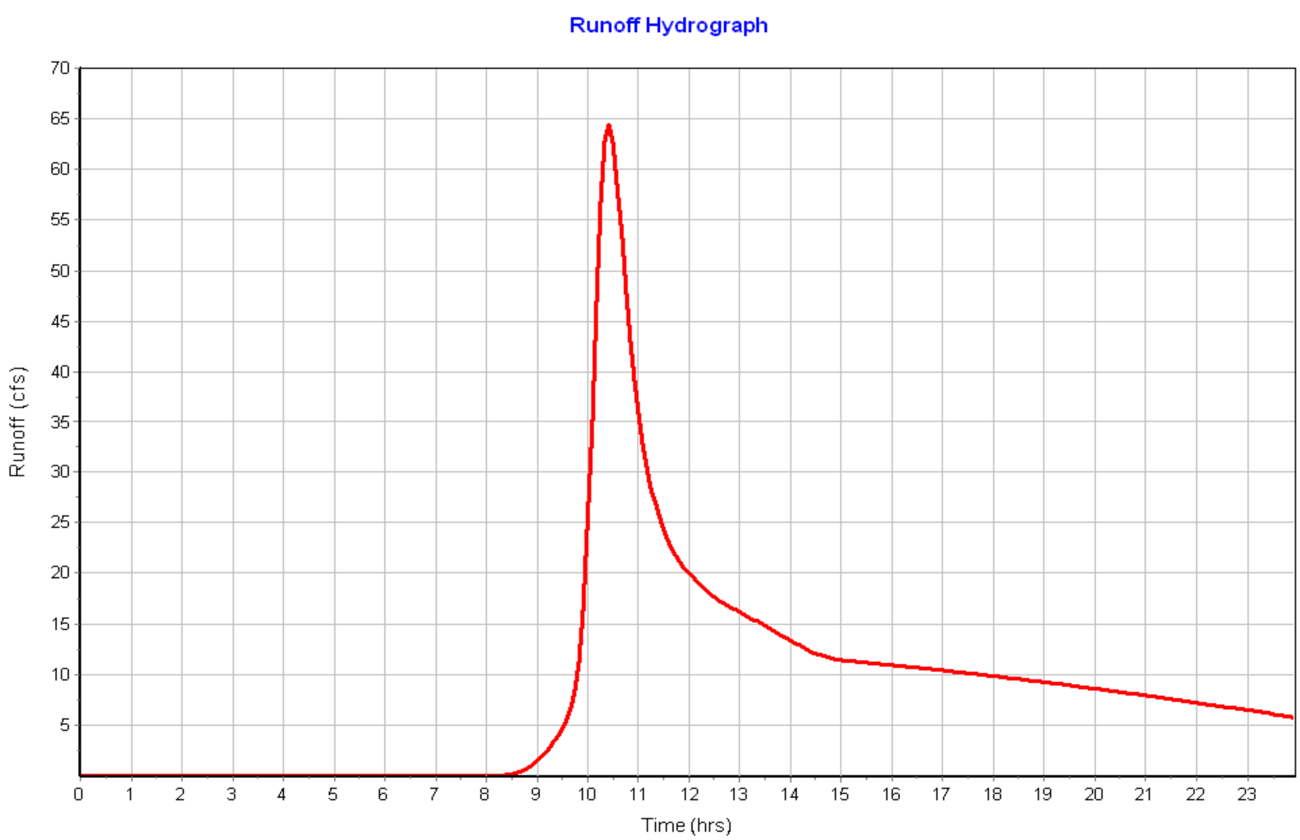
Total TOC (min) 47.80

Subbasin Runoff Results

Total Rainfall (in) 4.70
Total Runoff (in) 1.71
Peak Runoff (cfs) 64.39
Weighted Curve Number 68.60
Time of Concentration (days hh:mm:ss) 0 00:47:48

Subbasin : Sub-01





Subbasin : Sub-02

Input Data

Area (ac) 85.81
Weighted Curve Number 63.00
Rain Gage ID .... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Natural western desert	85.81	A	63.00
Composite Area & Weighted CN	85.81		63.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.13	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	1.28	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.90	0.00	0.00
Velocity (ft/sec) :	0.12	0.00	0.00
Computed Flow Time (min) :	13.56	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	1400	0.00	0.00
Slope (%) :	1.28	0.00	0.00
Surface Type :	Bare & untilled	Unpaved	Unpaved
Velocity (ft/sec) :	1.13	0.00	0.00
Computed Flow Time (min) :	20.65	0.00	0.00

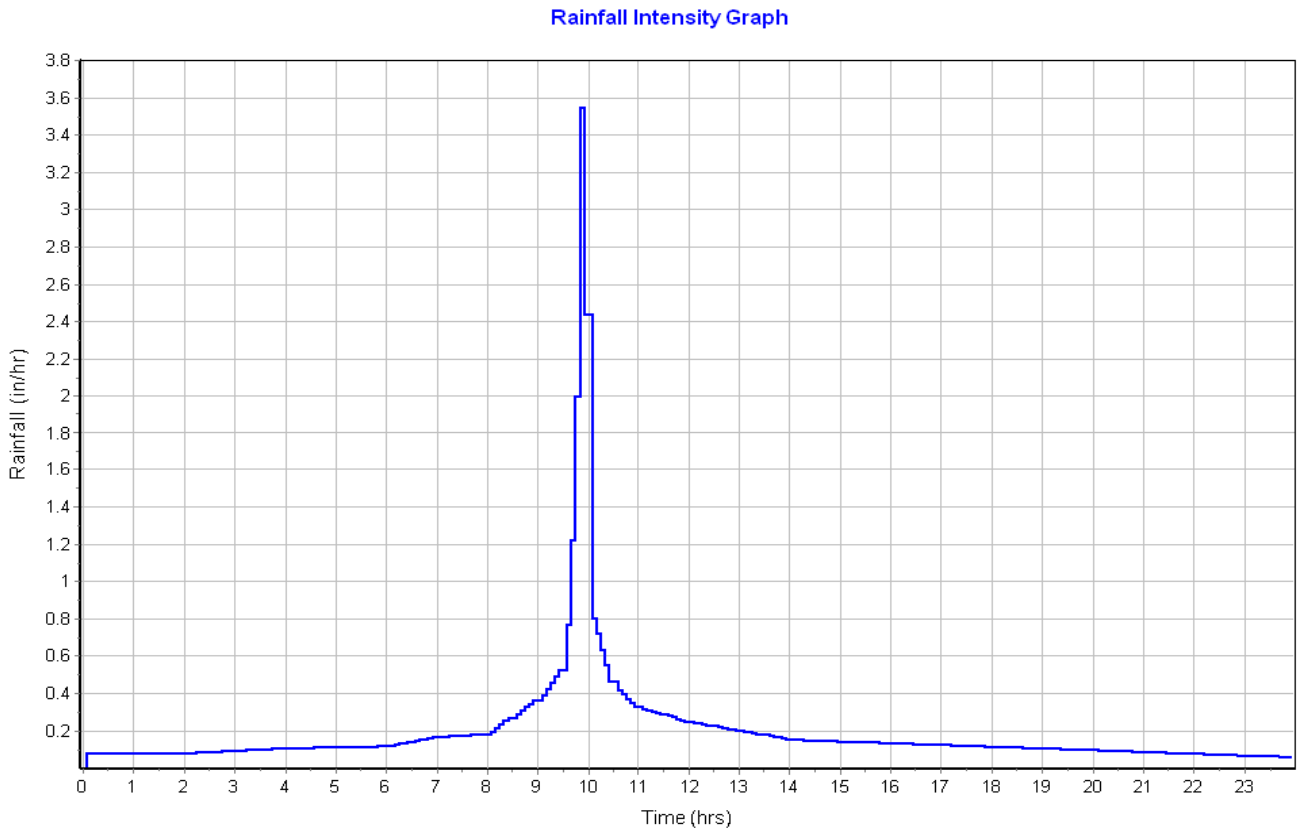
Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.030	0.00	0.00
Flow Length (ft) :	1617	0.00	0.00
Channel Slope (%) :	0.85	0.00	0.00
Cross Section Area (ft^2) :	2	0.00	0.00
Wetted Perimeter (ft) :	4.47	0.00	0.00
Velocity (ft/sec) :	2.68	0.00	0.00
Computed Flow Time (min) :	10.06	0.00	0.00

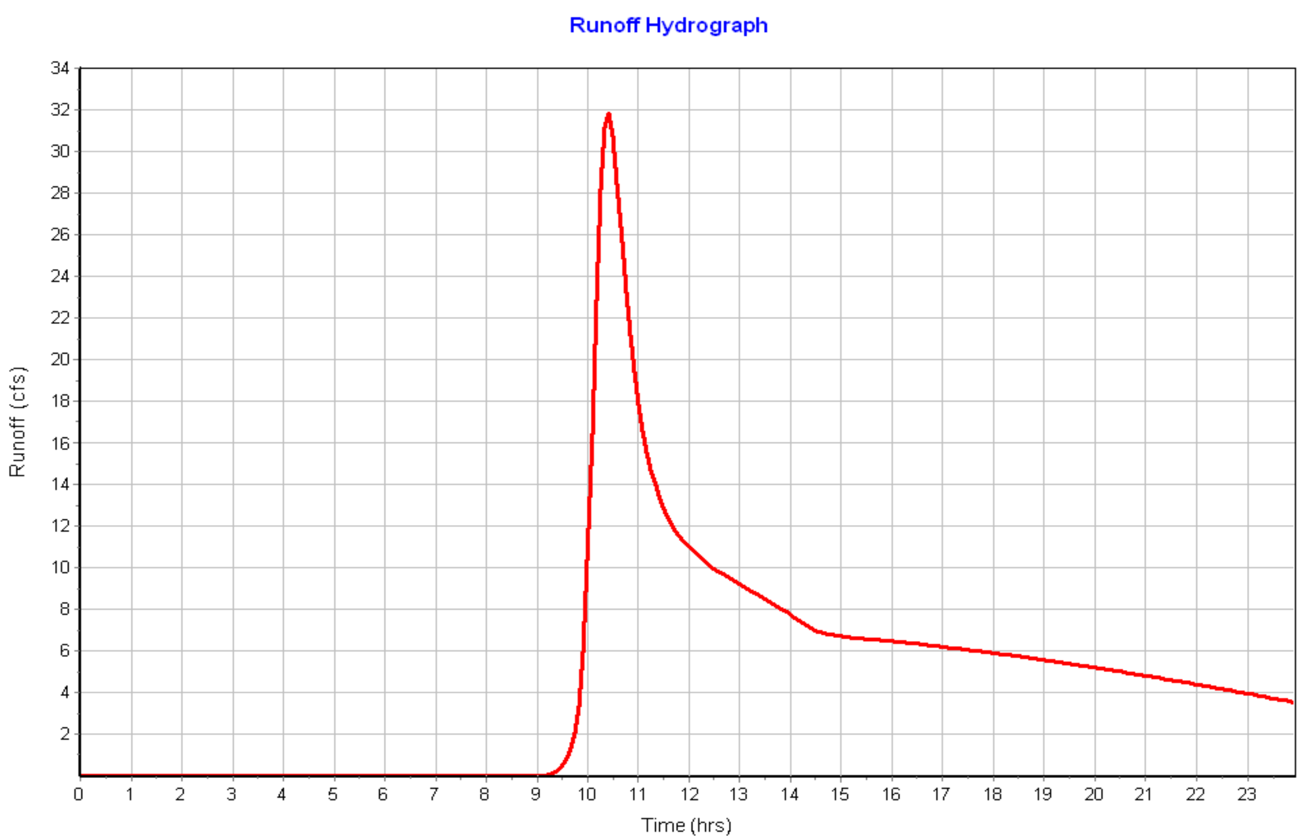
Total TOC (min) 44.27

Subbasin Runoff Results

Total Rainfall (in) 4.70
Total Runoff (in) 1.32
Peak Runoff (cfs) 31.92
Weighted Curve Number 63.00
Time of Concentration (days hh:mm:ss) 0 00:44:16

Subbasin : Sub-02





Subbasin : Sub-03

Input Data

Area (ac) 41.58
Weighted Curve Number 69.30
Rain Gage ID .... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Natural western desert	22.87	A	63.00
Natural western desert	18.71	B	77.00
Composite Area & Weighted CN	41.58		69.30

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.13	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	0.45	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.90	0.00	0.00
Velocity (ft/sec) :	0.08	0.00	0.00
Computed Flow Time (min) :	20.59	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	1400	0.00	0.00
Slope (%) :	0.70	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	1.35	0.00	0.00
Computed Flow Time (min) :	17.28	0.00	0.00

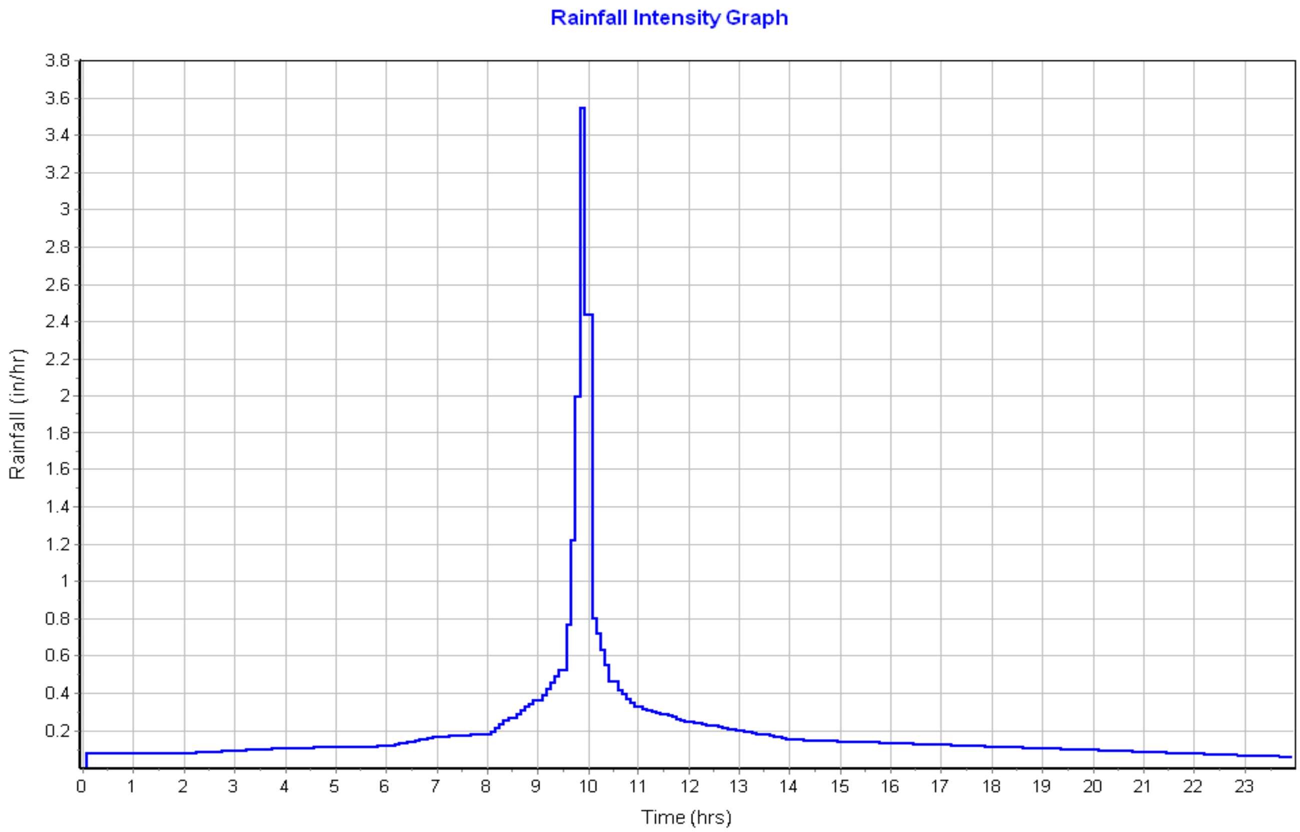
Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.030	0.00	0.00
Flow Length (ft) :	2150	0.00	0.00
Channel Slope (%) :	0.30	0.00	0.00
Cross Section Area (ft²) :	13.23	0.00	0.00
Wetted Perimeter (ft) :	13.28	0.00	0.00
Velocity (ft/sec) :	2.71	0.00	0.00
Computed Flow Time (min) :	13.21	0.00	0.00

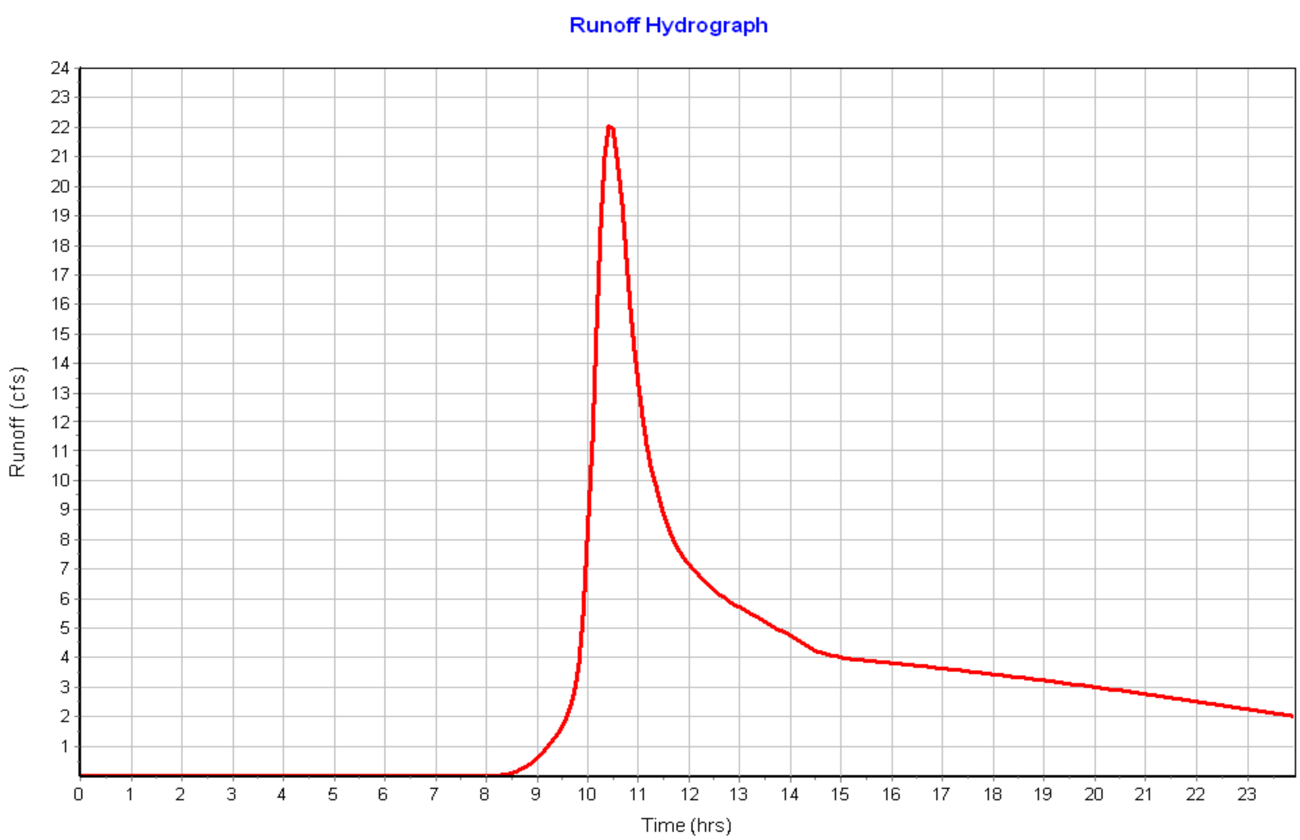
Total TOC (min) 51.08

Subbasin Runoff Results

Total Rainfall (in) 4.70
Total Runoff (in) 1.76
Peak Runoff (cfs) 22.17
Weighted Curve Number 69.30
Time of Concentration (days hh:mm:ss) 0 00:51:05

Subbasin : Sub-03





Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Minimum Pipe Cover (in)
1	Jun-01	2586.00	2588.00	2.00	2586.00	0.00	0.00	-2588.00	0.00	0.00
2	Jun-02	2584.90	2587.40	2.50	2584.90	0.00	0.00	-2587.40	0.00	0.00
3	Jun-03	2571.68	2576.00	4.32	2571.68	0.00	0.00	-2576.00	0.00	0.00
4	Jun-04	2570.88	2576.00	5.12	2570.88	0.00	0.00	-2576.00	0.00	0.00
5	Jun-05	2574.00	2574.50	0.50	2574.00	0.00	0.00	-2574.50	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Jun-01	31.82	31.82	2586.83	0.83	0.00	2.17	2586.24	0.24	0 10:30	0 00:00	0.00	0.00
2	Jun-02	31.81	0.00	2586.69	1.79	0.00	2.21	2585.51	0.61	0 10:30	0 00:00	0.00	0.00
3	Jun-03	52.65	22.03	2574.78	3.10	0.00	2.22	2573.60	1.92	0 10:37	0 00:00	0.00	0.00
4	Jun-04	52.64	0.00	2576.00	5.12	0.00	0.00	2574.27	3.39	0 08:07	0 00:00	0.00	0.00
5	Jun-05	64.37	64.37	2574.00	0.00	0.00	0.50	2574.00	0.00	0 00:00	0 00:00	0.00	0.00

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	Link-02	2150.00	2582.00	-2.90	2573.00	1.32	9.00	0.4200	Triangular	4.000	24.000	0.0300	0.5000	0.5000	0.0000	0.00	No

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	Link-02	31.07	0 10:37	271.10	0.11	3.41	10.51	1.77	0.44	0.00		

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	Link-01	63.92	2586.00	0.00	2584.90	0.00	1.10	1.7200	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	2
2	Link-03	65.60	2571.68	0.00	2570.88	0.00	0.80	1.2200	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	2

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	Link-01	31.81	0 10:30	189.58	0.17	9.95	0.11	0.83	0.28	0.00		Calculated
2	Link-03	52.64	0 10:36	159.59	0.33	10.12	0.11	1.18	0.40	0.00		Calculated

POST-DEVELOPMENT 50-YR STORM HYDROLOGY SUMMARY

Project Description

File Name .... Post-Development.SPF

Project Options

Flow Units .... CFS
Elevation Type .... Elevation
Hydrology Method .... SCS TR-55
Time of Concentration (TOC) Method .... SCS TR-55
Link Routing Method .... Kinematic Wave
Enable Overflow Ponding at Nodes .... YES
Skip Steady State Analysis Time Periods .... NO

Analysis Options

Start Analysis On	Aug 02, 2019	00:00:00
End Analysis On	Aug 03, 2019	00:00:00
Start Reporting On	Aug 02, 2019	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins...	3
Nodes..	6
Junctions	5
Outfalls	0
Flow Diversions	0
Inlets	0
Storage Nodes	1
Links..	4
Channels	2
Pipes	2
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	TS-01	Cumulative	inches	California	Los Angeles (Palmdale)	50	4.70	SCS Type I 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-01	131.60	69.30	4.70	1.76	232.14	79.36	0 00:41:16
2	Sub-02	85.81	63.00	4.70	1.32	113.44	31.92	0 00:44:16
3	Sub-03	31.58	67.20	4.70	1.61	50.90	13.19	0 01:01:34

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Jun-01	Junction	2586.00	2588.00	2586.00	0.00	0.00	31.82	2586.83	0.00	2.17	0 00:00	0.00	0.00
2	Jun-02	Junction	2584.90	2587.40	2584.90	0.00	0.00	31.81	2586.69	0.00	2.21	0 00:00	0.00	0.00
3	Jun-03	Junction	2571.68	2576.00	2571.68	0.00	0.00	44.15	2574.78	0.00	2.22	0 00:00	0.00	0.00
4	Jun-04	Junction	2570.88	2576.00	2570.88	0.00	0.00	44.08	2576.00	0.00	0.00	0 00:00	0.00	0.00
5	Jun-05	Junction	2574.00	2574.50	2574.00	0.00	0.00	79.34	2575.07	0.00	0.93	0 00:00	0.00	0.00
6	Stor-01	Storage Node	2570.00	2574.00	2570.00		0.00	79.25	2570.00				0.00	0.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
1	Link-01	Pipe	Jun-01	Jun-02	63.92	2586.00	2584.90	1.7200	36.000	0.0120	31.81	189.58	0.17	9.95	0.83	0.28	0.00	Calculated
2	Link-03	Pipe	Jun-03	Jun-04	65.60	2571.68	2570.88	1.2200	36.000	0.0120	44.08	159.59	0.28	9.65	1.08	0.36	0.00	Calculated
3	Link-02	Channel	Jun-02	Jun-03	2150.00	2582.00	2573.00	0.4200	48.000	0.0300	31.07	271.10	0.11	3.41	1.77	0.44	0.00	
4	Link-04	Channel	Jun-05	Stor-01	87.98	2574.00	2570.00	4.5500	24.000	0.0300	79.25	421.07	0.19	6.94	1.07	0.53	0.00	

Subbasin Hydrology

Subbasin : Sub-01

Input Data

Area (ac) 131.60
Weighted Curve Number 69.30
Rain Gage ID .... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Natural western desert	72.38	A	63.00
Natural western desert	59.22	B	77.00
Composite Area & Weighted CN	131.60		69.30

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft^2)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.10	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	0.75	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.90	0.00	0.00
Velocity (ft/sec) :	0.12	0.00	0.00
Computed Flow Time (min) :	13.61	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	1400	0.00	0.00
Slope (%) :	0.75	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	1.40	0.00	0.00
Computed Flow Time (min) :	16.67	0.00	0.00

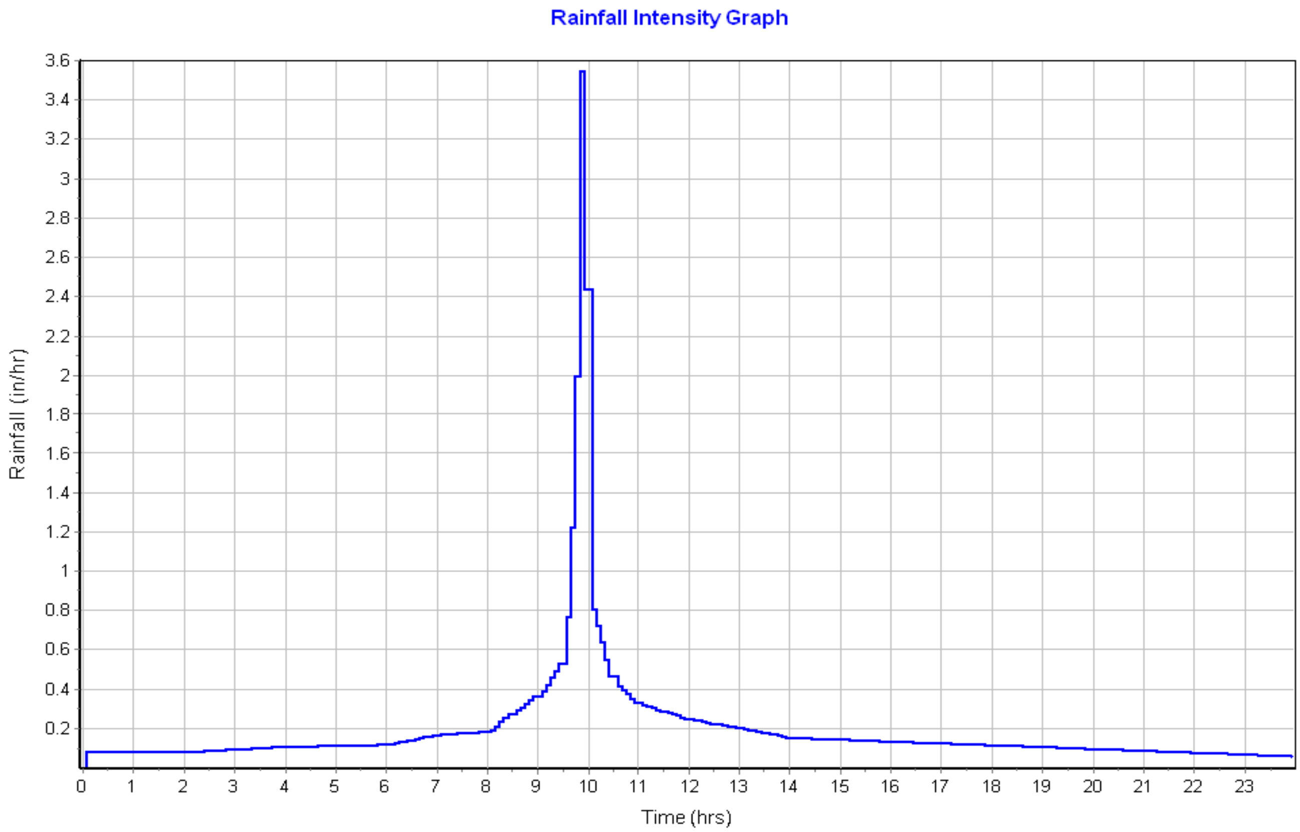
Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.023	0.00	0.00
Flow Length (ft) :	1990	0.00	0.00
Channel Slope (%) :	0.633	0.00	0.00
Cross Section Area (ft^2) :	2	0.00	0.00
Wetted Perimeter (ft) :	4.47	0.00	0.00
Velocity (ft/sec) :	3.02	0.00	0.00
Computed Flow Time (min) :	11.00	0.00	0.00

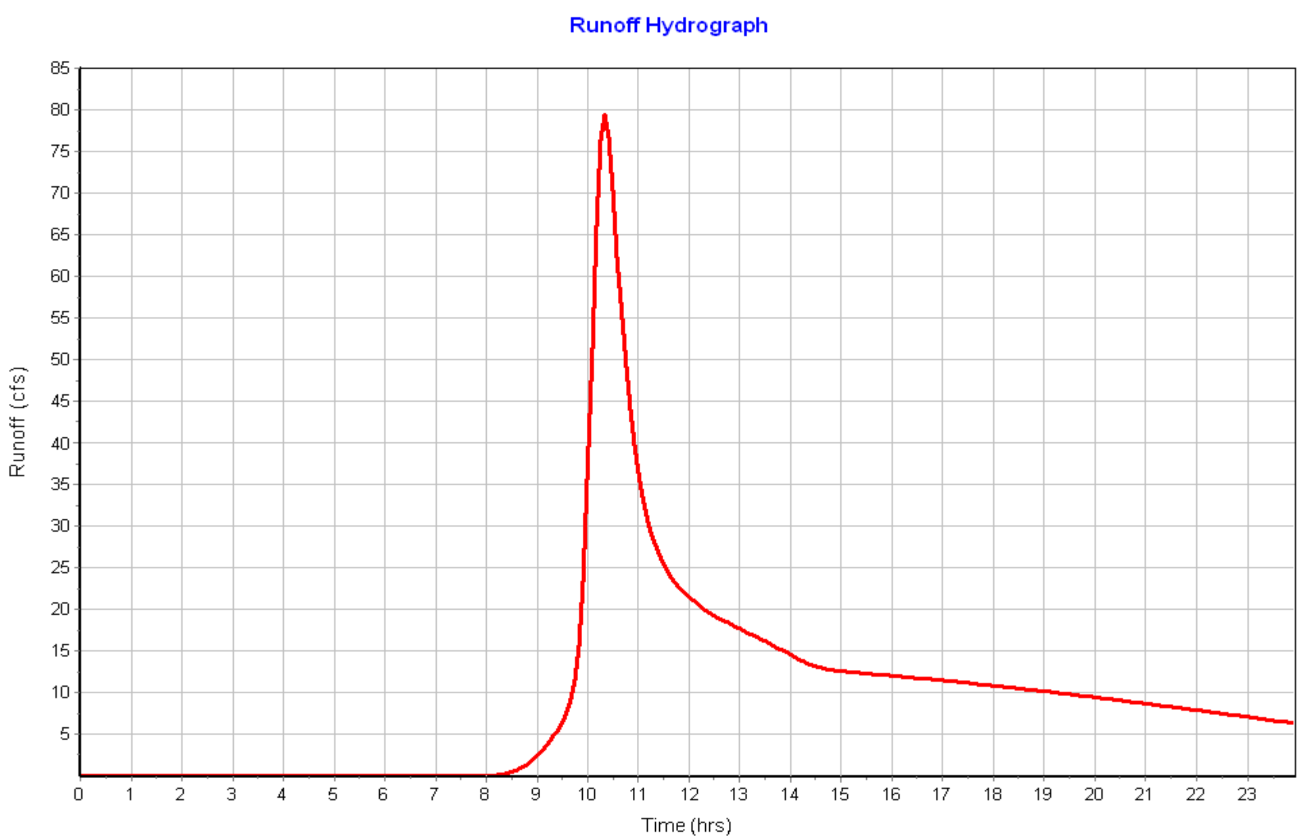
Total TOC (min) 41.28

Subbasin Runoff Results

Total Rainfall (in) 4.70
Total Runoff (in) 1.76
Peak Runoff (cfs) 79.36
Weighted Curve Number 69.30
Time of Concentration (days hh:mm:ss) 0 00:41:17

Subbasin : Sub-01





Subbasin : Sub-02

Input Data

Area (ac) 85.81
Weighted Curve Number 63.00
Rain Gage ID .... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Natural western desert	85.81	A	63.00
Composite Area & Weighted CN	85.81		63.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.13	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	1.28	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.90	0.00	0.00
Velocity (ft/sec) :	0.12	0.00	0.00
Computed Flow Time (min) :	13.56	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	1400	0.00	0.00
Slope (%) :	1.28	0.00	0.00
Surface Type :	Bare & untilled	Unpaved	Unpaved
Velocity (ft/sec) :	1.13	0.00	0.00
Computed Flow Time (min) :	20.65	0.00	0.00

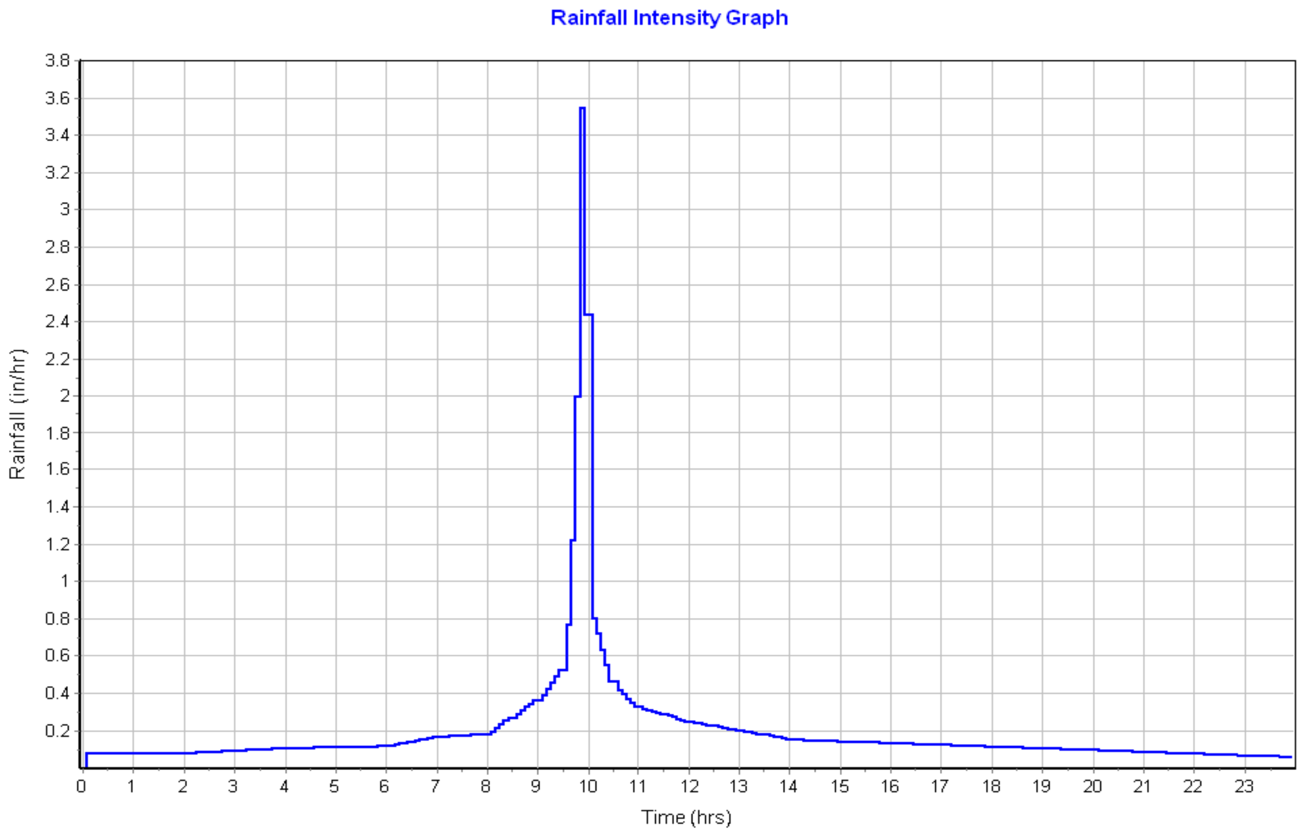
Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.030	0.00	0.00
Flow Length (ft) :	1617	0.00	0.00
Channel Slope (%) :	0.85	0.00	0.00
Cross Section Area (ft^2) :	2	0.00	0.00
Wetted Perimeter (ft) :	4.47	0.00	0.00
Velocity (ft/sec) :	2.68	0.00	0.00
Computed Flow Time (min) :	10.06	0.00	0.00

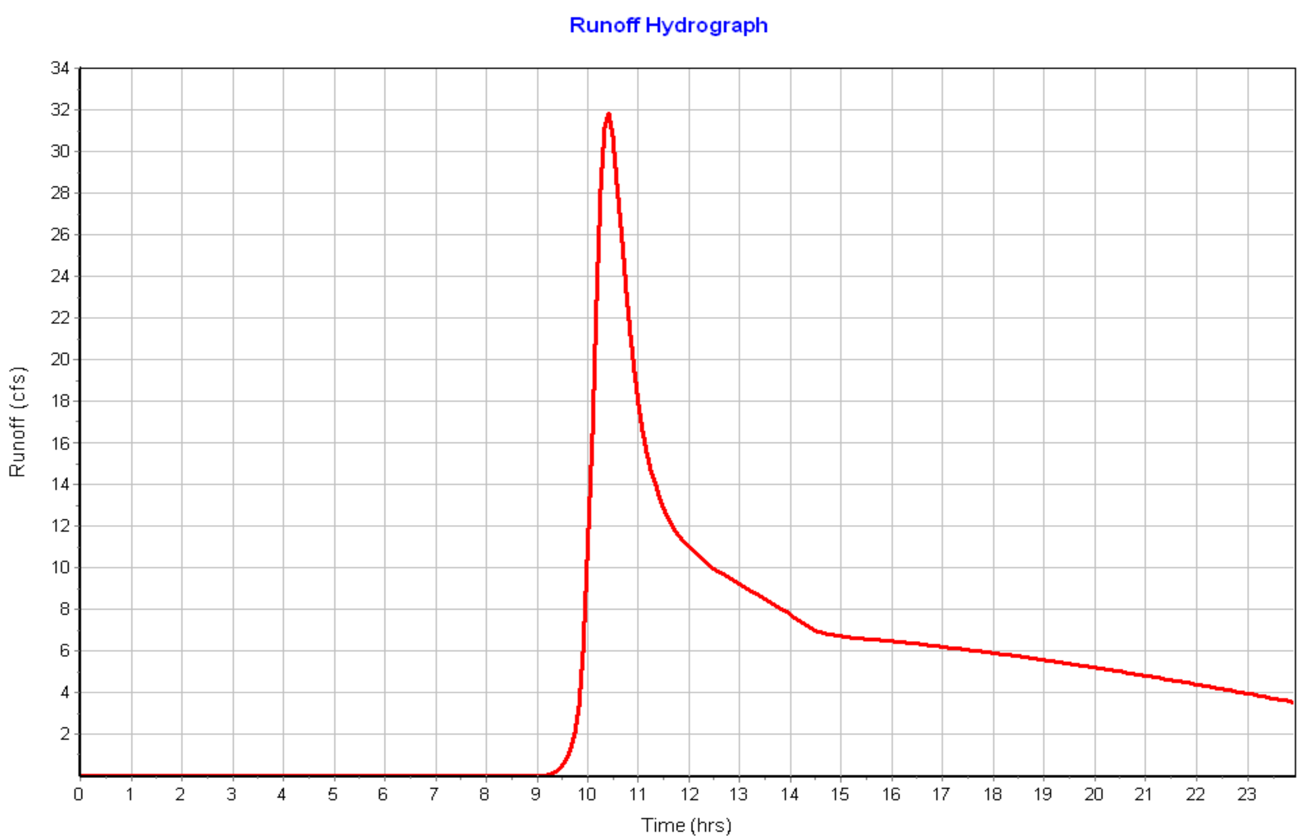
Total TOC (min) 44.27

Subbasin Runoff Results

Total Rainfall (in) 4.70
Total Runoff (in) 1.32
Peak Runoff (cfs) 31.92
Weighted Curve Number 63.00
Time of Concentration (days hh:mm:ss) 0 00:44:16

Subbasin : Sub-02





Subbasin : Sub-03

Input Data

Area (ac) 31.58
Weighted Curve Number 67.20
Rain Gage ID .... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Natural western desert	22.10	A	63.00
Natural western desert	9.47	B	77.00
Composite Area & Weighted CN	31.57		67.20

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.13	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	0.45	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.90	0.00	0.00
Velocity (ft/sec) :	0.08	0.00	0.00
Computed Flow Time (min) :	20.59	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	1400	0.00	0.00
Slope (%) :	0.70	0.00	0.00
Surface Type :	Bare & untilled	Unpaved	Unpaved
Velocity (ft/sec) :	0.84	0.00	0.00
Computed Flow Time (min) :	27.78	0.00	0.00

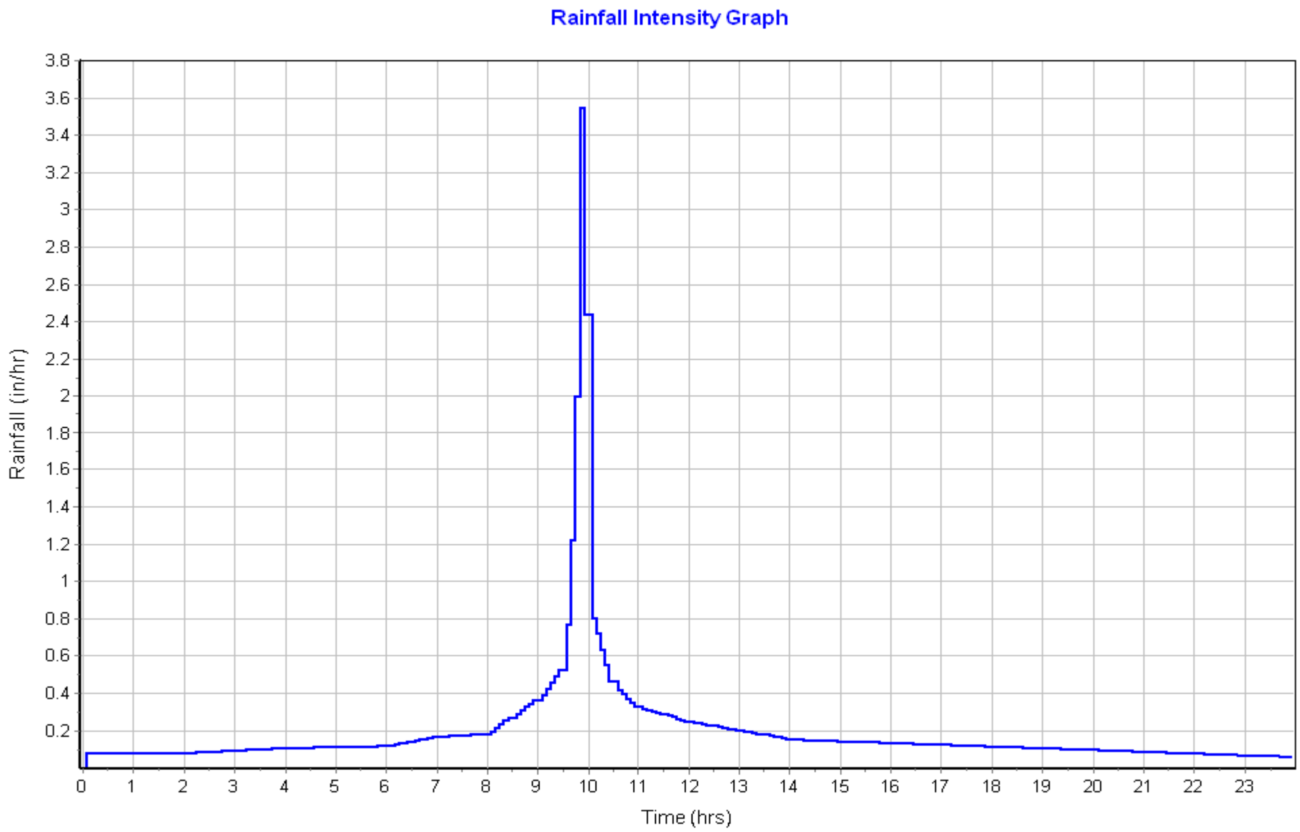
Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.030	0.00	0.00
Flow Length (ft) :	2150	0.00	0.00
Channel Slope (%) :	0.30	0.00	0.00
Cross Section Area (ft²) :	13.23	0.00	0.00
Wetted Perimeter (ft) :	13.28	0.00	0.00
Velocity (ft/sec) :	2.71	0.00	0.00
Computed Flow Time (min) :	13.21	0.00	0.00

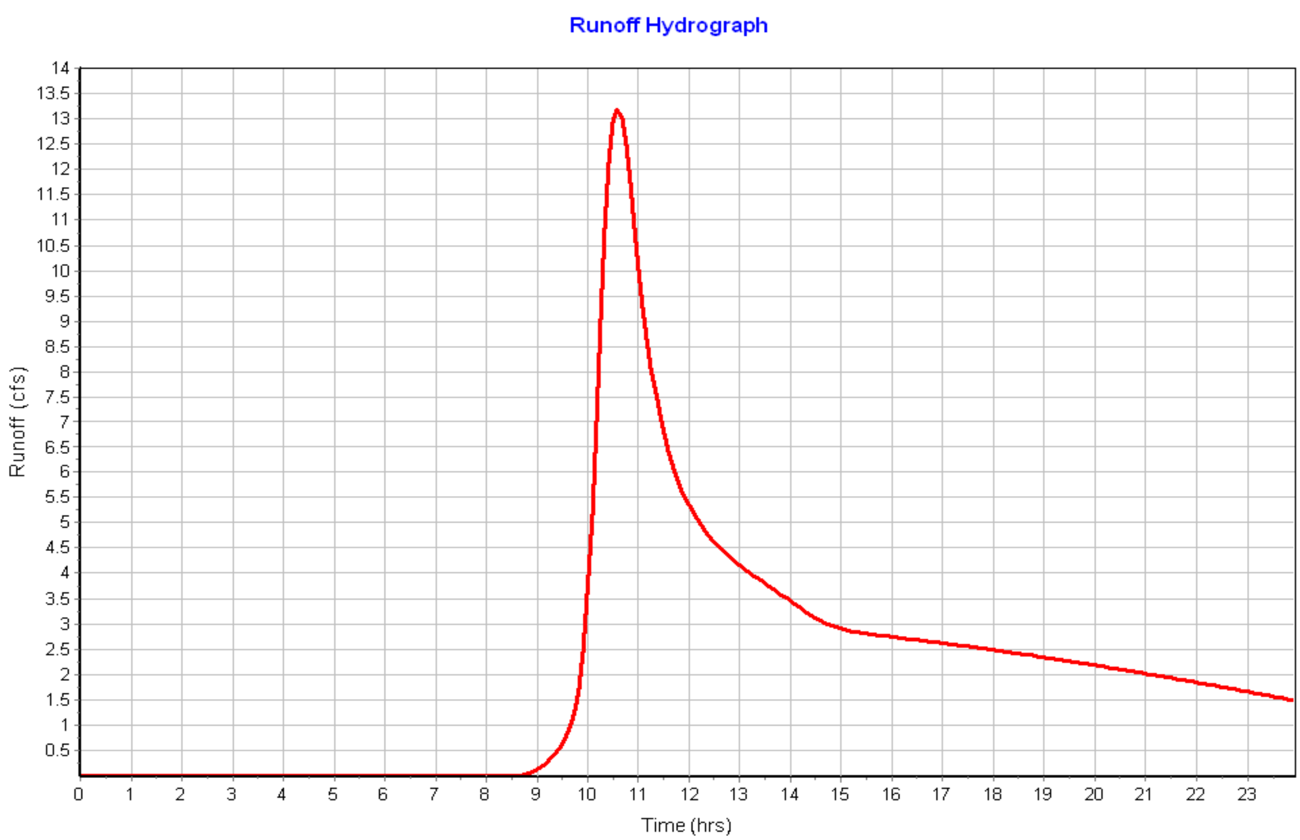
Total TOC (min) 61.58

Subbasin Runoff Results

Total Rainfall (in) 4.70
Total Runoff (in) 1.61
Peak Runoff (cfs) 13.19
Weighted Curve Number 67.20
Time of Concentration (days hh:mm:ss) 0 01:01:35

Subbasin : Sub-03





Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Minimum Pipe Cover (in)
1	Jun-01	2586.00	2588.00	2.00	2586.00	0.00	0.00	-2588.00	0.00	0.00
2	Jun-02	2584.90	2587.40	2.50	2584.90	0.00	0.00	-2587.40	0.00	0.00
3	Jun-03	2571.68	2576.00	4.32	2571.68	0.00	0.00	-2576.00	0.00	0.00
4	Jun-04	2570.88	2576.00	5.12	2570.88	0.00	0.00	-2576.00	0.00	0.00
5	Jun-05	2574.00	2574.50	0.50	2574.00	0.00	0.00	-2574.50	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Jun-01	31.82	31.82	2586.83	0.83	0.00	2.17	2586.24	0.24	0 10:30	0 00:00	0.00	0.00
2	Jun-02	31.81	0.00	2586.69	1.79	0.00	2.21	2585.51	0.61	0 10:30	0 00:00	0.00	0.00
3	Jun-03	44.15	13.18	2574.78	3.10	0.00	2.22	2573.60	1.92	0 10:37	0 00:00	0.00	0.00
4	Jun-04	44.08	0.00	2576.00	5.12	0.00	0.00	2574.18	3.30	0 08:33	0 00:00	0.00	0.00
5	Jun-05	79.34	79.34	2575.07	1.07	0.00	0.93	2574.35	0.35	0 10:25	0 00:00	0.00	0.00

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	Link-02	2150.00	2582.00	-2.90	2573.00	1.32	9.00	0.4200	Triangular	4.000	24.000	0.0300	0.5000	0.5000	0.0000	0.00	No
2	Link-04	87.98	2574.00	0.00	2570.00	0.00	4.00	4.5500	Triangular	2.000	40.000	0.0300	0.5000	0.5000	0.0000	0.00	No

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	Link-02	31.07	0 10:37	271.10	0.11	3.41	10.51	1.77	0.44	0.00		
2	Link-04	79.25	0 10:25	421.07	0.19	6.94	0.21	1.07	0.53	0.00		

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	Link-01	63.92	2586.00	0.00	2584.90	0.00	1.10	1.7200	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	2
2	Link-03	65.60	2571.68	0.00	2570.88	0.00	0.80	1.2200	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	2

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	Link-01	31.81	0 10:30	189.58	0.17	9.95	0.11	0.83	0.28	0.00		Calculated
2	Link-03	44.08	0 10:38	159.59	0.28	9.65	0.11	1.08	0.36	0.00		Calculated

Storage Nodes

Storage Node : Stor-01

Input Data

Invert Elevation (ft)	2570.00
Max (Rim) Elevation (ft)	2574.00
Max (Rim) Offset (ft)	4.00
Initial Water Elevation (ft)	2570.00
Initial Water Depth (ft)	0.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Output Summary Results

Peak Inflow (cfs)	79.25
Peak Lateral Inflow (cfs)	0.00
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2570.00
Max HGL Depth Attained (ft)	0
Average HGL Elevation Attained (ft)	2570.00
Average HGL Depth Attained (ft)	0
Time of Max HGL Occurrence (days hh:mm)	0 00:00
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

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