Imperial County Planning & Development Services
Planning / Building

Jim Minnick
DIRECTOR

November 16, 2022

Subject: **Request for Proposal (RFP) [(Review project and prepare Initial Study (IS)] Project Applicant: Ormat-Truckhaven Geothermal Exploration Well project.**
- **Zone Change # 22-0004 &**
- **General Plan Amendment # 22-0003**

Ladies & Gentlemen:

The Imperial County Planning & Development Services Department (ICPDS) is soliciting a proposal for the **Ormat-Truckhaven Geothermal Exploration Well project** & development.

ICPDS will act as the "Lead Agency" for the attached proposed project which includes; zone change and general plan amendment **for seismic testing and exploratory drilling.** The Planning & Development Services Department will act as the "Lead Agency" for the preparation of an **Initial Study** pursuant to the California Environmental Quality Act (CEQA. the successful consultant will work directly for the Imperial County Planning & Development Services Director in the preparation of a draft and final Initial Study.

The **Ormat-Truckhaven Geothermal Exploration Well project** includes:

1. **Exploration geothermal drilling**

Attached hereto is a copy of the application package and maps.

I. The County hereby requests the following information; for each item (as appropriate) the hourly rate and estimated total hours for the specific task must be documented.

A. Project scope to be utilized in the preparation of a legally adequate CEQA document; Identified milestones representing specific tangible work products (tasks) to which payments by the County would be linked and become part of the legal contract. (Please note that all subsequent bills/invoices will be required to include both the identified milestones and percent completed.)

B. All potential subcontractor(s) that will be utilized along with their estimated staff time and cost breakdown.

C. An estimated "not to exceed cost" to prepare the joint drafts and final environmental documents, including the final Initial Study.

801 Main St. El Centro, CA. 92243 (442) 265-1736 Fax (442) 265-1735 planninginfo@co.imperial.ca.us www.icpds.com

D. Review of project description for Zone Change # 22-0004 & General Plan Amendment # 22-0003
E. A digital (CD) version of all documents prepared by the prime CEQA consultant and potential subcontractor(s).

Please incorporate the cost estimate for the printing of the joint draft and final (Initial Study) for a **minimum of three (3) copies**.

II. We request that you provide within your cost estimate:

Applicant has submitted the **following** documentation with the proposed project. The Planning & Development Services Department requests that you provide within your estimate, the cost for the writing an Initial Study and meetings including the Planning Commission and Board of Supervisors. A number of studies were completed for this project.

One page cover letter introducing your firm.

1. **Project Understanding**
2. **Project Team**
   - Identify all company and consultant team personnel who will work on the project and short description of their education and work experience on this type of exploratory exploration for geothermal projects.
   - Resumes of the prime and technical consultants should be included and can be attached to the proposal as an appendix.
3. **Scope of Work**
   - Describe the proposed tasks to accomplish the scope of work.
   - Include deliverables, when applicable, for each task.
   - Include all applicable site visits, staff meetings and public hearings.
   - Be specific regarding your approach to complete the CEQA noticing requirements.
4. **The tasks should be presented as follows:**
   a) Include research, site visit, data collection, CEQA, include the preparation per CEQA Assumptions
   b) Please provide a specific section for assumptions. Include your assumptions regarding travel time, mileage, public noticing, or anything else that needs clarification; and
   c) The number of meetings and hearings that are included in your proposal should be detailed under each task. Meetings would include an Environmental Evaluation Meeting, Planning Commission Meeting, & Board of Supervisors Meeting.
5. **Proposed Schedule**
   Provide the number of weeks from project initiation to public hearings, EEC, Planning Commission, and Board of Supervisors.
6. **Cost Estimate/Milestones**
   - Provide a discussion of the proposed cost and any optional costs.
   - Include a spread sheet that details the personnel, their estimated hours, and associated costs per task (can be attached as an appendix).
   - A table of project milestones should be included in the Cost Estimate discussion.

7. **Consultant Selection Criteria**

a) **Understanding of the project:** the proposer should demonstrate understanding of key elements of the project and, accordingly, provide the appropriate personnel and expertise.
b) **Approach to the project:** The selection process will evaluate the extent to which the proposer has recognized and identified special circumstances on the project and whether the proposer has provided logical approach to tasks and issues of the project.
c) **Professional qualifications necessary for satisfactory performance:** The project manager and key team members should be qualified to perform the work categories on the project; and the proposer's knowledge of standards and procedures will be examined.
d) **Specialized experience and technical competence in the type of work required:** The proposer should provide information about comparable projects they have been involved with and/or successfully accomplished; past performance on contracts with government agencies and private industry will be considered together with past performance evaluations; and the capacity to accomplish the work in the required time will also be evaluated.

III. **It is requested that you disclose any conflict** or potential conflict that you may have if you are submitting a proposal. The conflict by the County envisions, at the very minimum, current/ongoing or previous contracts (within the past two years) with the applicant(s); this also includes current technical studies that either are or have been prepared for the applicant within the last year.

IV. **Not providing the extent of information (including hourly rate and total estimated hours per task) may negatively impact the evaluation of proposal.**

If you are interested in submitting a proposal, please submit it to the Director at Imperial County Planning & Development Services Department, 801 Main Street, El Centro, CA, 92243, **no later than December 8th, 2022 at 5:00 PM.** This must be post-marked or sent via facsimile on or before this date and time.

Please note that it is **not necessary to present us with voluminous references or individualized background data** on persons or personnel within your organization. We may require this at a later date. We look forward to receiving your submittal.

If you do have any questions, please contact the assigned Planner for this project, David Black, Planner IV at davidblack@co.imperial.ca.us or at (442) 265-1736 ext. 1746.

Sincerely,

Jim Minnick,
Planning & Development Services Department Director

By David Black

cc: Jim Minnick, Director of Planning and Development Services
Michael Abraham, AICP, Assistant Director of Planning & Development Services
Diana Robinson, Planning Division Manager
File: 10.102, 10.110, APN 017-010-057

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ORMAT

ATTN: Mr. Dave Black
County of Imperial – Planning and Development Services
801 W. Main Street
El Centro, CA 92243

Re: Truckhaven/Orni 5 Geothermal Exploration Well Project – Application for Zone Change and General Plan Amendment

Dear Mr. Black:

ORNI 5 (Applicant) proposes to drill and test up to six geothermal exploration wells (exploratory wells) on private and State lands in the Truckhaven Geothermal Exploration Area, located south-southwest of Salton City in western Imperial County (County), California. Each of the proposed geothermal exploration wells would be located on separate, individual well pads that would be constructed on lands under geothermal lease to the Applicant. Portions of the Project are located on privately owned parcels in unincorporated Imperial County and within the Western Shores Urban Plan Area and, therefore, are under County jurisdiction (APNs 017-010-057 and 017-970-011; Figure 1).

On December 11, 2019, the County Planning Commission approved Conditional Use Permit (CUP) # 18-0038. Included in the CUP, Special Condition 3 (SC3) requires:

Wells #18-32 and #747-32 are currently located within Residential designation/zone and would be subject to additional entitlements (i.e. General Plan Amendment, Zone Change, Conditional Use Permit, etc.) prior to any construction for these two wells.

In accordance with SC3 and in order to be consistent with the Project's proposed use, the Applicant is requesting a Zone Change (ZC) for APN 017-010-057 from the existing zoning of R-1 to S-1, and a General Plan (GP) Amendment (GPA) from *Low Density Residential* to *Recreational/Open Space*. APN 017-970-011 would not require a ZC or General Plan Designation change because the proposed Project is consistent with the existing zoning and GP designation; however, both parcels would need to be added to the GP's Geothermal Renewable Energy Overlay Zone (Figure 2). Table 1 below provides a summary of the proposed zoning and GP changes.

ORMAT NEVADA, INC.
6140 Plumas Street, Reno, NV 89519, USA • +1-775-356-9029 • ormat@ormat.com ormat.com

ZC22-0004

Table 1. Summary of the Proposed Zone Changes and General Plan Amendments

APN	Zoning		General Plan		
	Current	Proposed	Current Designation	Proposed Designation	Geothermal Overlay
017-010-057	R-1	S-1	Low Density Residential	Recreational / Open Space	Expand to Include Parcel
017-970-011	S-1	No proposed change	Recreational / Open Space	No proposed change	Expand to Include Parcel

Please let us know if you have any questions or concerns regarding this letter and associated application materials enclosed herein:

- Zone Change Application
- Figure 1 - Existing Zoning and GP Designations
- Figure 2 – Existing Geothermal Overlay
- Check for the $13,500 Application Fees

Please let us know if we can provide any additional information, specifically if it would be helpful to review any of the prior documentation and analyses conducted for the Project while the CUP was processed.

Sincerely,

Kim Carter
Permitting Manager
Ormat Nevada, Inc.
kcarter@ormat.com
Mobile: (775) 446-9648

CHANGE OF ZONE

I.C. PLANNING & DEVELOPMENT SERVICES DEPT.
801 Main Street, El Centro, CA 92243 (760) 482-4236

- APPLICANT MUST COMPLETE ALL NUMBERED (black & blue) SPACES – Please type or print -

1. PROPERTY OWNER'S NAME ORNI 5 LLC	EMAIL ADDRESS	
2. MAILING ADDRESS (Street / P O Box, City, State) 6140 Plumas Street, Reno, NV	ZIP CODE 83519	PHONE NUMBER
3. ENGINEER'S NAME CA. LICENSE NO.	EMAIL ADDRESS	
4. MAILING ADDRESS (Street / P O Box, City, State) 6140 Plumas Street, Reno, NV	ZIP CODE 89519	PHONE NUMBER 775-356-9029

5. ASSESSOR'S PARCEL NO. 017-010-057	ZONING (existing) R-1	ZONING (proposed) S-1
6. PROPERTY (site) ADDRESS		SIZE OF PROPERTY (in acres or square foot) 520 acres

7. GENERAL LOCATION (i.e. city, town, cross street)
Near Salton Sea

8. LEGAL DESCRIPTION S31 T10S R10E Sec 35 and 36

8. DESCRIBE CURRENT USE ON / OF PROPERTY (list and describe in detail) None/Vacant

9. PLEASE STATE REASON FOR PROPOSED USE (be specific) Six geothermal exploration wells on private and State lands in the Truckhaven Geothermal Exploration Area, located south-southwest of Salton City in western Imperial County. A 3D survey of the geology below the Truckhaven leasing is required to understand the underlying geothermal system.

10. DESCRIBE SURROUNDING PROPERTY USES Lands to the southeast comprise scattered single-family residences. The Imperial County Dump is southwest of the Project site. The remaining properties surrounding the Project are vacant.

I / WE THE LEGAL OWNER (S) OF THE ABOVE PROPERTY CERTIFY THAT THE INFORMATION SHOWN OR STATED HEREIN IS TRUE AND CORRECT.

Elizabeth Helms, Secretary
Print Name

Elizabeth E Helms
Signature

September 23, 2022
Date

REQUIRED SUPPORT DOCUMENTS

A. SITE PLAN
B. PRELIMINARY TITLE REPORT (6 months or newer)
C. FEE
D. OTHER

APPLICATION RECEIVED BY:		DATE	
APPLICATION DEEMED COMPLETE BY:		DATE	
APPLICATION REJECTED BY:		DATE	
TENTATIVE HEARING BY:		DATE	
FINAL ACTION: ☐ APPROVED ☐ DENIED		DATE	

REVIEW / APPROVAL BY OTHER DEPT'S required.
☐ P. W.
☐ E. H. S.
☐ A. P. C. D.
☐ O. E. S.
☐ _____
☐ _____

ZC #

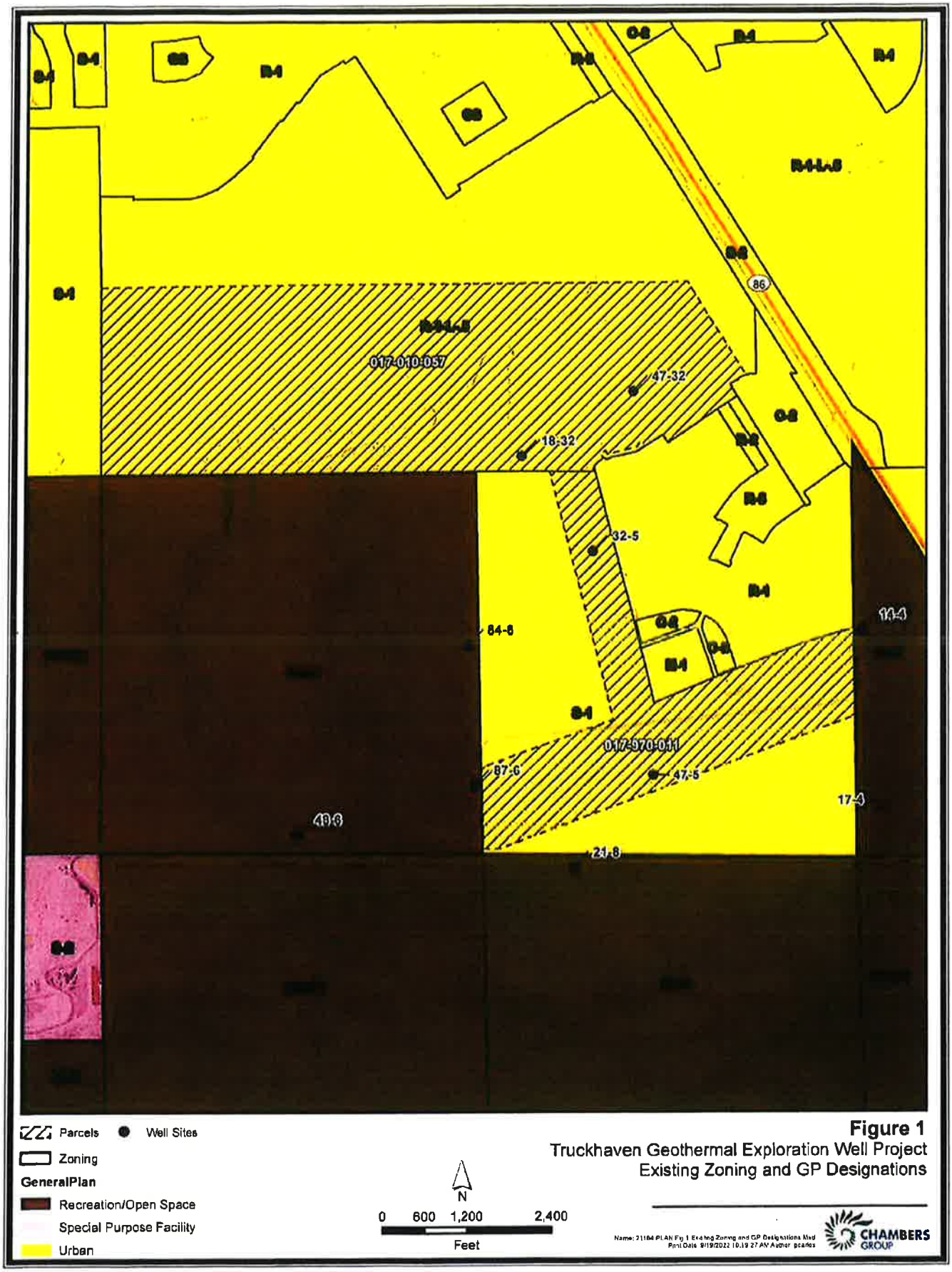

Figure 1
Truckhaven Geothermal Exploration Well Project
Existing Zoning and GP Designations

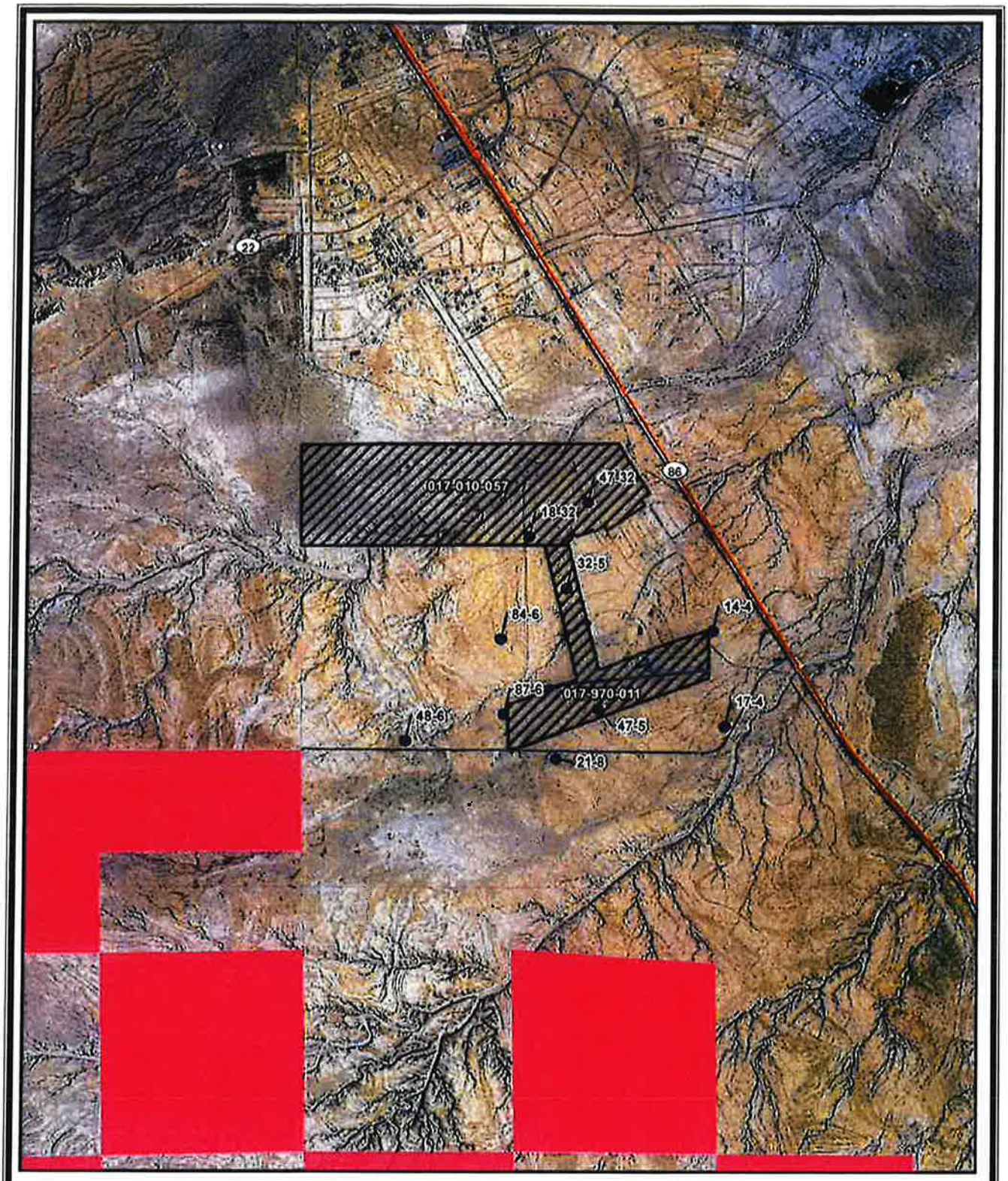

Figure 2
Truckhaven Geothermal Exploration Well Project
Exisiting Geothermal Overlay

Name: 21184 PLAN Fig 2 Existing Geothermal Overlay.mxd
Print Date: 8/13/2022 1:47:10 PM Author: pierles

CHAMBERS GROUP

PROJECT REPORT

TO: ENVIRONMENTAL EVALUATION COMMITTEE **AGENDA DATE: October 24, 2019**

FROM: PLANNING & DEVELOPMENT SERVICES **AGENDA TIME 1:30 PM / No. 1**

PROJECT TYPE: Orni 5-Truckhaven Geothermal Exploratory Wells & Seismic Testing Project - Initial Study #18-0025 SUPERVISOR DIST # 4

LOCATION: Salton Sea & Truck-haven Geothermal areas, APN: 017-340-003-, et.al

Salton Sea Areas, CA PARCEL SIZE: various

GENERAL PLAN (existing) Open Space / Salton Sea Urban Area Plan/ various

GENERAL PLAN (proposed)

ZONE (existing) S-1 Open Space/ State Lands/Parks/ Govt. /Federal ZONE (proposed) N/A

GENERAL PLAN FINDINGS ☒ CONSISTENT ☐ INCONSISTENT ☐ MAY BE/FINDINGS

PLANNING COMMISSION DECISION: HEARING DATE:

☐ APPROVED ☐ DENIED ☐ OTHER

PLANNING DIRECTORS DECISION: HEARING DATE:

☐ APPROVED ☐ DENIED ☐ OTHER

ENVIROMENTAL EVALUATION COMMITTEE DECISION: HEARING DATE: 10/24/2019

INITIAL STUDY: 18-0025

☐ NEGATIVE DECLARATION ☒ MITIGATED NEG. DECLARATION ☐ EIR

DEPARTMENTAL REPORTS / APPROVALS:

PUBLIC WORKS	☒ NONE	☐ ATTACHED
AG	☒ NONE	☐ ATTACHED
APCD	☒ NONE	☐ ATTACHED
E.H.S.	☒ NONE	☐ ATTACHED
FIRE / OES	☒ NONE	☐ ATTACHED
SHERIFF	☐ NONE	☒ ATTACHED
OTHER	NAHC,	

REQUESTED ACTION:

(See Attached)

Planning & Development Services
801 MAIN ST., EL CENTRO, CA.., 92243 442-265-1736
(Jim Minnick, Director)
Db\017\340\003\EEC hearing\projrep

EEC ORIGINAL PKG

☒ MITIGATED NEGATIVE DECLARATION

Initial Study & Environmental Analysis
For:

Truckhaven Geothermal Exploration Well Project

Prepared By:

COUNTY OF IMPERIAL
Planning & Development Services Department
801 Main Street
El Centro, CA 92243
(442) 265-1736
www.icpds.com

November 2019

EEC ORIGINAL PKG

TABLE OF CONTENTS

Figures

Tables

SECTION 1
INTRODUCTION

A. PURPOSE

This document is a ☐ policy-level, ☒ project level Initial Study for evaluation of potential environmental impacts resulting with the proposed _project_ .

B. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) REQUIREMENTS AND THE IMPERIAL COUNTY'S GUIDELINES FOR IMPLEMENTING CEQA

As defined by Section 15063 of the State California Environmental Quality Act (CEQA) Guidelines and Section 7 of the County's "CEQA Regulations Guidelines for the Implementation of CEQA, as amended", an **Initial Study** is prepared primarily to provide the Lead Agency with information to use as the basis for determining whether an Environmental Impact Report (EIR), Negative Declaration, or Mitigated Negative Declaration would be appropriate for providing the necessary environmental documentation and clearance for any proposed project.

☐ According to Section 15065, an **EIR** is deemed appropriate for a particular proposal if the following conditions occur:

- The proposal has the potential to substantially degrade quality of the environment.
- The proposal has the potential to achieve short-term environmental goals to the disadvantage of long-term environmental goals.
- The proposal has possible environmental effects that are individually limited but cumulatively considerable.
- The proposal could cause direct or indirect adverse effects on human beings.

☐ According to Section 15070(a), a **Negative Declaration** is deemed appropriate if the proposal would not result in any significant effect on the environment.

☒ According to Section 15070(b), a **Mitigated Negative Declaration** is deemed appropriate if it is determined that though a proposal could result in a significant effect, mitigation measures are available to reduce these significant effects to insignificant levels.

This Initial Study has determined that the proposed applications will not result in any potentially significant environmental impacts and therefore, a Negative Declaration is deemed as the appropriate document to provide necessary environmental evaluations and clearance as identified hereinafter.

This Initial Study and Negative Declaration are prepared in conformance with the California Environmental Quality Act of 1970, as amended (Public Resources Code, Section 21000 et. seq.); Section 15070 of the State & County of Imperial's Guidelines for Implementation of the California Environmental Quality Act of 1970, as amended (California Code of Regulations, Title 14, Chapter 3, Section 15000, et. seq.); applicable requirements of the County of Imperial; and the regulations, requirements, and procedures of any other responsible public agency or an agency with jurisdiction by law.

Pursuant to the County of Imperial Guidelines for Implementing CEQA, depending on the project scope, the County of Imperial Board of Supervisors, Planning Commission and/or Planning Director is designated the Lead Agency, in accordance with Section 15050 of the CEQA Guidelines. The Lead Agency is the public agency which has the principal responsibility for approving the necessary environmental clearances and analyses for any project in the County.

C. INTENDED USES OF INITIAL STUDY AND NEGATIVE DECLARATION

This Initial Study and Negative Declaration are informational documents which are intended to inform County of Imperial decision makers, other responsible or interested agencies, and the general public of potential environmental effects of the proposed applications. The environmental review process has been established to enable public agencies to evaluate environmental consequences and to examine and implement methods of eliminating or reducing any potentially adverse impacts. While CEQA requires that consideration be given to avoiding environmental damage, the Lead Agency and other responsible public agencies must balance adverse environmental effects against other public objectives, including economic and social goals.

The Initial Study and Negative Declaration, prepared for the project will be circulated for a period of 30 days for public and agency review and comments. At the conclusion, if comments are received, the County Planning & Development Services Department will prepare a document entitled "Responses to Comments" which will be forwarded to any commenting entity and be made part of the record within 10-days of any project consideration.

D. CONTENTS OF INITIAL STUDY & NEGATIVE DECLARATION

This Initial Study is organized to facilitate a basic understanding of the existing setting and environmental implications of the proposed applications.

SECTION 1

I. INTRODUCTION presents an introduction to the entire report. This section discusses the environmental process, scope of environmental review, and incorporation by reference documents.

SECTION 2

II. ENVIRONMENTAL CHECKLIST FORM contains the County's Environmental Checklist Form. The checklist form presents results of the environmental evaluation for the proposed applications and those issue areas that would have either a significant impact, potentially significant impact, or no impact.

PROJECT SUMMARY, LOCATION AND EVIRONMENTAL SETTINGS describes the proposed project entitlements and required applications. A description of discretionary approvals and permits required for project implementation is also included. It also identifies the location of the project and a general description of the surrounding environmental settings.

ENVIRONMENTAL ANALYSIS evaluates each response provided in the environmental checklist form. Each response checked in the checklist form is discussed and supported with sufficient data and analysis as necessary. As appropriate, each response discussion describes and identifies specific impacts anticipated with project implementation.

SECTION 3

III. MANDATORY FINDINGS presents Mandatory Findings of Significance in accordance with Section 15065 of the CEQA Guidelines.

IV. PERSONS AND ORGANIZATIONS CONSULTED identifies those persons consulted and involved in preparation of this Initial Study and Negative Declaration.

V. REFERENCES lists bibliographical materials used in preparation of this document.

VI. NEGATIVE DECLARATION – COUNTY OF IMPERIAL

E. SCOPE OF ENVIRONMENTAL ANALYSIS

For evaluation of environmental impacts, each question from the Environmental Checklist Form is summarized and responses are provided according to the analysis undertaken as part of the Initial Study. Impacts and effects will be evaluated and quantified, when appropriate. To each question, there are four possible responses, including:

1. No Impact: A "No Impact" response is adequately supported if the impact simply does not apply to the proposed applications.

2. Less Than Significant Impact: The proposed applications will have the potential to impact the environment. These impacts, however, will be less than significant; no additional analysis is required.

3. Less Than Significant With Mitigation Incorporated: This applies where incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact".

4. Potentially Significant Impact: The proposed applications could have impacts that are considered significant. Additional analyses and possibly an EIR could be required to identify mitigation measures that could reduce these impacts to less than significant levels.

F. POLICY-LEVEL or PROJECT LEVEL ENVIRONMENTAL ANALYSIS

This Initial Study and Negative Declaration will be conducted under a ☐ policy-level, ☒ project level analysis. Regarding mitigation measures, it is not the intent of this document to "overlap" or restate conditions of approval that are commonly established for future known projects or the proposed applications. Additionally, those other standard requirements and regulations that any development must comply with, that are outside the County's jurisdiction, are also not considered mitigation measures and therefore, will not be identified in this document.

G. TIERED DOCUMENTS AND INCORPORATION BY REFERENCE

Information, findings, and conclusions contained in this document are based on incorporation by reference of tiered documentation, which are discussed in the following section.

1. Tiered Documents

As permitted in Section 15152(a) of the CEQA Guidelines, information and discussions from other documents can be included into this document. Tiering is defined as follows:

"Tiering refers to using the analysis of general matters contained in a broader EIR (such as the one prepared for a general plan or policy statement) with later EIRs and negative declarations on narrower projects; incorporating by reference the general discussions from the broader EIR; and concentrating the later EIR or negative declaration solely on the issues specific to the later project."

Tiering also allows this document to comply with Section 15152(b) of the CEQA Guidelines, which discourages redundant analyses, as follows:

"Agencies are encouraged to tier the environmental analyses which they prepare for separate but related projects including the general plans, zoning changes, and development projects. This approach can eliminate repetitive discussion of the same issues and focus the later EIR or negative declaration on the actual issues ripe for decision at each level of environmental review. Tiering is appropriate when the sequence of analysis is from an EIR prepared for a general plan, policy or program to an EIR or negative declaration for another plan, policy, or program of lesser scope, or to a site-specific EIR or negative declaration."

Further, Section 15152(d) of the CEQA Guidelines states:

"Where an EIR has been prepared and certified for a program, plan, policy, or ordinance consistent with the requirements of this section, any lead agency for a later project pursuant to or consistent with the program, plan, policy, or ordinance should limit the EIR or negative declaration on the later project to effects which:

(1) Were not examined as significant effects on the environment in the prior EIR; or

(2) Are susceptible to substantial reduction or avoidance by the choice of specific revisions in the project, by the imposition of conditions, or other means."

2. Incorporation By Reference

Incorporation by reference is a procedure for reducing the size of EIRs/MND and is most appropriate for including long, descriptive, or technical materials that provide general background information, but do not contribute directly to the specific analysis of the project itself. This procedure is particularly useful when an EIR or Negative Declaration relies on a broadly-drafted EIR for its evaluation of cumulative impacts of related projects (*Las Virgenes Homeowners Federation v. County of Los Angeles* [1986, 177 Ca.3d 300]). If an EIR or Negative Declaration relies on information from a supporting study that is available to the public, the EIR or Negative Declaration cannot be deemed unsupported by evidence or analysis (*San Francisco Ecology Center v. City and County of San Francisco* [1975, 48 Ca.3d 584, 595]). This document incorporates by reference appropriate information from the "Final Environmental Impact Report and Environmental Assessment for the "County of Imperial General Plan EIR" prepared by Brian F. Mooney Associates in 1993 and updates.

When an EIR or Negative Declaration incorporates a document by reference, the incorporation must comply with Section 15150 of the CEQA Guidelines as follows:

- The incorporated document must be available to the public or be a matter of public record (CEQA Guidelines Section 15150[a]). The General Plan EIR and updates are available, along with this document, at the County of Imperial Planning & Development Services Department, 801 Main Street, El Centro, CA 92243 Ph. (442) 265-1736.

- This document must be available for inspection by the public at an office of the lead agency (CEQA Guidelines Section 15150[b]). These documents are available at the County of Imperial Planning & Development Services Department, 801 Main Street, El Centro, CA 92243 Ph. (442) 265-1736.

- These documents must summarize the portion of the document being incorporated by reference or briefly describe information that cannot be summarized. Furthermore, these documents must describe the relationship between the incorporated information and the analysis in the tiered documents (CEQA Guidelines Section 15150[c]). As discussed above, the tiered EIRs address the entire project site and provide background and inventory information and data which apply to the project site. Incorporated information and/or data will be cited in the appropriate sections.

- These documents must include the State identification number of the incorporated documents (CEQA Guidelines Section 15150[d]). The State Clearinghouse Number for the County of Imperial General Plan EIR is SCH #93011023.

- The material to be incorporated in this document will include general background information (CEQA Guidelines Section 15150[f]). This has been previously discussed in this document.

II. Environmental Checklist

1. **Project Title**: Truckhaven Geothermal Exploration Well Project

2. **Lead Agency**: Imperial County Planning & Development Services Department

3. **Contact person and phone number**: __David Black__, Planner _IV_, (442)265-1736, ext. 1746__

4. **Address**: 801 Main Street, El Centro CA, 92243

5. **E-mail**: davidblack@co.imperial.ca.us

6. **Project location**: The Proposed Project area is within the Truckhaven Geothermal Exploration Area in western Imperial County, California. The proposed geophysical survey would occur over a 23.5-square mile area within the USGS Geologic Survey 7.5' quadrangle for Kane Springs NW (Figure 3). The exploratory well sites would be located in six parcels, listed below (Figure 2).

Well Site	Assessor's Parcel Number (APN)
32-5	017-970-001 (209.4 acres)
47-5	017-970-012 (50 acres)
18-32	017-010-053 (520 acres)
47-32	017-010-053 (520 acres)
14-4	017-340-003 (213.6 acres)
17-4	017-340-003 (213.6 acres)

7. **Project sponsor's name and address**:

ORNI 5

6225 Neil Road

Reno, NV 89511

8. **General Plan designation**:

Recreation/Open Space

9. **Zoning**:

S-1 Open Space/Recreational

10. **Description of project**:

The Applicant proposes to conduct a geophysical survey (survey) and drill and test up to six geothermal exploration wells (exploratory wells) on private and State lands in the Truckhaven Geothermal Exploration Area, located south-southwest of Salton City in western Imperial County, California. Each of the proposed geothermal exploration wells would be located on separate, individual well pads that would be constructed on lands under geothermal lease to the Applicant.

11. **Surrounding land uses and setting**: Briefly describe the project's surroundings:

Surrounding land uses include Light Industrial to the north and Open Space/Recreational to the east, south, and west.

12. **Other public agencies whose approval is required** (e.g., permits, financing approval, or participation agreement.):

California Department of Conservation, Division of Oil, Gas and Geothermal Resources (CDOGGR)

Imperial County Air Pollution Control District

California Regional Water Quality Control Board, Colorado River Basin Region

California Department of Fish and Wildlife
California State Parks

13. Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentially, etc.? Yes; the County sent formal AB 52 consultation letters to Torres - Martinez Tribes and Quechan Tribes on August 7th, 2019. To date no responses have been received by the County.

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.

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

ENVIRONMENTAL EVALUATION COMMITTEE (EEC) DETERMINATION

After Review of the Initial Study, the Environmental Evaluation Committee has:

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

☒ Found that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

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

☐ Found that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact 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. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ Found that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE DE MINIMIS IMPACT FINDING: ☐ Yes ☒ No

EEC VOTES	YES	NO	ABSENT
PUBLIC WORKS	☐	☐	☐
ENVIRONMENTAL HEALTH SVCS	☐	☐	☐
OFFICE EMERGENCY SERVICES	☐	☐	☐
APCD	☐	☐	☐
AG	☐	☐	☐
SHERIFF DEPARTMENT	☐	☐	☐
ICPDS	☐	☐	☐

EEC ORIGINAL PKG

Jim Minnick, Director of Planning/EEC Chairman Date:

PROJECT SUMMARY

The Applicant proposes to drill and test up to six geothermal exploration wells on private and State lands in the Truckhaven Geothermal Exploration Area, located south-southwest of Salton City in western Imperial County, California (see Figure 1). Each of the proposed geothermal exploration wells would be located on separate, individual well pads that would be constructed on lands under geothermal lease to the Applicant.

The purpose of the Proposed Project is to conduct a geophysical survey and drill, complete, test and monitor up to six proposed geothermal resource wells. The geophysical survey would construct a high-resolution image of the subsurface geologic features within the Truckhaven Geothermal Lease area to identify potential geothermal reservoirs of commercial quantity. The exploratory geothermal wells would drill into and flow test the anticipated underlying geothermal reservoir to confirm the characteristics of the geothermal reservoir and detect if the geothermal resource is commercially viable.

The well sites have been tentatively selected based on past geologic investigations going back to the 1980s, including geologic mapping, geophysical surveys and temperature gradient holes. Although the six geothermal exploration well targets have been selected as best as possible at the present time, as with all geothermal exploration, geothermal reservoir targets are often refilled (and geothermal exploration wells relocated) as more data are collected and analyzed. The proposed well sites are exploratory and may or may not identify a commercially viable geothermal resource area for future development.

A. Project Location:

The Proposed Project (see Figure 1) would be located in the "Truckhaven Geothermal Leasing Area" analyzed by the BLM in the "Final Environmental Impact Statement for the Truckhaven Geothermal Leasing Area" (October 2007). The proposed well sites (see Figures 2 and 3) are located in an area analyzed in the Geothermal Overlay Zone for Imperial County's "Final Programmatic Environmental Impact Report - Renewable Energy and Transmission Element Update" (July 2015). The six exploration wells would be built within the six parcels listed in Table 1. Each of the six exploration well pads would be approximately 400 feet by 400 feet, for a surface area of approximately 3.7 acres per well and a total surface area of approximately 22.2 acres. The geophysical survey would occur within a 23.5-square mile (15,040-acre) survey area in the Truckhaven Geothermal Leasing Area. The actual survey truck paths would be approximately 10 feet wide and 200 feet long, covering a total of approximately 189 acres.

Land uses surrounding the Proposed Project include Light Industrial to the north and Open Space/Recreational to the east, south, and west. The Ocotillo Wells State Vehicular Recreational Area borders the Proposed Project area on the southern and western edges. The proposed well sites are currently vacant, unirrigated, desert land that is sparsely vegetated and primarily flat. Tule Wash and Surprise Ditch flow northeast and eventually empty into the Salton Sea. The well sites were selected to minimize surface disturbance, reduce the potential for adverse environmental effects, and make the best use of existing access within the limitation of testing the targeted geothermal resource. To the degree possible existing roads, trails and disturbances are used for access.

Primary highway access to the proposed well sites are off State Highway 86 to Airpark Drive or County Dump Road (see Figure 2). Existing access roads would be utilized to the extent practical. The access roads would be constructed or improved with gravel and/or maintained as needed to safely accommodate the traffic required for the exploration well drilling activities. Road beds would typically be approximately twenty (20) feet across. Table 1 shows the land ownership and general information for access to each well site.

Table 1: Project Well Land Ownership and Access Information – Geothermal Wells

Well Site	Assessor's Parcel Number (APN)	Surface Land Owner	Geothermal Rights Owner	Well Site Access	Nearest Residence
32-5	017-970-001 (209.4 acres)	Burrtec Waste Industries	Burrtec Waste Industries	Airpark Drive to Dessert Air Court.	0.34 mile
47-5	017-970-012 (50 acres)	Burrtec Waste Industries	Burrtec Waste Industries	From Dump Road	0.44 mile
18-32	017-010-053 (520 acres)	ORNI 5	State of California	Airpark Drive to Skywalk Drive to La Guardia Ave to Starlight Drive	0.40 mile
47-32	017-010-053 (520 acres)	ORNI 5	State of California	Airpark Drive to Skywalk Drive	0.20 mile
14-4	017-340-003 (213.6 acres)	State of California	State of California	Airpark Drive to Skywalk Drive	0.28 mile
17-4	017-340-003 (213.6 acres)	State of California	State of California	New driveway from County Dump Road	0.58 mile

Additionally, the geophysical survey will occur within a 23.5-square mile (15,040-acre) survey area covering over 200 parcels in the Truckhaven Geothermal Leasing Area as shown in Figure 3, with township and range sections noted.

B. Project Summary:

The Proposed Project includes a geophysical survey and drilling and testing of up to six geothermal exploration wells on private and State lands.

Geophysical Survey

A 23.5-square-mile, three-dimensional (3D) geophysical survey would be conducted in conjunction with vibration monitoring and drilling activities, described below. The purpose of the geophysical survey is to construct a high-resolution image of the subsurface geologic features within the Truckhaven Geothermal Lease area. This image would allow ORNI 5 to effectively verify and/or supplement the existing geologic data to design a more predictive geologic model which could be used to identify potential geothermal reservoirs of commercial quantity. Additionally, the predictive geologic model would reduce future environmental impacts by minimizing "hit and miss" exploration activities.

The survey would include approximately 3,168 receiver points distributed over approximately 119.09 linear miles of receiver lines and 3,243 source points distributed over approximately 121.97 linear miles of source lines. Two approximately 60,000-pound peak force truck-mounted vibrators equipped with hydraulically lowered pads would be used as the energy source.

Two sets of two Vibroseis trucks (four in total) would operate in tandem to travel along the GPS-established geophysical lines, stopping at given points to lower the vibrator pads centered under each vehicle. The vibrator pad would lift the truck; and source generation would be triggered from a central control truck stationed at the Salton Sea Airport (Airport), causing all trucks to vibrate in unison; this creates the energy source, which sends selected vibration signals propagating though the ground. The resulting energy wave would be recorded by the receivers and transmitted wirelessly to the data collection point located at the Airport. Source generation from vibrators will occur between 3 and 5-minute intervals, depending on access, detours, and terrain. Approximately 301 receiver channels may be actively collecting data at any given time.

Placement of receivers, consisting of six geophones each, will occur by helicopter during the data acquisition operations. A helicopter would move cache bags containing four to six receivers along parallel receiver lines. The cache bags will be suspended from a helicopter with a long line and deposited one at a time to predetermined GPS locations provided by the civil surveyors. Field survey crew members will walk to the placed cache bags to prepare and connect the transmitter station and geophones. Cables and attached geophones will be laid out by hand around each station in a predetermined pattern. Each geophone will be mounted on a 3-inch spike and placed into the soil using

foot pressure. In areas of rock outcrops, battery-operated hand drills may be used to provide a pilot hole for the geophone spike if they cannot be coupled to the ground sufficiently. Staggered deployment and pick-up of receiving stations would occur as the source sequence proceeds during data acquisition.

Field data acquisition with the use of Vibroseis trucks and receiver equipment would take an estimated 12 to 14 days.

Vibration Monitoring

Similar seismic technology will be employed for vibration monitoring conducted prior to the drilling activities. Specifically, vibration monitoring services will be conducted to collect peak particle velocity (PPV) measurements while a Vibroseis truck vibrates the ground surface (referred to as a "sweep").

The vibration monitoring would use a Blastmate III vibration monitor (data logger) with a tricomponent (transverse, longitudinal, and vertical) sensor. The sensor would be installed at two locations during vibration monitoring: 25 feet and 50 feet from the Vibroseis truck vibration pad. The sensor would be secured to the ground surface with 3-inch long pins and leveled. The longitudinal axis would be oriented toward the Vibroseis truck (parallel to the length of the truck). Two different operating capacities of the Vibroseis truck would be tested; the Vibroseis truck operating at 70% capacity and at 35-percent capacity. This allows for a PPV comparison relative to operating capacities of the Vibroseis truck. Several Vibroseis sweeps, which would span approximately 12 seconds with a frequency bandwidth of 6 to 96 Hertz (Hz), would be conducted and monitored.

The vibration monitor is programmed to monitor, record, and save the data internally. The collected data would be later downloaded to a laptop computer. Several roughly 12-second long sweeps would be monitored at each station location. The PPV and corresponding frequency would be stored and the peak vector sum (PVS) calculated. The PVS is the resultant magnitude of the peak particle velocity for the three sensor components (calculated by squaring and adding the magnitudes of the individual components and taking the square root).

Results would be presented for the three components (transverse, vertical and longitudinal) during the multiple sweeps and the corresponding frequency, as well as the PVS. It should be noted that prior to conducting the sweeps, a sample of the background vibrations would be performed. It is assumed for a remote location that the background value would be very low.

The California Department of Transportation (Caltrans) Transportation and Construction Vibration Manual (September 2013) and the USBM OSMRE Blasting Guidance Manual (March 1987) provide velocity attenuation relationships that can be used to estimate PPV at various distances and site conditions. Also included in these Manuals are vibration criteria and standards related to potential impacts from vibrations on structures and people.

The vibration monitoring would be conducted in general accordance with current practice and the standard of care exercised by consultants performing similar tasks in the project area.

Restoration of the Geophysical Survey Area

Once seismic testing activities associated with the geophysical survey and vibration monitoring are complete, areas of disturbance will be restored to be consistent with conditions prior to the project activities. If any vegetation is removed during the seismic testing activities, it will be restored to match pre-project conditions.

Well Pad Layout and Construction

One well pad will be constructed for each of the six drill sites. Each exploration well pad will be approximately 400 feet by 400 feet for a surface area of about 3.7 acres per well pad and 22.2 acres for six wells total.

Well pad preparation activities would include clearing, earthwork, drainage and other improvements necessary for efficient and safe operation. The site selection process included minimizing cut and fill requirements. Additionally, the

applicant would implement Applicant Prepared Measure (APM) 1, which requires the preparation of an erosion control plan, which would identify site-specific best management practices to reduce erosion impacts, before grading to adequately control erosion during construction. However, it should be noted that the well pads would be constructed to conduct drainage to the cellar where it will be pumped to the containment basin. No off-site soil erosion is anticipated.

Construction of each well will occur sequentially so that wells are constructed one at a time. Each proposed well site would be prepared to create a level pad for the drill rig, and a graded gravel (if needed) surface for the support equipment. Runoff from undisturbed areas around the constructed sites would be directed into ditches and energy dissipaters (if needed) around the proposed well site, consistent with California Regional Water Quality Control Board, Colorado River Basin Region (CRWQCB) and Imperial County, as appropriate, best management practices for stormwater. All machinery, drilling platforms, and oil and fuel storage would be in areas tributary to the containment basin in order to prevent the movement of storm water from these areas off of the construction site. The proposed well site would be graded to direct runoff from the pad into the cellar which would be pumped to the containment basin.

The proposed well sites would be graded to direct runoff from the pad into the cellar which would be pumped to the containment basin. Containment basins would be constructed at each proposed well site for the containment and temporary storage of drilling mud and cuttings and stormwater runoff from the construction site. Each containment basin would be approximately 100 feet by 250 feet by 7 feet deep and would hold roughly 420,000 gallons with a 2-foot freeboard. Each containment basin would be lined with a 40-milimeter synthetic liner, in accordance with requirements of the CRWQCB. Compliance with California construction stormwater notification and permitting requirements would be performed for each proposed wellsite and new access road (Figure 2).

Well Drilling

The hole will be drilled with a mud rotary drilling rig, as previously used in the Imperial Valley. The rig will be equipped with diesel engines, storage tanks, mud pumps, and other typical auxiliary equipment. During drilling, if necessary)the top of the derrick will be approximately 175 feet above ground level.

The hole will be drilled using a gel- or polymer-based drilling fluid (drill mud). This fluid circulates the rock cuttings out of the bore hole and into the surface tanks or a reserve pit, where they are separated from the mud and collected. The mud is then recirculated. Underbalanced drilling may also be utilized in an effort to minimize water needs and to reduce risk of formation damage from drilling mud.

To construct the well, a 42-inch-diameter hole is first drilled to approximately ±80 feet below ground level (101 feet KB), and a 30-inch conductor is cemented in place. The rotary rig is then rigged up, a 30-inch rotating head is welded on the conductor, and a 26-inch hole is drilled to approximately ±360 feet KB. The 22-inch casing is cemented in place, and blowout prevention equipment (BOPE) is installed.

After testing the BOPE, a 20-inch hole will be drilled to approximately ±2,200 feet and 16-inch casing cemented in place. Following installation and testing of the BOPE, a 14-1/4-inch hole will be directionally drilled utilizing underbalanced drilling to a total depth of approximately 4,200 feet. A slotted 13-3/8-inch liner will be hung from ±2,200 feet to 4,150 feet.

At the conclusion of drilling, a short flow test will be conducted to clean the hole and provide reservoir information. Both reservoir temperature and pressure will be measured during and after this test. The collected cuttings and drill mud will then be tested prior to being transported off site for disposal. Depending on the analytical results, the materials will be disposed at either a landfill or another approved disposal site.

Geothermal well drilling would be conducted from the constructed well pads described above. Drilling operations would take place for 24 hours per day, 7 days per week. Each geothermal well would take approximately 30 days to complete. The drilling operation would employ about 25 people in 6-person shifts. Well pad construction and drilling would generate a small number of daily one-way vehicle trips (as many as 40 or more trucks and 12 to 16 small trucks/service vehicles/worker vehicles). It is assumed the Proposed Project would require four off-highway trucks (Vibroseis trucks)

operating eight hours per day, six vendor trucks per day to deliver equipment, and 20 worker trips per day.

The California Department of Conservation, Division of Oil, Gas and Geothermal Resources (CDOGGR) regulates geothermal well drilling operations on private and state lands in California. CDOGGR authorizes the drilling of the wells under a Notice of Intent. CDOGGR reviews and approves the drilling program for each well including the blowout prevention equipment (BOPE) to ensure the drilling operations are safe, protect the community, and protect land and water resources. BOPE includes a 30-inch weld-on rotating head (diverter) that would be used to drill the surface hole to ±360 feet. An API 2M CSO blind ram, pipe rams, and annular preventer with rotating head will be used below ±360 feet to total depth. BOPE testing will be witnessed by the State of California's Division of Oil, Gas, and Geothermal Resources or their designated agent.

Standard geothermal well drilling equipment and well drilling operations (listed below) would be used for the Proposed Project. The wells would be drilled using a large rotary drilling rig whose diesel engines are permitted under the California Air Resources Board (CARB) Portable Equipment Registration Program (PERP). The wells would be drilled with water- or gel-based drilling mud to circulate the drill cuttings to the surface. During drilling, the top of the drill rig derrick would be as much as 175 feet above the ground surface (including non-LED aircraft safety lighting), and the rig floor could be 20 to 30 feet above the ground surface. The typical drill rig and associated support equipment (rig floor and pipe stands; draw works; derrick; drill pipe; trailers; drilling mud, fuel and water tanks; diesel generators; air compressors; etc.) would be brought to the prepared well pad on approximately 40 or more large tractor-trailer trucks. The placement of this equipment on each prepared well pad would depend on rig-specific requirements and site-specific conditions.

Standard Geothermal Well Drilling Equipment

- Rig floor and pipe stands
- Draw works
- Derrick
- Drill pipe
- Trailers
- Drilling mud
- Fuel and water tanks
- Diesel generators
- Air compressors

Each geothermal well would also be drilled and cased to the design depth of approximately 5,000 to 7,000 feet. A geothermal well drilling and completion program for each well would be submitted to CDOGGR. BOPE inspected and approved by CDOGGR would be utilized while drilling below the surface casing. Well casing (typically 20") would be cemented to a depth of approximately 1,800 feet below Kelly bushing (bkb). A slotted liner (typically 9 5/8 inch) would be hung from approximately 1,750 feet to near total depth. All these numbers are subject to change and would be formalized when the drilling programs are submitted to CDOGGR or BLM, as appropriate.

The well bore would be drilled using non-toxic, temperature stable gel-based drilling mud or gel and polymer drilling fluid to circulate the rock cuttings to the surface where they are removed from the drilling mud. The mud is then recirculated. A containment basin would be excavated and rock cuttings would be captured in the containment basin. Additives would be added to the drilling mud as needed to prevent corrosion, increase mud weight, and prevent mud loss. The inside diameter of the wells would be approximately 30 inches at the top and would telescope with depth. The typical design depth of both the production and injection wells is projected to be about 5,000 to 7,000 feet. Each geothermal well would be drilled and cased to the design depth or the depth selected by the project geologist. The final determination of well depth and well completion would be based on geological and reservoir information obtained as wells are drilled.

Drill Pad and Access Road Aggregate

Aggregate required for well pad (estimated at 5,926 cubic yards per well pad) and access road construction would likely be purchased from the Aggregate Products Inc. Salton Sea quarry facility, located approximately 2 miles west of the town of Salton Sea Beach and 10 miles north-northwest of the Proposed Project. It is assumed the Proposed Project would require four off-highway trucks (Vibroseis trucks) operating eight hours per day, six vendor trucks per day to deliver equipment, and 20 worker trips per day.

Water Requirements and Sources

Water required for well pad and access road construction and well drilling would typically average about 50,000 gallons per day. Water necessary for these activities would be purchased from the Coachella Valley Water District via a fire hydrant. Water would be picked up from the source and delivered over existing roads to each construction location or drilling site by a water truck which would be capable of carrying approximately 4,000 gallons per load. This includes the water needed for road grading, construction and dust control.

Well Testing

Wells would be initially flow tested while the drill rig is still over the well. The residual drilling mud and cuttings would be flowed from the well bore and discharged into the containment basin. This cleanout flow test may be followed by one or more short-term flow tests, each lasting from several hours to a day and also conducted while the drill rig is over the well. These tests typically consist of producing the geothermal well into portable steel tanks brought onto the well site while monitoring geothermal fluid temperatures, pressures, flow rates, chemistry and other parameters. Steam and noncondensable gasses, such as hydrogen sulfide and carbon dioxide, from the geothermal fluid would be discharged to the atmosphere. Produced fluid from the short-term flow test would be pumped back into the well.

An injectivity test could also be conducted by injecting the produced geothermal fluid from the steel tanks back into the well and the geothermal reservoir. The drill rig would likely be moved from the well site following completion of these short-term test(s). Following the short-term test(s), all equipment would be removed and the well shut in. Temperature profiles of the wellbore would be measured during the shut-in period.

After the rig has moved, a longer-term test could be conducted using a test facility consisting of approximately ten, 21,000-gallon steel tanks, injection pumps, coil tubing, nitrogen pumps, filtration units, flow meters, recorders, and sampling apparatus. This test could last for 30 days. Steam and noncondensable gasses from the geothermal fluid would typically be discharged to the atmosphere. The remaining geothermal fluid would be injected back into either the well from which it was produced or into a second well via temporary pipeline routed above ground along the well site access roads or, if following access roads is not feasible, along other previously disturbed routes (see Figure 2).

Geothermal Well Monitoring

Following completion of the short-term geothermal well testing, all of the drilling and testing equipment would be removed from the site. The surface facilities remaining on the site would typically consist of several valves on top of the surface casing; which would be chained and locked and surrounded by an approximately 12-foot by 12-foot by 6-foot high fence to prevent unauthorized access and vandalism. Pressure and temperature sensors may be installed in the hole at fixed depths to monitor any changes in these parameters over time. A temperature profile of the well may also be run. This monitoring may be continued indefinitely.

Abandonment Program

After drilling operations are completed on each well, the liquids from the containment basin would either be evaporated, pumped back down the well, and/or disposed of in accordance with the requirements of the CRWQCB or Imperial County Public Health Department, as applicable.

The solid contents remaining in each containment basin, typically consisting of non-hazardous, non-toxic drilling mud and rock cuttings, would be tested as required by the CRWQCB. The solids would be removed and disposed of in a waste disposal facility authorized by the CRWQCB to receive and dispose of these materials. If allowed they may be used as daily cover at the nearby landfill. After the materials in the containment basins have been removed the containment basin area may be reclaimed depending on if there may be a need for its use in the future.

Upon the completion of each well drilled and flow-tested, a decision would be made by the Applicant regarding the commercial potential of each well. If a well is judged by the Applicant to have any commercial potential, well operations

would likely be suspended pending application for and receipt of regulatory approvals to place the well into commercial service through a new pipeline to a new geothermal power plant or direct use facility. The well would likely continue to be monitored while these approvals are being processed. If a well is judged to not have commercial potential, it may continue to be monitored, or it may be abandoned in conformance with the well abandonment requirements of the CDOGGR. Abandonment of a geothermal well involves plugging the well bore with clean drilling mud and cement sufficient to ensure that fluids would not move across into different aquifers. The well head (and any other equipment) would be removed, and the casing cut off at least 6 feet below ground surface.

Following abandonment of the well, the well site itself would be reclaimed, typically by re-grading the entire well pad and access road area to approximately the same topography as existed prior to construction of the site, including the spreading the topsoil (if any) over the surface. Revegetation would be in conformance with the requirements of the surface managing agency.

Figure 1: Vicinity Map

Figure 2: Proposed Well Locations

Figure 3: Geophysical Survey Travel Paths

EVALUATION OF ENVIRONMENTAL IMPACTS:

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. 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). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2) All answers must take account of the whole action involved, including offsite as well as onsite, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3) Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

4) "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from "Earlier Analyses," as described in (5) below, may be cross-referenced).

5) Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:

   a) Earlier Analysis Used. Identify and state where they are available for review.
   b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.
   c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

7) Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

8) This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

9) The explanation of each issue should identify:

   a) the significance criteria or threshold, if any, used to evaluate each question; and
   b) the mitigation measure identified, if any, to reduce the impact to less than significance

	Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)

I. *AESTHETICS*

Except as provided in Public Resources Code Section 21099, would the project:

a) Have a substantial adverse effect on a scenic vista? ☐ ☐ ☒ ☐

a) Imperial County includes over 4,597 square miles between Riverside County to the north, Arizona to the east, Mexico to the south, and San Diego County to the west. The County's visual character varies greatly and includes natural scenic visual resources such as deserts, sand dunes, mountains, and the Salton Sea. Visual character within Imperial County is defined as low, moderate, and high. Areas with a moderate to high value for maintenance of visual quality could represent opportunities for conservation and open space areas. Two scenic viewpoints along the Borrego Salton Sea Way (S-22) overlook the Proposed Project area: Badlands Viewpoint and Calcite Mine Road Look Out. These viewpoints are approximately 10 miles northwest of the Proposed Project.

Geophysical Survey: Although the geophysical survey would occur within the viewsheds of two overlooks along S-22, the Imperial County General Plan identifies the proposed geophysical survey location as within an area of "Low Value" visual quality (County of Imperial 2016). Additionally, the survey is anticipated to deploy four vibrator trucks and a series of small, geophone sensors for a duration of 12 to 14 days; therefore, any visual impacts would be minor and temporary. All tire tracks generated by vibrator trucks would also be hand raked following the completion of the survey to blend the tracks into the surrounding soil surface. The geophysical survey associated with the Proposed Project would have a less than significant impact on a scenic vista.

Exploratory Wells: Although the exploratory wells would be constructed within the viewsheds of two overlooks along S-22, the Imperial County General Plan identifies the proposed well locations as within an area of "Low Value" visual quality (County of Imperial 2016). The drilling rig derrick would be as much as 175 feet above the ground surface and the rig floor would be 20 to 30 feet above the ground surface, but there is an radio tower associated with the Salton Sea Airport currently in the viewshed; thus, the drilling rig would be consistent with the existing view. Therefore, the exploratory wells associated with the Proposed Project would have a less than significant impact 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? ☐ ☐ ☐ ☒

b) The California Department of Transportation (Caltrans) manages the California Scenic Highway Program. The goal of the program is to preserve and protect scenic highway corridors from changes that would affect the aesthetic value of the land adjacent to the scenic corridor.

Geophysical Survey: No State scenic highways have been designated in Imperial County; therefore, no impact associated with a scenic highway would occur.

Exploratory Wells: No State scenic highways have been designated in Imperial County; therefore, no impact associated with a scenic highway would occur.

c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surrounding? (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? ☐ ☐ ☒ ☐

c) Geophysical Survey: The geophysical survey associated with the Proposed Project would occur in an undeveloped area of Imperial County. As described above, the geophysical survey would be within the viewshed of two overlooks along S-22, but the Imperial County General Plan identifies the proposed geophysical survey location as within an area of "Low Value" visual quality (County of Imperial 2016). The survey would last 12 to 14 days and involve minor, temporary impacts to the public views due to the presence of four vibration trucks and receiving equipment. The existing visual character of the area is not anticipated to change in the long-term, as all equipment and waste would be cleaned up by the crew concurrent with survey operations and the survey area would be continuously spot-checked for waste removal throughout each day. Tire tracks from vibrator trucks would also be hand raked at the completion of the survey to blend the tracks with surrounding soil surface. Visual conditions following the completion of the geophysical survey would be substantially similar to initial visual conditions. Furthermore, no scenic resources are found on the Proposed Project site. The geophysical survey associated with the Proposed Project would result in a less than significant impact to the existing visual character of the site.

Exploratory Wells: The Proposed Project involves the construction, drilling, and testing of six geothermal exploratory wells in an undeveloped area of Imperial County. As previously stated, the exploratory wells would be within the viewsheds of two overlooks along S-22, but the Imperial County General Plan identifies the proposed well locations as within an area of "Low Value" visual quality (County of Imperial 2016). The construction and drilling of the wells would involve temporary disturbance of the proposed well sites; however, these impacts would be short-term and are not anticipated to change the character of the area substantially. The Proposed Project

would result in a minor change in the existing visual character of portions of the Proposed Project area due to the construction of the drill pads; however, the Proposed Project area is located within the Truckhaven Geothermal Leasing Area and wells similar to the wells associated with the Proposed Project are currently active within the Proposed Project area. In addition, there are no existing scenic resources on the Proposed Project site. Therefore, the exploratory wells associated with the Proposed Project would result in a less than significant impact to the existing visual character or quality of the site and its surroundings.

d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area? ☐ ☐ ☒ ☐

d) Geophysical Survey: The Proposed Project does not include the addition of substantial lighting or glare-producing components; the components of the geophysical survey include four trucks, a series of small, geophone sensors, and receiving equipment. Ambient lighting and glare in the nearby areas would not significantly increase above existing conditions due to the survey associated with the Proposed Project. The geophysical survey will occur during daytime hours, so nighttime views would not be affected, and it would occur over the duration of 12 to 14 days. Impact is less than significant.

Exploratory Wells: The Proposed Project does not include the addition of substantial lighting or glare producing components. During drilling, the top of the drill rig derrick would be as much as 175 feet above the ground surface; non-LED aircraft safety lighting would be located atop the drill rig derrick. Ambient lighting and glare in the nearby areas would not significantly increase above existing conditions. Additionally, temporary construction lighting would be used for illuminating the proposed well sites during construction. Following construction, any construction lighting would be disassembled and removed from the site. This impact is less than significant.

II. *AGRICULTURE AND FOREST 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. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. --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 non-agricultural use? ☐ ☐ ☐ ☒

a) Geophysical Survey: The geophysical survey area associated with the Proposed Project is not located in an area identified as Prime Farmland, Unique Farmland, of Farmland of Statewide Importance (California Department of Conservation 2019). No impact would occur.

Exploratory Wells: None of the proposed well sites are located in an area identified as Prime Farmland, Unique Farmland, of Farmland of Statewide Importance (California Department of Conservation 2019). No impact would occur.

b) Conflict with existing zoning for agricultural use, or a Williamson Act Contract? ☐ ☐ ☐ ☒

b) Geophysical Survey: The geophysical survey area associated with the Proposed Project is not located within an area under a Williamson Act Contract (California Department of Conservation 2016). No impact would occur.

Exploratory Wells: None of the proposed well sites are located within an area under a Williamson Act Contract (California Department of Conservation 2016). No impact would occur.

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))? ☐ ☐ ☐ ☒

c) Geophysical Survey: The proposed geophysical survey area is zoned Open Space/Recreational and is located within the Imperial County Geothermal Overlay Zone (County of Imperial 2016). Implementation of the Proposed Project would not result in a change to zoning at any of the proposed well sites. No impact would occur.

Exploratory Wells: The proposed well sites are zoned Open Space/Recreational and are located within the Imperial County Geothermal Overlay Zone (County of Imperial 2016). Implementation of the Proposed Project would not result in a change to zoning at any of the proposed well sites. No impact would occur.

	Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)

d) Result in the loss of forest land or conversion of forest land to non-forest use? ☐ ☐ ☐ ☒

d) Geophysical Survey: As described in Impact c) above, the proposed geophysical survey area is zoned Open Space/Recreational and designated Recreation/Open Space; the proposed geophysical survey area is not located on land zoned or designated as forest land (Imperial County 2016). No impact would occur.

Exploratory Wells: As noted above in Impact c), the proposed well sites are zoned Open Space/Recreational and designated Recreation/Open Space; the proposed well sites are not located on land zoned or designated as forest land (Imperial County 2016). No impact would occur.

e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use? ☐ ☐ ☐ ☒

e) Geophysical Survey: As noted above in Impact c) and d), the Proposed Project would not result in the rezoning or redesignation of the proposed geophysical survey area. Further, the proposed well sites are not located in areas zoned or designated for agriculture or forest use. No impact would occur.

Exploratory Wells: As noted above in Impact c) and d), the Proposed Project would not result in the re-zoning or re-designation of any of the proposed well sites. Further, the proposed well sites are not located in areas zoned or designated for agriculture or forest use. No impact would occur.

III. *AIR QUALITY*

This section describes the existing air quality setting and potential effects from project implementation on the site and its surrounding area. Construction-related air quality modeling was performed through use of the California Emissions Estimator Model (CalEEMod) Version 2016.3.2. The model output is provided in Appendix A.

The proposed wells sites are located on the southwest side of Salton City, which is an unincorporated area located in the western portion of Imperial County. The proposed well sites are located within the Salton Sea Air Basin (Air Basin), and air quality regulation is administered by the Imperial County Air Pollution Control District (ICAPCD). The ICAPCD implements the programs and regulations required by the federal and state Clean Air Acts.

Atmospheric Setting

Air quality is a function of both the rate and location of pollutant emissions under the influence of meteorological conditions and topographical features. Atmospheric conditions such as wind speed, wind direction, and air temperature gradients interact with physical features of the landscape to determine their movement and dispersal, and consequently, their effect on air quality. The combination of topography and inversion layers generally prevents dispersion of air pollutants in the Air Basin. The following description of climate of Imperial County was obtained from *Imperial County 2018 Redesignation Request and Maintenance Plan for Particulate Matter less than 10 Microns in Diameter,* prepared by ICAPCD, October 23, 2018.

The climate of Imperial County is governed by the large-scale sinking and warming of air in the semi-permanent high-pressure zone of the eastern Pacific Ocean. The high-pressure ridge blocks out most mid-latitude storms, except in the winter, when it is weakest and located farthest south. The coastal mountains prevent the intrusion of any cool, damp air found in California coastal areas. Because of the barrier and weakened storms, Imperial County experiences clear skies, extremely hot summers, mild winters, and little rainfall. The sun shines, on the average, more in Imperial County than anywhere else in the United States.

Winters are mild and dry with daily average temperatures ranging between 65- and 75-degrees Fahrenheit (°F). During winter months it is not uncommon to record maximum temperatures of up to 80 °F. Summers are extremely hot with daily average temperatures ranging between 104 and 115 °F. It is not uncommon to record maximum temperatures of 120 °F during summer months.

The flat terrain of the valley and the strong temperature differentials created by intense solar heating, produce moderate winds and deep thermal convection. The combination of subsiding air, protective mountains, and distance from the ocean all combine to severely limit precipitation. Rainfall is highly variable with precipitation from a single heavy storm able to exceed the entire annual total during a later drought condition. The average annual rainfall is just over three inches with most of it occurring in late summer or mid-winter.

Humidity is low throughout the year, ranging from an average of 28 percent in summer to 52 percent in winter. The large daily oscillation of temperature produces a corresponding large variation in the relative humidity. Nocturnal humidity rises to 50 to 60 percent but drops to about 10 percent during the day.

The wind in Imperial County follows two general patterns. Wind statistics indicate prevailing winds are from the west-northwest through southwest; a secondary flow maximum from the southeast is also evident. The prevailing winds from the west and northwest occur seasonally from fall through spring and are known to be from the Los Angeles area. Occasionally, Imperial County experiences periods of extremely high wind speeds. Wind speeds can exceed 31 miles per hour (mph) and this occurs most frequently during the months of April and May. However, speeds of less than 6.8 mph account for more than one-half of the observed wind measurements.

Regulatory Setting

The Proposed Project site lies within the Air Basin, which is managed by the ICAPCD. National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) have been established for the following criteria pollutants: carbon monoxide (CO), ozone, sulfur dioxide (SO_2), nitrogen dioxide (NO_2), inhalable particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), and lead. The CAAQS also set standards for sulfates, hydrogen sulfide, and visibility.

Areas are classified under the Federal Clean Air Act as either "attainment" or "nonattainment" areas for each criteria pollutant, based on whether the NAAQS have been achieved or not. Attainment relative to the state standards is determined by the California Air Resources Board (CARB). The Air Basin has been designated by the Federal Environmental Protection Agency (EPA) as a nonattainment area for ozone, PM_{10}, and $PM_{2.5}$. Currently, the Air Basin is in attainment with the NAAQS for CO, SO_2, and NO_2. Table 2 presents the designations and classifications applicable to the Proposed Project area.

Table 2: Designations/Classifications for the Project Area

Pollutant	National Classification	California Standards[2]
Ozone (O_3) - 2008 Standard	Non-Attainment (Moderate)	Non-Attainment
Particulate Matter (PM_{10})	Non-Attainment (Serious)	Non-Attainment
Fine Particulate Matter ($PM_{2.5}$)	Non-Attainment (Moderate)	Attainment
Carbon Monoxide (CO)	Attainment	Attainment
Nitrogen Dioxide (NO_2)	Attainment	Attainment
Sulfur Dioxide (SO_2)	Attainment	Attainment

Sources: https://ww3.arb.ca.gov/desig/adm/adm.htm; and https://ww3.arb.ca.gov/planning/sip/planarea/imperial/staffreport121318.pdf

The ICAPCD has addressed each of three nonattainment pollutants in separate State Implementation Plans (SIPs). For ozone the most current SIP is the *Imperial County 2017 State Implementation Plan for the 2008 8-Hour Ozone Standard* (2017 Ozone SIP), prepared by IPACD, September 2017, which was prepared to detail measures to reduce ozone precursors (i.e. ROG and NOx) within the County in order to meet the 2008 NAAQS for 8-hour ozone standard of 0.075 parts per million (ppm) by July 20, 2018. Although the Ozone 2017 SIP demonstrates that the County met the 8-hour ozone standard 0.075 ppm by the July 20, 2018, requirement, it should be noted that in 2015 the EPA further strengthened its 8-hour ozone standard to 0.070 ppm, which will require an updated SIP for the County to meet the new ozone standard.

Since PM_{10} in the County has met the 24-hour NAAQS other than for exceptional events that include storms as well as from substantial PM_{10} concentrations blowing into the County from Mexico, the most current PM_{10} plan is the *Imperial County 2018 Redesignation Request and Maintenance Plan for Particulate Matter less than 10 Microns in Diameter* (2018 PM_{10} Plan), prepared by ICAPCD, October 23, 2018. The 2018 PM10 Plan shows that the monitoring of PM10 in the County found that other than exceptional events, no violation of the 24-hour PM_{10} NAAQS of 150 $\mu g/m^3$ occurred over the 2014 to 2016 time period. As such, the ICAPCD has requested the EPA to redesignate the Air Basin to maintenance. The redesignation is anticipated to occur sometime in the year 2020.

For $PM_{2.5}$ the most current SIP is the *Imperial County 2018 Annual Particulate Matter less than 2.5 Microns in Diameter State Implementation Plan* (2018 $PM_{2.5}$ SIP), prepared by ICAPCD, April 2018, which was prepared to detail measures to meet the 2012 NAAQS for annual $PM_{2.5}$ standard of 12 $\mu g/m^3$ by the end of 2021 for the portion of Imperial County (approximately from Brawley to Mexico border) that is designated nonattainment. The $PM_{2.5}$ Plan found that the only monitoring station in the County that has recorded an exceedance of $PM_{2.5}$ is the Calexico Monitoring Station that is likely caused by the transport of $PM_{2.5}$ across the Mexico border. It is anticipated that the ICAPCD will submit a redesignation request for $PM_{2.5}$ in the near future.

Although ICAPCD is responsible for air quality planning efforts in the County, it does not have the authority to directly regulate air quality issues associated with new development projects. Instead, this is controlled through local jurisdictions in accordance to CEQA. In order to assist local jurisdictions with air quality compliance issues, the ICAPCD has prepared the *CEQA Air Quality Handbook* (ICAPCD, 2017). The purpose of the Handbook is to assist lead agencies in evaluating a project's potential air quality impacts and provides direction on how to evaluate potential air quality impacts, how to determine whether these impacts are significant and how to mitigate these impacts. The Handbook provides the following standard measures for dust control and use of combustion equipment that all construction projects in the Air Basin are required to implement:

- All disturbed areas, including Bulk Material storage which is not being actively utilized, shall be effectively stabilized and visible emissions shall be limited to no greater than 20 percent opacity for dust emissions by using water, chemical stabilizers, dust

suppressants, tarps, or other suitable material such as vegetative ground cover.

- All onsite and off-site unpaved roads will be effectively stabilized and visible emissions shall be limited to no greater than 20 percent opacity for dust emissions by paving, chemical stabilizers, dust suppressants and/or watering.
- All unpaved traffic areas one (1) acre or more with 75 or more average vehicle trips per day will be effectively stabilized and visible emission shall be limited to no greater than 20 percent opacity for dust emissions by paving, chemical stabilizers, dust suppressants and/or watering.
- The transport of Bulk Materials shall be completely covered unless 6 inches of freeboard space from the top of the container is maintained with no spillage and loss of Bulk Material. In addition, the cargo compartment of all Haul Trucks is to be cleaned and/or washed at delivery site after removal of Bulk Material.
- All Track-Out or Carry-Out will be cleaned at the end of each workday or immediately when mud or dirt extends a cumulative distance of 50 linear feet or more onto a paved road within an Urban area.
- Movement of Bulk Material handling or transfer shall be stabilized prior to handling or at points of transfer with application of sufficient water, chemical stabilizers or by sheltering or enclosing the operation and transfer line.
- The construction of any new Unpaved Road is prohibited within any area with a population of 500 or more unless the road meets the definition of a Temporary Unpaved Road. Any temporary unpaved road shall be effectively stabilized and visible emissions shall be limited to no greater than 20 percent opacity for dust emission by paving, chemical stabilizers, dust suppressants and/or watering.
- Use alternative-fueled or catalyst-equipped diesel construction equipment, including all off-road and portable diesel powered equipment.
- Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to 5 minutes as a maximum.
- Limit, to the extent feasible, the hours of operation of heavy duty equipment and/or the amount of equipment in use.
- Replace fossil-fueled equipment with electrically driven equivalents (provided they are not run via a portable generator set)

Since the project site is located in an area that is known to experience high winds, the Proposed Project would also need to implement the fugitive dust reduction measures provided in the *High Wind Exceptional Event Fugitive Dust Mitigation Plan for Imperial County*, (ICAPCD, 2018). The High Wind Plan requires the implementation of various measures to limit fugitive dust emissions when sustained winds exceed 25 miles per hour.

Since the Proposed Project will utilize off-road diesel equipment that will emit air emissions, the Proposed Project will be required to obtain an ICAPCD permit under Rule 201. The Permit will require the applicant to demonstrate that all off-road equipment utilized are registered with CARB or the ICAPCD. The Permit also requires the applicant to quantify the emissions created from the specific equipment utilized during construction of the Proposed Project in order to ensure that the air emissions created from the off-road equipment utilized during construction activities are within the ICAPCD standards.

Monitored Air Quality

The air quality at any site is dependent on the regional air quality and local pollutant sources. The air quality at any location in the Air Basin is determined by the release of pollutants throughout the Air Basin as well as from air pollutants that travel from the coastal areas and Mexico to the Air Basin. The ICAPCD operates a network of monitoring stations throughout the County that continuously monitor ambient levels of criteria pollutants in compliance with federal monitoring regulations.

Since not all air monitoring stations measure all of the tracked pollutants, the data from the following two monitoring stations, listed in the order of proximity to the Proposed Project site have been used: Niland – English Road Monitoring Station (Niland Station) and El Centro – 9th Street Monitoring Station (El Centro Station).

The Niland Station is located approximately 23 miles east of the proposed well sites at 7711 English Road, Niland and the El Centro Station is located approximately 38 miles southeast of the proposed well sites at 150 9th Street, El Centro. It should be noted that due to the air monitoring stations distances from the proposed wells sites, recorded air pollution levels at the air monitoring stations reflect with varying degrees of accuracy local air quality conditions at the Proposed Project site. Table 3 below presents the composite of gaseous pollutants monitored from 2016 through 2018.

	Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)

Table 3: Ambient Air Quality Monitoring Summary

Air Pollutant	2016	2017	2018
Ozone (O_3)[1]			
Max 1 Hour (ppm)	0.079	0.072	0.060
Days > CAAQS (0.09 ppm)	0	0	0
Max 8 Hour (ppm)	0.066	0.061	0.055
Days > NAAQS (0.070 ppm)	0	0	0
Days > CAAQS (0.070 ppm)	0	0	0
Nitrogen Dioxide (NO_2) [2]			
Max 1 Hour (ppb)	50.9	48.8	34.1
Days > NAAQS (100 ppb)	0	0	0
Days > CAAQS (180 ppb)	0	0	0
Particulate Matter (PM_{10})[1]			
Max Daily California Measurement	225.7	345.8	331.5
Days > NAAQS (150 µg/m^3)	1	4	11
Days > CAAQS (50 µg/m^3)	14	ND	7
State Average (20 µg/m^3)	40.7	ND	ND
Particulate Matter ($PM_{2.5}$) [2]			
Max Daily National Measurement	31.3	23.2	22.4
Days > NAAQS (35 µg/m^3)	0	0	0
National Average (12 µg/m^3)	9.4	8.4	8.6
State Average (12 µg/m^3)	9.5	8.4	8.7

Abbreviations:
> = exceed ppm = parts per million ppb = parts per billion µg/m^3 = micrograms per cubic meter
CAAQS = California Ambient Air Quality Standard NAAQS = National Ambient Air Quality
ND = Insufficient or No Data **Bold** = exceedance
[1] Measurement taken from Niland Mesa Station
[2] Measurement taken from El Centro Station
Source: http://www.arb.ca.gov/adam/

Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to the following determinations. Would the Project:

a) Conflict with or obstruct implementation of the applicable air quality plan? ☐ ☐ ☒ ☐

a) Geophysical Survey: The Proposed Project geographical survey would not conflict with the applicable air quality plans, which include the 2017 Ozone SIP, 2018 PM_{10} Plan, and 2018 $PM_{2.5}$ SIP that are described above in the air quality regulatory setting. The CEQA Air Quality Handbook, prepared by ICAPCD, November 2007, requires large residential and commercial developments that are required to develop an EIR. Projects that have the potential to exceed the ICAPCD thresholds of significance for its operations are considered large developments and are required to demonstrate consistency with the regional air quality plans. The geographical survey consists of development of six exploratory wells and would not include any residential or commercial development, nor does the Project require the preparation of an EIR. Accordingly, the Proposed Project would not conflict with or obstruct implementation of the applicable air quality plan.

Exploratory Wells: The exploratory wells would not conflict with the applicable air quality plans, which include the 2017 Ozone SIP, 2018 PM_{10} Plan, and 2018 $PM_{2.5}$ SIP that are described above in the air quality regulatory setting. The CEQA Air Quality Handbook, prepared by ICAPCD, November 2007, requires large residential and commercial developments to develop an EIR. Projects that have the potential to exceed the ICAPCD thresholds of significance for its operations are considered large developments and are required to demonstrate consistency with the regional air quality plans. The Proposed Project consists of development of six exploratory wells and would not include any residential or commercial development, nor does the project require the preparation of an EIR. Accordingly, the Proposed Project would not 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? ☐ ☐ ☒ ☐

	Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)

b) As shown above in Table 3, the Proposed Project area is designated as a federal and/or state nonattainment area for ozone, PM_{10}, and $PM_{2.5}$. The ICAPCD has prepared the *CEQA Air Quality Handbook* (ICAPCD, 2017), in order to assist lead agencies in making a determination of significance for air quality impacts. The screening criteria in the CEQA Handbook can be used to demonstrate that a project's total emissions would not result in a significant impact as defined by CEQA. Table 4 shows the ICAPCD screening thresholds for both construction and operations.

Table 4: ICAPCD Thresholds of Significance

	Pollutant Emissions (Pounds/Day)					
	ROG	NOx	CO	SO_2	PM_{10}	$PM_{2.5}$
Construction	75	100	550	150	150	550
Operation	137	137	550	150	150	550

Notes:
[1] Since the ICAPCD does not provide a construction threshold for SO_2 and $PM_{2.5}$, the operation threshold has been utilized to provide a conservative analysis.
Source: ICAPCD, http://www.co.imperial.ca.us/AirPollution/PlanningDocs/CEQAHandbk.pdf

Geophysical Survey: The geographical survey would create air emissions primarily from on-road vehicle emissions and helicopter exhaust. The helicopter exhaust emissions were calculated through use of the FAA's EDMS 5.1.2 model for a Bell 407 helicopter based on 16 landings and takeoffs per day for 14 days (see Appendix A). The on-road vehicle emissions were analyzed through use of the CalEEMod model (see Appendix A) and included four off-highway trucks (Vibroseis trucks) operating eight hours per day, six vendor trucks per day to deliver equipment, and 20 worker trips per day. Table 5 shows the estimated worst-case summer or winter daily emissions that would be predicted from each phase of the Proposed Project for one well site, which is based on the construction equipment provided by the applicant of what is anticipated to be used during construction activities.

Table 5: Construction-Related Criteria Pollutant Emissions from the Geophysical Survey

Activity	Pollutant Emissions in pounds/day					
	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
On-Road Vehicles	2.82	26.07	16.44	0.05	30.42	3.82
Helicopter	27.08	2.62	115.94	1.56	--	--
Total Daily Emissions	29.90	28.69	132.38	1.61	30.42	3.82
ICAPCD Construction Thresholds	75	100	550	150	150	550
Exceed Thresholds?	No	No	No	No	No	No

Source: CalEEMod Version 2016.3.2; EDMS Version 5.1.2.

As shown in Table 5, the geophysical survey emissions for one well site would not exceed ICAPCD's construction-related criteria pollutant thresholds. In addition, construction emissions would be short-term, limited only to the period when construction activity is taking place and all construction activities are required to comply with ICAPCD regulations for controlling fugitive dust emissions, including the standard regulations for all projects provided in the CEQA Handbook and summarized above in the Regulatory Section as well as Rule 800 – General Requirements for Control of PM10; Rule 802; Rule 802 – Bulk Materials; Rule 803 – Carry-Out and Track-Out; Rule 804 – Open Areas; and Rule 805 – Unpaved Roads. As such, construction-related emissions would be less than significant for the geophysical survey.

Exploratory Wells:
Construction Emissions

Construction of the exploratory wells would create air emissions primarily from equipment exhaust and fugitive dust. The air emissions from the exploratory wells were analyzed through use of the CalEEMod model (see Appendix A). Construction activities for the Proposed Project are anticipated to begin in early 2020 and each well would take approximately two months to complete, or approximately one year for all six wells as it is anticipated that after a well is completed the crew would move to the next well location, so no concurrent well construction activities are anticipated. It should also be noted that the project applicant is also proposing four additional exploratory wells on federal land that is being processed under a separate environmental analysis; however, similar to the Proposed Project, the same well crew that would complete the proposed six wells would also complete the four wells on federal land and will complete one well at a time. As such, no cumulative construction emission impacts are anticipated to occur from both projects. The anticipated construction phases for each well location would include: (1) Well pad preparation; (2) Well drilling; (3) Well testing; and (4) Well clean-up.

Table 6 shows the estimated worst-case summer or winter daily emissions that would be predicted from each phase of the Proposed Project for one well site, which is based on the construction equipment provided by the applicant of what is anticipated to be used during construction activities.

Table 6: Construction-Related Criteria Pollutant Emissions from One Well Site

Activity	Pollutant Emissions in pounds/day					
	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Well Pad Preparation	2.07	22.61	11.20	0.02	22.67	4.35
Well Drilling	3.75	33.21	30.92	0.07	108.06	12.18
Well Testing	1.99	18.35	16.15	0.03	12.25	2.09
Well Clean-Up	0.87	9.35	6.78	0.01	19.90	3.57
Maximum Daily Construction Emissions	3.75	33.21	30.92	0.07	108.06	12.18
ICAPCD Construction Thresholds	75	100	550	150	150	550
Exceed Thresholds?	No	No	No	No	No	No

Source: CalEEMod Version 2016.3.2.

As shown in Table 6, the Proposed Project's emissions for one well site would not exceed ICAPCD's construction-related criteria pollutant thresholds. In addition, construction emissions would be short-term, limited only to the period when construction activity is taking place and all construction activities are required to comply with ICAPCD regulations for controlling fugitive dust emissions, including the standard regulations for all projects provided in the CEQA Handbook and summarized above in the Regulatory Section as well as Rule 800 – General Requirements for Control of PM_{10}; Rule 802; Rule 802 – Bulk Materials; Rule 803 – Carry-Out and Track-Out; Rule 804 – Open Areas; and Rule 805 – Unpaved Roads. As such, construction-related emissions would be less than significant for the Proposed Project.

Operational Emissions

The Proposed Project consists of development of six exploratory geothermal wells, which would be tested after completion of the well drilling phase in order to determine the commercial potential of each well. If a well is judged to have commercial potential, well monitoring may be continued indefinitely until the applicant proceeds with the approval process to place the well into commercial service. Therefore, the operational emissions would be limited to well monitoring activities that may be limited to weekly or monthly vehicle trips to the well sites to obtain pressure and temperature measurements. The air emissions associated with the Proposed Project have been calculated through use of the CalEEMod model and are based on the year 2020, which is the anticipated opening year of the Proposed Project. Table 7 shows the estimated worst-case daily emissions from operation of the Proposed Project.

Table 7: Exploratory Wells Operations-Related Criteria Pollutant Emissions

Activity	Pollutant Emissions in pounds/day					
	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Area Sources[1]	0.08	0.02	0.00	0.00	0.00	0.00
Energy Usage[2]	0.00	0.00	0.00	0.00	0.00	0.00
Mobile Sources[3]	0.01	0.07	0.10	0.00	5.96	0.60
Total Project Emissions	0.09	0.09	0.10	0.00	5.96	0.60
ICAPCD Operational Thresholds	137	137	550	150	150	550
Exceed Thresholds?	No	No	No	No	No	No

Notes:

[1] Area sources consist of emissions from consumer products, architectural coatings, and landscape equipment.

[2] Energy usage consists of emissions from natural gas usage (no natural gas appliances would be utilized as part of the Proposed Project).

[3] Mobile sources consist of emissions from vehicles and road dust.

Source: CalEEMod Version 2016.3.2.

As shown in Table 7, the exploratory wells operations-related emissions would not exceed ICAPCD thresholds. As such, operations-related emissions would be less than significant for the Proposed Project. Due to the nominal operational emissions created from operation of the Proposed Project, it is also anticipated that the cumulative operational emissions created from both the Proposed Project and from the project for the four additional exploratory wells on federal land that is being processed under a separate environmental analysis would also result in a less than significant impact.

	Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)

Accordingly, the Proposed Project would not result in a cumulative considerable net increase of any criteria pollutant.

c) Expose sensitive receptors to substantial pollutants concentrations? ☐ ☐ ☒ ☐

c) The nearest sensitive receptor to the exploratory wells is a single-family home located on Skyway Drive that is as near as 0.20 mile to the southeast of proposed well site 47-32. As discussed above in (b), the criteria pollutant emissions have been calculated for construction activities, which were found to be within the ICAPCD's allowable construction thresholds. Due to the limited amount of criteria pollutants created from construction activities and the distances to the nearest sensitive receptors to the Proposed Project, construction emissions would not expose sensitive receptors to substantial concentrations of criteria pollutants.

In addition, to the criteria pollutant emissions, construction activities have the potential to expose nearby sensitive receptors to toxic air contaminants (TACs), which would be created from the operation of diesel-powered equipment in the form of diesel particulate matter (DPM). According to SCAQMD methodology, health effects from TACs are usually described in terms of "individual cancer risk". "Individual Cancer Risk" is the likelihood that a person exposed to concentrations of toxic air contaminants over a 70-year lifetime will contract cancer, based on the use of standard risk-assessment methodology. Given the relatively limited number of heavy-duty construction equipment, the varying distances that construction equipment would operate to the nearby sensitive receptors, and the short-term construction schedule, the Proposed Project would not result in a long-term (i.e., 70 years) substantial source of toxic air contaminant emissions and corresponding individual cancer risk. In addition, California Code of Regulations Title 13, Article 4.8, Chapter 9, Section 2449 regulates emissions from off-road diesel equipment in California. This regulation limits idling of equipment to no more than five minutes, requires equipment operators to label each piece of equipment and provide annual reports to CARB of their fleet's usage and emissions. This regulation also requires systematic upgrading of the emission Tier level of each fleet, and currently no commercial operator is allowed to purchase Tier 0 or Tier 1 equipment and by January 2023, no commercial operator is allowed to purchase Tier 2 equipment. In addition to the purchase restrictions, equipment operators need to meet fleet average emissions targets that become more stringent each year between years 2014 and 2023. Therefore, no significant short-term toxic air contaminant impacts would occur during construction of the Proposed Project.

Operational emissions would be limited to weekly or monthly vehicle trips to obtain pressure and temperature measurements well monitoring activities. As discussed above in (b), the criteria pollutant emissions have been calculated for operational activities, which were found to be within the ICAPCD's allowable operational thresholds. Due to the limited amount of criteria pollutants created from operational activities and the distances to the nearest sensitive receptors to the proposed exploratory wells, operational emissions would not expose sensitive receptors to substantial concentrations of criteria pollutants that are anticipated to create nominal levels of emissions and would not result in a substantial increase in traffic volumes, which have the potential to create CO hotspots. As such, operation of the Proposed Project would result in a less than significant exposure of sensitive receptors to substantial pollutant concentrations.

Therefore, implementation of the Proposed Project would not expose sensitive receptors to substantial pollutant concentrations, and impacts would be less than significant.

d) Result in other emissions (such as those leading to odors adversely affecting a substantial number of people? ☐ ☐ ☒ ☐

d) Geophysical Survey: Any diesel equipment used during the geophysical survey associated with the Proposed Project would consist of mobile equipment that would be changing locations, allowing the odors to disperse rapidly and not impact any nearby receptors. The survey is anticipated to be limited to 12 to 14 days, thus odor impacts will be temporary and would be likely not be noticeable at the nearest sensitive receptors that are located 0.2 mile or farther from the proposed well sites. Therefore, construction and operation of the Proposed Project would not create objectionable odors affecting a substantial number of people, and impacts would be less than significant.

Exploratory Wells: Any diesel equipment used during construction of the Proposed Project would consist of mobile equipment that would be changing locations, allowing the odors to disperse rapidly and not impact any nearby receptors. Should diesel equipment be required during maintenance at the proposed well sites, it would also change locations, allowing the odors to disperse rapidly and not impact any nearby receptors. Well construction activities would also result in the discharge of drilling mud that will be stored onsite in the containment basins. It is anticipated that the due to the climate of the project site, any drilling mud would evaporate and harden quickly, which upon hardening will cease the release of odors. In addition, well testing activities have the potential to release geothermal gases that are a known source of odors. Since most well testing activities are anticipated to be limited to less than a day, the well testing odors would be temporary and the odor impacts would be likely not be noticeable at the nearest sensitive receptors that are located 0.2 mile or farther from the proposed well sites. Therefore, construction and operation of the Proposed Project would not create objectionable odors affecting a substantial number of people, and impacts would be less than significant.

	Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)

IV. *BIOLOGICAL RESOURCES* *Would the project:*

The following section is based on the Biological Resources Evaluation Report (2018) and the Botanical Survey Report (2017) prepared by Power Engineers for the Proposed Project. These reports are included as Appendix B and Appendix C respectively.

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?	☐	☒	☐	☐

a) Surveys to document special status flora and fauna species were conducted in 2016, 2017, and 2018 by Power Engineers. Power Engineers provided a wildlife biologist and a botanist for the surveys. The role of the wildlife biologist was to record observations of wildlife species, with emphasis on special- status species such as flat-tailed horned lizard (*Phrynosoma mcallii*) and burrowing owl (Athene cunicularia), and record active or potential burrows for a variety of wildlife species.

The botanist was tasked with creating a vegetation map of the corridors that were surveyed, extending as far as they could reliably determine using line-of-sight and aerial imagery, and identifying and recording plant species encountered, with emphasis on special-status plant species. Botanists also recorded occurrences of seeps encountered.

All detected wildlife and botanical species were recorded, as were observed vegetation communities within and adjacent to the survey corridors. Wildlife species were detected either by observation, by vocalization, or by sign (e.g., tracks, burrows, scat). The botanical inventory was floristic in nature, meaning that all plants observed were identified to the taxonomic level needed to determine whether they were special- status plant species. Vegetation communities were classified according to Holland (1986).

Vegetation communities consisted primarily of Sonoran creosote bush scrub and desert saltbush scrub. Seven special- status plant species were observed within the Proposed Project area during the surveys. A list of plant species observed during the field surveys is provided in Appendix A. One special- status, wildlife species, flat-tailed horned lizard, was detected within the Proposed Project area. Few wildlife species were observed within the Proposed Project area, but wildlife sign was observed more frequently. Burrows of varying sizes were present intermittently throughout the Proposed Project area, including rodent and potential burrowing owl burrows. A small number of unoccupied bird nests were also observed.

Special Status Plant Species

A total of 38 plant species have the potential to occur within the Proposed Project area. Of the 38 plant species considered to have a potential to occur, seven were observed during the survey. Three species were determined to have a moderate potential for occurrence within the Proposed Project area, and seven had a low potential, while the remaining were determined to be absent. Potential for occurrence was based on habitat, elevation, soil, and proximity to known recorded occurrences of a species. Table 8 (located in Attachment A) provides the potential for occurrence of special- status plant species. A plant was considered to be of special- status if it met one or more of the following criteria:

- Listed, proposed for listing, or candidates for listing as threatened or endangered under the Federal Endangered Species Act (50 Code of Federal Regulations Part 17.12 [listed plants]);
- Listed or proposed for listing by the State of California as threatened or endangered under the California Endangered Species Act (CDFW 2017);
- Identified by the CDFW as species of concern or fully protected species, including fish and wildlife that do not have State or federal threatened or endangered status, but may still be threatened with extinction (CDFW 2017);
- Included in the CNPS Rare Plant Inventory (CNPS 2017);
- Otherwise defined as rare, threatened, or endangered under the California Environmental Quality Act;
- Identified by State Parks Ocotillo Wells Field Office as a sensitive species; or
- Identified by the BLM or the BLM El Centro Field Office as a sensitive species.

Special Status Wildlife Species

A total of 12 wildlife species have the potential to occur within the Proposed Project area. Of the 12 wildlife species, one species had a high potential for occurrence within the Proposed Project area, two had a moderate potential, five had a low potential, and the remainder were determined to be absent. Their habitat description, status, and potential for occurrence within the Proposed Project area are provided in Table 7.9 (located in Attachment A). Additionally, American badgers and Colorado Desert fringe-toed lizards may be present within the project area and auditory detections of wester mastiff bats have occurred in Tule Wash (Alvarez 2015).

One special- status, wildlife species, flat-tailed horned lizard, was detected within the Proposed Project area. Additionally, small mammal burrows occur throughout the Proposed Project area that can provide suitable cover for a variety of wildlife species, including

flat-tailed horned lizard and burrowing owls.

The Applicant will secure all the necessary permits, memorandums of understanding, or permissions identified in Section II of this document. Impacts to special- status species would be avoided where feasible, and where not feasible, impacts would be reduced via implementation of the mitigation measures identified below.

Due to the potential for the Proposed Project to impact special- status species, the following mitigation measures would be implemented to ensure that impacts to special- status species would be reduced to a level below significant. Following implementation of the mitigation measures identified below would result in a less than significant impact associated with special- status species.

MM-BIO-1: A qualified biologist(s) will monitor all construction activities to ensure that standard and special- status species-specific avoidance and minimization recommendations are adhered to. The monitor will retain stop work authority in the event there is the likelihood of eminent take of special- status species. The biological monitor will conduct a general preconstruction survey no more than 14 days prior to the start of construction to verify that no special- status species are in the Proposed Project area or its buffers. The monitor shall also conduct a daily survey in and around work areas before activities start.

MM-BIO-2: A worker education program (WEAP) will be prepared and presented to all employees working on the Proposed Project in sensitive species habitat. The education program will include identification of target species and their habitats, any project mitigation measures and stipulations, reporting requirements, and penalties for failure of compliance.

MM-BIO-3: Should construction activities occur between February 15 and August 15, the time period typically referenced in California for the general bird nesting season, preconstruction nesting surveys will be conducted in the Proposed Project area by a qualified biologist within two weeks of the start of construction. If no active bird nests are found within this area, no further mitigation is required. If an active nest is found, a buffer shall be instated around the nest if it belongs to a non-listed or migratory bird in coordination with USFWS and CDFW. If the nest belongs to a listed or fully-protected species, a larger buffer shall be instated around the nest, at a distance approved prior to construction activities.

MM-BIO-4: Avoid burrows that may be utilized by special- status wildlife species with a minimum buffer of 20-feet from burrows suitable for flat-tailed horned lizard and a minimum buffer of 30- feet from burrows suitable for burrowing owls. If burrows cannot be avoided, MM-BIO-5 and MM-BIO-6 would be implemented.

MM-BIO-5: If flat-tailed horned lizards are observed within the construction area, the qualified biological monitor, with prior approval through project acquired permits or permissions and in consultation with CDFW, will notify CDFW and relocate the individual out of the construction area, adjacent to where it was moved from.

MM-BIO-6: If burrowing owls are observed within the Project area prior to or during construction activities, occupied burrows shall not be disturbed during the owl nesting season, February 1 and August 31. If burrows are found, the appropriate CDFW-recommended buffer, or a buffer deemed appropriate by the qualified biological monitor, shall be instated in consultation with CDFW until occupancy status is determined. If the buffer cannot be maintained during the non-breeding season, owls may be evicted from the burrows using accepted methodology as approved by resource agencies. Eviction will not occur during the breeding season.

MM-BIO-7: Avoid special- status plant species with a minimum buffer of 5 to 10 feet, depending on the root structure and as determined by the biological monitor.

MM-BIO-8: Access to proposed well sites and geophysical survey truck paths will be via pre-existing access routes, to the greatest extent possible, and the work area boundaries will be delineated with staking, flagging, or other comparable markings to minimize surface disturbance associated with vehicle straying. Signs and/or fencing will be placed around the Proposed Project area to restrict access to project-related vehicles.

MM-BIO-9: Project-related equipment will be washed prior to entering the project area for the first time to reduce the chance of transporting noxious weed seeds from outside the area.

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service? ☐ ☐ ☐ ☒

b) Geophysical Survey: The Biological Resources Evaluation Report (2018) prepared for the geophysical survey associated with the Proposed Project did not identify any riparian habitat throughout the survey area. The survey area is within the boundary of the BLM Desert Renewable Energy Conservation Plan (DRECP), which identifies sensitive natural communities; though, the geophysical survey area is not classified in the DRECP as an Area of Critical Environmental Concern, California Desert National Conservation Lands, or Wildlife Allocation (BLM 2016). Coordination with the BLM would occur to ensure that the geophysical survey is consistent with the conservation goals of the DRECP. No impact would occur.

Exploratory Wells: The Botanical Survey Report (2017) prepared for the Proposed Project did not identify any riparian habitat throughout the well sites associated with the Proposed Project; therefore, the Proposed Project would not result in any impacts to riparian habitat. The wells sites are within the boundary of the BLM DRECP, which identifies areas with sensitive natural communities; though, the exploratory well sites are not classified in the DRECP as Areas of Critical Environmental Concern, California Desert National Conservation Lands, or Wildlife Allocation (BLM 2016). Coordination with the BLM would occur to ensure that the well construction is consistent with the conservation goals of the DRECP. No impact would occur.

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? ☐ ☒ ☐ ☐

c) Geophysical Survey: Some of the 200-foot long receiver lines implemented during the geophysical survey would be deployed in the vicinity of federally protected wetlands (USFW 2019). The geophysical survey associated with the Proposed Project is temporary, lasting an anticipated 12 to 14 days, and does not require removal, filling, or hydrological interruption. No wetland or riparian vegetation will be removed during the survey and geophone sensors will enter, at maximum, the top 3 inches of soil using only foot pressure. Pre-operational meetings would occur daily to inform crew personnel on expectations for protecting riparian areas. Impacts would be less than significant.

Exploratory Wells: The exploratory wells associated with the Proposed Project have the potential to impact state and/or federally protected wetlands. The Proposed well sites 18-32, and 47-32 would require access roads that are located within a 100-year Federal Emergency Management Administration (FEMA) floodplain. As identified in the biological resources studies, these washes may be considered to be jurisdictional waters of the United States or Sate. Potential impacts would include potential upgrades to thise access paths to allow for vehicle travel to the well pads. If the features are found to be state or federally protected wetlands and project activities will require dredge or fill within these areas, the Proposed Project would require compliance with Section 401 and 404 of the Clean Water Act (CWA) and Fish and Game Code 1600. If it is determined the Proposed Project would result in impacts to jurisdictional waters, the appropriate permits will be secured prior to impacts to the waters. This impact is potentially significant unless mitigation is incorporated.

Due to potential impacts associated with construction of the access roads for proposed well pads 47-32 and 18-32, the Proposed Project would implement Mitigation Measures MM-BIO-10 to reduce impacts associated with state or federally protected wetlands.

MM-BIO-10: If the California Department of Fish and Wildlife (CDFW), Regional Water Quality Control Board (RWQCB), or U.S. Army Corps of Engineers (USACE) determine that access roads associated with well sites 47-32 and 18-32 are located within waters of the State/United States, prior to impacts the Applicant or its contractor shall obtain, and shall comply with all mitigation and conditions associated with, one or more of the following permits, as applicable: a CDFW Lake and Streambed Alteration Agreement; RWQCB Section 401 Water Quality Certification; or Section 404 USACE permit. Permit compliance shall be met through the purchase of in-lieu credits for non-vegetated streams at an approved mitigation bank, implementation of in-kind or out-of-kind restoration, or a combination of these actions. The mitigation replacement ratio shall be determined by the regulatory agencies during the permitting process.

d) Interfere substantially with the movement of any resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites? ☐ ☒ ☐ ☐

d) Geophysical Survey: The geophysical survey area associated with the Proposed Project area is currently undeveloped. As identified in the Biological Resources Evaluation Report (2018) prepared by Power Engineers, nesting birds have the potential to occur within the survey area; a potential exists for avian species covered by the Migratory Bird Treaty Act (MBTA) to nest on site. During the surveys for the Biological Resources Evaluation Report no active avian nests were observed, and only abandoned bird nests were observed. If construction activities are to occur during bird breeding season, nesting bird surveys will be required in accordance with the MBTA, as described in Mitigation Measure MM-BIO-3, above.

Exploratory Wells: The well sites associated with the Proposed Project area are currently vacant. The well sites do not provide for any substantial movement of wildlife species through a land-based corridor. However, as identified in the Biological Resources Evaluation Report (2018) prepared by Power Engineers, there is potential for nesting birds to occur within the well sites; a potential exists for avian species covered by the Migratory Bird Treaty Act (MBTA) to nest onsite. During the surveys for the Biological Resources Evaluation Report no active or old avian nests were observed. If construction activities are to occur during bird breeding season, nesting bird surveys will be required in accordance with the MBTA, as described in Mitigation Measure MM-BIO-3, above.

e) Conflict with any local policies or ordinance protecting biological resource, such as a tree preservation policy or ordinance? ☐ ☒ ☐ ☐

e) The County of Imperial General Plan Open Space Conservation Policy requires detailed investigations to be conducted to determine

the significance, location, extent, and condition of natural resources in the County. If any rare, sensitive, or unique plant or wildlife habitat will be impacted by a project, the County must notify the agency responsible for protecting plant and wildlife before approving the project.

Geophysical Survey: The geophysical survey associated with the Proposed Project is not anticipated to conflict with any local policies or ordinances protecting biological resources during construction of the Proposed Project. Implementation of the survey would be consistent with the County's Open Space Conservation Policy because appropriate studies have been prepared for the survey area.

Exploratory Wells: Construction of the well sites is not anticipated to conflict with any local policies or ordinances protecting biological resources during construction of the Proposed Project. Consistent with the County's Open Space Conservation Policy, appropriate studies have been prepared for the well sites. Additionally, implantation of Mitigation Measures MM-BIO-1 through MM-BIO-9 would reduce any potential impacts to rare, sensitive, or unique plant or wildlife habitat to less than significant; therefore, this impact is potentially significant unless mitigation is incorporated.

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? ☐ ☐ ☒ ☐

f) The Proposed Project area overlaps with the boundaries of the Ocotillo Wells SVRA Research Area designated within the Flat-tailed Horned Lizard Rangewide Management Strategy. This document was written by the members of the Flat-tailed Horned Lizard Interagency Coordinating Committee in 1997, and updated in 2003, with the purpose of guiding conservation and management of sufficient habitat to maintain extant populations of flat-tailed horned lizards in five management areas near the California-Arizona border (ICC 2003).

Geophysical Survey: The geophysical survey area overlaps with the Ocotillo Wells SVRA Research Area designated within the Flat-Tailed Horned Lizard Rangewide Management Strategy (ICC 2003). Coordination with the BLM and California Department of Parks and Recreation (CDPR) would occur to ensure the geophysical survey activities comply with the goals of the Flat-Tailed Horned Lizard Rangewide Management Strategy. Impacts would be less than significant.

Exploratory Wells: The well sites overlap with the Ocotillo Wells SVRA Research Area designated within the Flat-Tailed Horned Lizard Rangewide Management Strategy (ICC 2003). Coordination with the BLM and CDPR would occur to ensure the proposed well site construction complies with the goals of the Flat-Tailed Horned Lizard Rangewide Management Strategy. Impacts would be less than significant.

V. *CULTURAL RESOURCES* *Would the project:*

This section is based on the Class III Archaeological Survey prepared by Power Engineers, Inc (POWER) for the Proposed Project in August 2019; this report in included as Appendix D.

a) Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5? ☐ ☒ ☐ ☐

a) A Class III Archaeological Survey for the Proposed Project was prepared by Power Engineers, Inc (POWER) in August 2019. A record search with the South Coast Information Center (SCIC) for the Proposed Project determined a total of 31 cultural resource studies have been conducted in and within one-half mile of the Proposed Project area. Three of the previous surveys identified by the SCIC occurred in the past 10 years, and the rest occurred between 11 and 45 years ago. The earliest studies were associated with the widening of State Route 86 and represent the first modern archaeological studies in this region.

The records search identified 219 archaeological sites and 183 historic-era isolates within one-half mile of the Proposed Project area. In 2017, POWER recorded 12 sites and 12 isolates during the 2017 field season as part of the Proposed Project. Seven of these sites are in the Proposed Project area. Because the Proponents' geophysical contractor and POWER archaeological staff were tasked with moving Proposed Project features away from archaeological sites listed by the SCIC, no cultural resources are located within a feature of the Proposed Project.

The archaeological sites previously recorded in and within one-half mile from the geophysical survey area and well sites associated with the Proposed Project consist mainly of artifact scatters, although sites bearing stacked rock features and what appears to be habitation foundations are plentiful near large washes, especially the wash banks just west of State Route 86. No sites have been recorded on the floor of any wash, although a few isolates are known. Sites bearing the remnants of prehistoric fish traps or weir foundations, which in this area take the form of V-or J-shaped single-coursed cobble alignments (Dice et.al. 2018) are also recorded in the Proposed Project area. Many of these can be seen on high-resolution aerial photographs. Historic trash and metal debris do occur near older roads, including dummy bombs and rounds that may have been dropped by World War II training planes between approximately 1940 and 1943 within the Proposed Project area. Trash litters both sides of the State Route 86 right-of-way and some of this is mixed with debris that may be more than 50 years old.

Attempts were made before any fieldwork began to move projected location of project features into locations where no sites had been previously located. Nonetheless, the inventory encountered 175 archaeological resources and 91 isolated artifacts. Proposed Project features have been moved to positions that would avoid the recorded site boundaries; however, construction of the access road associated with proposed well site 87-6 has the potential to impact a historic resource. To minimize impacts to historic resources associated with the construction of the access road for proposed well site 87-6, the mitigation measures listed below would be implemented; the resulting impact would be reduced to less than significant.

MM-CUL-1: A temporary track will be placed over the historic site within the geophysical survey vibroseis path in the three different locations the Applicant would like to cross over the historic resource. Once the need to cross the area associated with the historic resource has concluded, the temporary cover can be removed.

MM-CUL-2: Prior to construction, the Applicant shall prepare a mitigation and monitoring plan specific to Cultural resources. The mitigation and monitoring plan shall identify procedures for monitoring and the implementation of a discovery plan in coordination with affected Tribal groups. The mitigation and monitoring plan will incorporate a worker awareness program, stop work authority and all avoidance recommendations from the Class III report.

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5? ☐ ☒ ☐ ☐

b) As noted above, POWER prepared a Class III Archaeological Survey for the Proposed Project. Prior to any fieldwork associated with the Class III Archaeological Survey, the Applicant relocated project features into locations where no sites had been previously located. Although all archaeological sites have been avoided, aside from the site located within the geophysical survey vibroseis path at the western end of the Salton Sea Airport landing strip, there remains potential to impact unknown archaeological resources. Implementation of the mitigation measures below would reduce any potential impacts associated with an archaeological resource to less than significant.

MM-CUL-3: The Applicant shall retain qualified archaeological monitors (and Tribal monitors, if requested) for all ground-disturbing activities associated with the geophysical survey and development of access roads and construction of the drill pads. If a significant cultural resource site is found during ground-disturbing activities associated with well pad or access road construction the Project features will either be moved, or the resource will be protected in place, or data recovery will be initiated, consistent with the mitigation and monitoring plan required by MM-CUL-2. The final disposition of archaeological or historical, resources recovered on state land under the jurisdiction of the California State Lands Commission must be approved by the Commission.

c) Disturb any human remains, including those interred outside of dedicated cemeteries? ☐ ☒ ☐ ☐

c) No publicly available information indicates that human remains may occur within the Proposed Project area and the geophysical survey vibroseis paths and well sites were chosen in coordination with POWER to avoid potential impacts to cultural resources; however, given the cultural sensitivity of the area, it remains possible to uncover human remains. In the event that the discovery of human remains occurs during ground-disturbing activities, the following regulations must be followed to reduce the impact to less than significant.

MM-CUL-4: California State law (California Health and Safety Code 7050.5) and federal law and regulations (Archaeological Resources Protection Act [ARPA], 16 United States Code [U.S.C.] 470 and 43 Code of Federal Regulations, [CFR] 7, Native American Graves Protection and Repatriation Act [NAGPRA] 25 U.S.C. 3001 and 43 CFR 10, and Public Lands, Interior 43 CFR 8365.1-7) require a defined protocol if human remains are discovered in the state of California regardless if the remains are modern or archaeological. Upon discovery of human remains, all work within a minimum of 200 feet of the remains must cease immediately, and the County Coroner must be notified. The appropriate land manager/owner or the site shall also be notified of the discovery. If the remains are located on federal lands, the federal land manager(s), federal law enforcement, and/or federal archaeologist should also be notified. If the human remains are determined by the Coroner to be prehistoric, the appropriate federal archaeologist must be called. The archaeologist will initiate the proper procedures under ARPA and/or NAGPRA. If the remains can be determined to be Native American, the steps as outlined in NAGPRA 43 CFR 10.6 Inadvertent Discoveries must be followed.

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? ☐ ☐ ☒ ☐

a) Geophysical Survey: Performing the geophysical survey associated with the Proposed Project would not require the use of energy sources beyond rechargeable battery packs for wireless receiving equipment and small portable generators. Additionally, the survey is anticipated to last 12 to 14 days, so energy consumption would be minor and temporary. Completion of the survey would not result in wasteful, inefficient, or unnecessary consumption of energy resources because the Proposed Project would not include the

	Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)

construction of structures (residential, commercial, or industrial) that would require daily usage of energy resources. Impacts would be less than significant.

Exploratory Wells: Construction of the exploratory wells associated with the Proposed Project would result in the need for energy resources. The amount of energy resources required for the construction of the exploratory wells would be contingent on the well location because the total acreage of disturbance would vary; therefore, the energy requirements for each site is unknown at this time. However, energy use for the exploratory wells would be temporary in nature and minimal. Operation of the well sites would not result in wasteful, inefficient, or unnecessary consumption of energy resources because the exploratory wells associated with the Proposed Project would not involve the construction of structures (residential, commercial, or industrial) that would require daily usage of energy resources. This impact is less than significant.

b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency? ☐ ☐ ☒ ☐

b) The County of Imperial prepared a Renewable Energy and Conservation Element (Element) that provides objectives in innovating renewable energy systems within the County.

Geophysical Survey: The geophysical survey associated with the Proposed Project would not conflict or obstruct a renewable energy or energy efficiency plan because the survey would occur within the Truckhaven Geothermal Leasing area, consistent with the Element. Therefore, impacts would be less than significant with regard to energy usage and renewable energy plans.

Exploratory Wells: The exploratory wells associated with the Proposed Project would not conflict or obstruct a renewable energy or energy efficiency plan because implementation of the well sites would occur within the Truckhaven Geothermal Leasing area, consistent with the Element. Therefore, impacts would be less than significant with regard to energy usage and renewable energy plans.

VII. *GEOLOGY AND SOILS Would the project:*

a) Directly or indirectly cause potential substantial adverse effects, including risk of loss, injury, or death involving: ☐ ☐ ☒ ☐

1) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42? ☐ ☐ ☐ ☒

1) In accordance with the Alquist-Priolo Special Studies Zone Act (Chapter 7.5, Division 2, Public Resources Code, State of California, effective May 4, 1975) the Office of State Geologist delineated Special Study Zones which encompass potentially and recently active traces of four major faults (San Andreas, Calaveras, Hayward and San Jacinto). The Alquist-Priolo Special Study Zone Act is enforced by the County to assure that homes, offices, hospitals, public buildings, and other structures for human occupancy which are built on or near active faults, or if built within special study areas, are designed and constructed in compliance with the County of Imperial Codified Ordinance.

Geophysical Survey: The geophysical survey associated with the Proposed Project would not result in the construction of any structure intended for human occupancy, and human presence in the area would be limited to 12 to 14 days. Additionally, the Proposed Project area is not located within or adjacent to any earthquake fault as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map (County of Imperial 1997). There would be no impacts relating to the rupture of a known earthquake fault.

Exploratory Wells: Construction of the exploratory wells associated with the Proposed Project would not result in the construction of any structure intended for human occupancy. Additionally, the Proposed Project area is not located within or adjacent to any earthquake fault as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map (County of Imperial 1997). There would be no impacts relating to the rupture of a known earthquake fault.

2) Strong Seismic ground shaking? ☐ ☐ ☒ ☐

2) California rests on the boundary between the North American Plate and the Pacific Plate. The San Andreas Fault system is located where the northwesterly drifting Pacific Plate grinds along and is subducted by the southwesterly drifting North American Plate. Baja, and California west of the fault system, are part of the Pacific Plate and move northwest compared to the rest of California and North America.

Geophysical Survey: As described in the Project Summary section above, a geophysical survey would be conducted as part of

the Proposed Project. Because Southern California is a seismically active region, it is highly likely that regional earthquakes would occur that could affect the survey area (County of Imperial 1997); however, as noted above, no active faults are underlaying or adjacent to the survey area. The California Department of Transportation (Caltrans) Transportation and Construction Vibration Manual (September 2013) and the USBM OSMRE Blasting Guidance Manual (March 1987) provide vibration criteria and standards related to potential impacts from vibrations on structures and people. The survey would be conducted in general accordance with current practice and the standard of care exercised by consultants performing geophysical survey tasks within the survey area. Further, no onsite structures or facilities would be constructed as a result of the survey, and the survey would occur over an anticipated 12 to 14 days. Since the survey does not involve structure building and is temporary in nature, the potential impacts due to strong seismic ground shaking are a less than significant impact.

Exploratory Wells: Southern California is a seismically active region, therefore it is highly likely that regional earthquakes would occur that could affect the exploratory well sites (County of Imperial 1997); though, as noted in section a) 1), no active faults are underlaying or adjacent to the well sites. As noted above in the Project Summary Section of this document, vibration monitoring would be conducted prior to construction to determine areas appropriate for drilling. The California Department of Transportation (Caltrans) Transportation and Construction Vibration Manual (September 2013) and the USBM OSMRE Blasting Guidance Manual (March 1987) provide velocity attenuation relationships that can be used to estimate PPV at various distances and site conditions. Also included in these Manuals are vibration criteria and standards related to potential impacts from vibrations on structures and people. The vibration monitoring would be conducted in general accordance with current practice and the standard of care exercised by consultants performing vibration monitoring tasks within the exploratory well sites. Additionally, all structures and onsite facilities would be designated in accordance with the California Building Code (CBC) for the peak site ground acceleration. Since the design and construction of the wells associated with the Proposed Project would be required to conform to the specific mandated structural design requirements to protect against strong seismic shaking, the potential impacts due to strong seismic ground shaking are a less than significant impact.

3) Seismic-related ground failure, including liquefaction and seiche/tsunami? ☐ ☐ ☒ ☐

3) The geology that makes up Imperial County includes young, unconsolidated sediments of the Salton Trough that are subject to failure during earthquakes, especially throughout the irrigated portions of Imperial Valley where the soil is generally saturated. Liquefaction, and related loss of foundation support, is a common hazard in these areas (County of Imperial 1997).

A seiche is a to and from vibration of a body of water like the slopping of water in a jolted basin. Once initiated, the water body continues to oscillate independently. Seiches can be triggered by seismic events such as earthquakes. The most likely location for a significant seiche to occur is the Salton Sea. While there have been a number of seismic events since the formation of the Salton Sea, no significant seiches have occurred to date (County of Imperial 1997).

Geophysical Survey: The geophysical survey associated with the Proposed Project is not located within an irrigated portion of Imperial Valley, thus the risk of liquefication in the area is low. Additionally, despite the survey area being close proximity to the Salton Sea, seiches in the area are unlikely. Furthermore, the survey area is approximately 80 miles from the closest ocean, the Pacific Ocean, and therefore is too far to be at risk of experiencing a tsunami. Due to these factors, the impacts regarding seismic-related ground failure, including liquefaction and seiche/tsunami are less than significant.

Exploratory Wells: The exploratory wells associated with the Proposed Project are not located within an irrigated portion of Imperial Valley, causing the risk of liquefication in the area to be low. Additionally, despite the survey area being close proximity to the Salton Sea, seiches in the area are unlikely. Additionally, the well sites are approximately 80 miles from the nearest ocean, the Pacific Ocean, and therefore are too far to be at risk of experiencing a tsunami. Impacts associated with seismic-related ground failure, including liquefaction and seiche/tsunami are less than significant.

4) Landslides? ☐ ☐ ☒ ☐

4) A landslide refers to slowly to very rapidly descending rock or debris caused by the pull of gravity. Landslides affect humans in many ways. A very rapid landslide could result in casualties and devastating property damage while a slow landslide could result in the nuisance of having a fence slowly pulled apart. The cost in lives and property from landslides is surprisingly high. According to the U.S. Geological Survey, more people in the United States died from landslides during the last three months of 1985 than were killed by all other geologic hazards, such as earthquakes and volcanic eruptions. The damage to property from landslides each year exceeds the cost of earthquake damage for the last twenty years (County of Imperial 1997).

Geophysical Survey: The geophysical survey area is located in a relatively flat portion of Imperial County and is not identified as an area at risk of landslide (County of Imperial 1997); therefore, impacts associated with landslides are considered less than significant.

Exploratory Wells: The exploratory well sites are located in a relatively flat portion of Imperial County and are not identified as an area at risk of landslide (County of Imperial 1997); therefore, impacts associated with landslides are considered less than significant.

	Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)
b) Result in substantial soil erosion or the loss of topsoil?	☐	☒	☐	☐

b) Erosion is the removal of rock fragments or soil by the action of running water, glacial ice, or wind. Human activities can accelerate erosion. The areas in Imperial County that are most subject to erosion are the Algodones Sand Dunes paralleling the East Mesa and Superstition Mountain, and the Chocolate, Picacho, Cargo Muchacho, and Coast Range Mountains. The remainder of Imperial County is generally flat and experiences low levels of natural erosion (County of Imperial 1997).

Geophysical Survey: The geophysical survey area is relatively flat and identified as having low erosion potential (County of Imperial 1997). Moreover, the survey does not entail any major soil disturbing activities that would expose highly erodible subsoil; geophone sensors will be deployed into the top three inches of soil at maximum on a thin spike and wide, low pressure flotation tires are installed on vibration trucks to reduce ground depression. Vibrator trucks would also drive only along approved routes to reduce soil disturbance and the survey would last up to 12 to 14 days. Therefore, impact is less than significant.

Exploratory Wells: Although the exploratory wells are located in a relatively flat area identified as having low erosion potential (County of Imperial 1997), the preparation of a SWPPP would be required due to the size of the disturbed area exceeding one acre. The SWPPP would identify best management practices (BMPs) that would reduce any impacts associated with soil erosion or loss of topsoil; therefore, this impact is less than significant.

MM-GEO-1: Applicant will prepare a SWPPP consistent with the requirements of the California State Water Resources Control Board (SWRCB) to reduce the potential for water pollution and sedimentation from proposed Project activities. The SWPPP will be project specific and expressly address site runoff, assuring that project runoff would not affect or alter drainage patterns to sensitive habitat,

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 landslides, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☒	☐

c) Subsidence is the gradual, local settling or sinking of the earth's surface with little or no horizontal motion. Subsidence is usually the result of gas, oil, or water extraction, hydrocompaction, or peat oxidation, and not the result of a landslide or slope failure. Ground surface effects related to subsidence are generally restricted to long surface structures such as canals, drains, and sewers, which are sensitive to slight changes in elevation. Subsidence from earthquakes and other activities, including geothermal resources development, can disrupt drainage systems and cause localized flooding.

Geophysical Survey: As noted above, the geophysical survey area is relatively flat and in an area with low risk of landslide and liquefaction. No gas, oil, or water extraction, hydrocompaction, or peat oxidation would occur as a result of the survey; therefore risk of subsidence is low. As mentioned in Impact b), no major soil disturbance activities are associated with the geophysical survey. Impact is less than significant.

Exploratory Wells: Well field programs covering production and injection plans are required by the Bureau of Land Management (BLM) and the California Division of Oil and Gas (CDOG) for each major geothermal project. Detrimental subsidence from geothermal development would be avoided through careful permit review by CDOG and the County, establishment of standards for each project, and through impact mitigation and monitoring programs. Compliance with the well field program and adherence to standards established via coordination with CDOG and the County would reduce any impacts associated with subsidence; therefore, this impact is less than significant.

d) Be located on expansive soil, as defined in the latest Uniform Building Code, creating substantial direct or indirect risk to life or property?	☐	☐	☒	☐

d) Expansive soils are soils that expand when water is added and shrink when they dry out. This continuous change in soil volume can cause structures built on this soil to move unevenly and crack; expansive soils are commonly associated with clay rich soils.

Geophysical Survey: The soils underlaying the geophysical survey site are sedimentary rock and the survey would not result in the establishment of permanent structures; therefore, impacts associated with expansive soils are less than significant.

Exploratory Wells: The soils underlaying the well sites are sedimentary rock. Additionally, construction of the exploratory wells would not result in the establishment of permanent structures, unless a viable geothermal resource is identified. Therefore, impacts associated with expansive soils are less than significant.

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?	☐	☐	☐	☒

e) Geophysical Survey: The geophysical survey associated with the Proposed Project would not require the use of septic systems or

alternative wastewater systems to accommodate wastewater needs. No impact would occur.

Exploratory Wells: The exploratory wells associated with the Proposed Project would not require the use of septic systems or alternative wastewater systems to accommodate wastewater needs. No impact would occur.

f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature? ☐ ☒ ☐ ☐

f) A Paleontological Resource Assessment and Survey Report was prepared for the Proposed Project by Applied Earthworks, Inc. in March 2017 and an Addendum to the report was prepared by Rincon Consultants, Inc. in December 2018.

The 2017 Paleontological Resource Assessment and Survey Report assessment included a comprehensive review of published and unpublished literature and museum collections records maintained by the Natural History Museum of Los Angeles County. The purpose of the literature review and museum records search was to identify the geologic units underlying the Proposed Project area and to determine whether previously recorded paleontological localities occur either within the Proposed Project boundaries or within the same geologic units elsewhere. The museum records search was supplemented by a search of the University of California Museum of Paleontology's online collections database. Using the results of museum records search and literature review, the paleontological resource potential and Potential Fossil Yield Classification (PFYC) of geologic units within the Project area was recommended in accordance with the Society of Vertebrate Paleontology (2010) and BLM (2008) guidelines, respectively.

As a result of the 2017 study, the Pliocene to Holocene geologic units underlying the Proposed Project area consist of undifferentiated younger alluvium, older alluvium, lacustrine (Lake Cahuilla), and terrace deposits of Quaternary age. These deposits have a recommended paleontological sensitivity of low (PFYC Class 2) to very high (PFYC Class 5). Consequently, the likelihood of impacting scientifically significant vertebrate fossils as a result of Proposed Project development is high. Although a review of available online museum records indicated that no paleontological resources have been found within the Proposed Project area, geologic units underlying the Project area have been known to yield significant fossils nearby. Concretions, sandstone bars, and visible Lake Cahuilla remnants are also considered unique geologic features within the Proposed Project area.

The 2018 Addendum to the Paleontological Resource Assessment and Survey Report was prepared to summarize the results of Rincon's supplemental paleontological field survey, discuss the potential for impacts to paleontological resources, and provide additional mitigation measures, as necessary. The findings of the paleontological field survey described in the addendum are consistent with the results of the 2016 paleontological survey described in the paleontological resource assessment and survey for the project (Applied EarthWorks 2017). The report determined the Proposed Project area is underlain by geologic units with PFYC 2 to 5 (low to very high paleontological sensitivity), in accordance with SVP (2010) and BLM (2016) guidelines.

In general, the potential for a given project to result in adverse impacts to paleontological resources is directly proportional to the amount of ground disturbance associated with the project. The Proposed Project entails a geophysical survey and the drilling, completion, testing and monitoring of the proposed wells and construction of associated access roads. Each of the proposed geothermal exploration wells would be located on separate, individual well pads. Ground disturbing activities are anticipated and the likelihood of impacting fossils is related to both the type and extent of disturbance and the geologic unit in which the disturbance occurs. Ground disturbances are proposed along areas underlain by previously undisturbed Arroyo Diablo Formation, Borrego Formation, Brawley Formation, Lake Cahuilla deposits, and Quaternary older alluvium, which have proven to yield vertebrate remains throughout the western Colorado Desert, including Imperial County, eastern San Diego County, and southern Riverside County. Ground disturbance planned for portions of the Proposed Project area that are underlain Quaternary alluvium will also likely impact previously undisturbed lithology in those deposits. Significant fossils have not been reported within these deposits, but they may shallowly overlie older sensitive units at an unknown depth. Implementation of the mitigation measures below would reduce impacts associated with paleontological resources to a less than significant level and would also be consistent with other federal and local laws and regulations. This impact is less than significant with mitigation incorporated.

MM-PAL-1: All Project personnel and other onsite workers shall receive environmental awareness training on paleontological resources prior to the start or continuation of any elements of the Project that include ground-disturbing activities. The training will be conducted by a qualified, BLM- and DPR-permitted paleontologist and will provide a description of the fossil resources that may be encountered in the Project area, outline steps to follow in the event that a fossil discovery is made, and provide contact information for the Project Paleontologist. The training may be conducted concurrent with other environmental training (e.g., cultural and natural resources awareness training, safety training, etc.) and may also be videotaped or presented in an informational brochure for future use by field personnel not present at the start of the Project. The workers should be informed that any unlawful collection of paleontological resources may be subject to a misdemeanor, a fine, or both.

MM-PAL-2: Prior to the commencement of ground-disturbing activities, a qualified professional paleontologist shall be retained to prepare and implement a Paleontological Resource Mitigation Plan (Plan) for the Project. The Plan should address the recommended approach to additional specimen collection, the specific locations and intensity of monitoring recommended for each geologic unit, and monitoring intensity.

	Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)

Paleontological monitoring will be required for all ground-disturbing activities within the previously undisturbed Arroyo Diablo Formation, Borrego Formation, Brawley Formation, Lake Cahuilla deposits, and Quaternary older alluvium, which underlies the Project area. Monitoring will entail the visual inspection of excavated or graded areas and trench sidewalls. In the event that a paleontological resource is discovered, the monitor will have the authority to temporarily divert the construction equipment around the find until it is assessed for scientific significance and collected. The final disposition of paleontological resources recovered on state land under the jurisdiction of the California State Lands Commission must be approved by the Commission.

MM-PAL-3: Upon completion of fieldwork, all significant fossils collected will be prepared in a properly equipped paleontology laboratory to a point ready for curation. Preparation will include the careful removal of excess matrix from fossil materials and stabilizing and repairing specimens, as necessary. Following laboratory work, all fossils specimens will be identified to the lowest taxonomic level, cataloged, analyzed, and curated. Fossil specimens collected from BLM managed land remain the property of the Federal government and they must be placed in the approved museum repository identified on the Paleontological Resource Use Permit. Fossil specimens collected from DPR-managed land remain the property of the State of California and must also be delivered to an accredited regional museum repository for permanent curation and storage. The cost of curation is assessed by the repository and is the responsibility of 8nb.

At the conclusion of laboratory work and museum curation, a final report will be prepared to describe the results of the paleontological mitigation monitoring efforts associated with the Project. The report will include a summary of the field and laboratory methods, an overview of the Project area geology and paleontology, a list of taxa recovered (if any), an analysis of fossils recovered (if any) and their scientific significance, and recommendations. If the monitoring efforts produced fossils, then a copy of the report will also be submitted to the curation facility.

VIII. *GREENHOUSE GAS EMISSION*

Introduction

This section describes the regulatory setting and potential global climate change effects from implementation of the Proposed Project. GHG emission modeling was performed through use of the CalEEMod Version 2016.3.2. The CalEEMod model output files are provided in Appendix G.

Regulatory Setting

Significant legislative and regulatory activities directly and indirectly affect climate change and GHGs in California. The primary climate change legislation in California is AB 32, the California Global Warming Solutions Act of 2006. AB 32 focuses on reducing greenhouse gas emissions in California, and AB 32 requires that GHGs emitted in California be reduced to 1990 levels by the year 2020. In addition to AB 32, Executive Order B-30-15 was issued on April 29, 2015 that aims to reduce California's GHG emissions 40 percent below 1990 levels by 2030. In September 2016, AB 197 and SB 32 codified into statute the GHG emission reduction targets provided in Executive Order B-20-15.

CARB is the state agency charged with monitoring and regulating sources of emissions of GHGs in California that contribute to global warming in order to reduce emissions of GHGs. The CARB Governing Board approved the 1990 GHG emissions level of 427 million tons of CO_2 equivalent ($MtCO_2e$) on December 6, 2007. Therefore, in 2020, annual emissions in California are required to be at or below 427 $MtCO_2e$. The CARB Board approved the Climate Change Scoping Plan (Scoping Plan) in December 2008, the First Update to the Scoping Plan in May 2014, and California's 2017 Climate Change Scoping Plan in November 2017. The Scoping Plans define a range of programs and activities that will be implemented primarily by state agencies but also include actions by local government agencies. Primary strategies addressed in the Scoping Plans include new industrial and emission control technologies; alternative energy generation technologies; advanced energy conservation in lighting, heating, cooling, and ventilation; reduced-carbon fuels; hybrid and electric vehicles; and other methods of improving vehicle mileage. Local government will have a part in implementing some of these strategies. The Scoping Plans also call for reductions in vehicle-associated GHG emissions through smart growth that will result in reductions in vehicle miles traveled (CARB 2008, 2014, 2017).

Would the project:

a)	Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐

a) Neither the County of Imperial nor the ICAPCD has established significance thresholds for GHG emissions. In order to establish context in which to consider the GHG emissions created from the Proposed Project, this analysis reviewed guidelines used by other public agencies in California and found the most conservative GHG emissions threshold is detailed in *CEQA & Climate Change,* prepared by California Air Pollution Control Officers Association (CAPCOA, 2008), which recommends a threshold of 900 metric tons of CO_2e ($MTCO_2e$) per year from any project. It should also be noted that a direct comparison of construction GHG emissions with long-term thresholds would not be appropriate, since construction emissions are short-term in nature and would cease upon completion of

construction. Other Air Districts, including the SCAQMD, recommend that GHG emissions from construction activities be amortized over 30 years, when construction emissions are compared to operational-related GHG emissions thresholds.

The CalEEMod model used to calculate the criteria pollutant emissions for the air quality analysis was also utilized to calculate the GHG emissions associated with construction of the Proposed Project (see Appendix G). The CalEEMod model calculated GHG emissions generated from the construction of one of the six exploratory wells that would be constructed as part of the proposed project. and the completion of the geophysical survey as well as from the on-going geothermal well monitoring. Table 10 shows the estimated GHG emissions from each phase of construction of geophysical survey, one well site and the total construction-related GHG emissions from all six exploratory well sites.

Table 8: Proposed Project Greenhouse Gas Emissions

Activity	Greenhouse Gas Emissions in metric tons/year			
	CO_2	CH_4	N_2O	CO_2e
Geophysical Survey				
Exploratory Well Construction	34.41	0.01	0.00	34.67
• Well Pad & Access Road Construction	10.54	0.00	0.00	9.47
• Well Drilling	148.41	0.02	0.00	149.02
• Well Testing	2.51	0.00	0.00	2.52
• Well Clean-Up	3.28	0.00	0.00	3.31
• Total Construction Emissions for One Well Site	164.74	0.03	0.00	165.46
• Total Construction Emissions for Six Well Sites	988.46	0.18	0.00	992.77
Total Geographical Survey and Exploratory Well Construction Emissions	1,022.87	0.20	0.00	1,027.44
Total Construction Emissions Amortized over 30 years	34.10	0.01	0.00	34.25
Geothermal Well Monitoring	0.56	0.00	0.00	0.56
Total Project GHG Emissions	34.66	0.01	0.00	34.81
GHG Emissions Threshold of Significance[1]				900
Exceed Threshold?				No

Notes:
[1] GHG emissions threshold from CAPCOA, 2008.
Source: CalEEMod Version 2016.3.2 (see Appendix B).

As shown in Table 10, construction and operation of the Proposed Project would generate 34.81 $MtCO_2e$ per year, which would not exceed the annual GHG emissions threshold of 900 $MtCO_2e$. As such, it could be concluded that the Project's construction-related GHG contribution is not "cumulatively considerable" and is therefore less than significant under CEQA.

Therefore, implementation of the Proposed Project would not generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment, and impacts would be less than significant.

b) Conflict with an applicable plan or policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases? ☐ ☐ ☒ ☐

b) The California State Legislature adopted AB 32 in 2006, that requires the State's GHG emissions by 2020 to meet the GHG emissions level created in 1990 and adopted AB 197 and SB 32 in 2016, that requires the State's GHG emissions to be 40 percent below 1990 levels by 2030.

Neither the County of Imperial nor the ICAPCD has adopted a climate action plan to reduce GHG emissions in the Proposed Project area. As such, the only applicable plans for reducing GHG emissions for the Proposed Project area are statewide plans that include AB 32, AB 197, and SB 32. As shown above in impact (a), the Proposed Project would generate 33.09 MTCO2e per year from construction of the Proposed Project and as discussed above in impact (a), only negligible GHG emissions would be created from operation of the

	Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)

Proposed Project. In addition, it should be noted that the Proposed Project has the potential to assist the State in meeting its GHG reduction goals provided in AB 32, AB 197, and SB 32, as the project consists of six exploratory geothermal wells that have the potential of creating a carbon-free electricity in the future, if any of the wells are found to be commercially viable.

Therefore, the Proposed Project would not conflict with any applicable plan, policy, or regulation adopted for reducing the emissions of GHGs. A less than significant impact would occur.

IX. *HAZARDS AND HAZARDOUS MATERIALS* *Would the project:*

a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials? ☐ ☐ ☒ ☐

a) Material that is to be transported, stored, or disposed of during project construction and operation has the potential to contain hazardous materials and could present a hazard to construction workers, the public, or the environment if improperly managed.

Geophysical Survey: Vehicles and equipment used for the geophysical survey would contain or require the temporary, short-term use of potentially hazardous substances, such as fuels, lubricating oils, and hydraulic fluid. Hazardous substances would be stored in transportable containment trailers at locations within the construction staging area to minimize potential for accidental releases and/or spills. No other hazardous or potentially hazardous materials will be brought to the geophysical survey area. Further, the Proposed Project would be required to comply with all applicable rules and regulations involving hazardous materials, including the State of California CCR Title 23 Health and Safety Regulations, the California Division of Occupational Safety and Health (Cal/OSHA) requirements, the Hazardous Waste Control Act, the California Accidental Release Prevention (CalARP) Program, and the California Health and Safety Code. Compliance with these measures would reduce any potential risk or impact associated with the transport, use, or disposal of hazardous materials. This impact is less than significant.

Exploratory Wells: Vehicles and equipment used for exploratory well construction would contain or require the temporary, short-term use of potentially hazardous substances, such as fuels, lubricating oils, and hydraulic fluid. Hazardous substances would be stored in transportable containment trailers at locations within the construction staging area to minimize potential for accidental releases and/or spills. No other hazardous or potentially hazardous materials will be brought to the exploratory well sites. Further, the Proposed Project would be required to comply with all applicable rules and regulations involving hazardous materials, including the State of California CCR Title 23 Health and Safety Regulations, the California Division of Occupational Safety and Health (Cal/OSHA) requirements, the Hazardous Waste Control Act, the California Accidental Release Prevention (CalARP) Program, and the California Health and Safety Code. Compliance with these measures would reduce any potential risk or impact associated with the transport, use, or disposal of hazardous materials. This impact is less than significant.

b) Create a significant hazard to the public or the environment through reasonable foreseeable upset and accident conditions involving the release of hazardous materials into the environment? ☐ ☐ ☒ ☐

b) Geophysical Survey: As described in Impact a), the geophysical survey associated with the Proposed Project would require the storage of hazardous materials; however, hazardous substances would be stored in transportable containment trailers at locations within the construction staging area to minimize potential for accidental releases and/or spills. No other hazardous or potentially hazardous materials will be brought to the geophysical survey area. Further, the Proposed Project would be required to comply with all applicable rules and regulations involving hazardous materials, including the State of California CCR Title 23 Health and Safety Regulations, the California Division of Occupational Safety and Health (Cal/OSHA) requirements, the Hazardous Waste Control Act, the California Accidental Release Prevention (CalARP) Program, and the California Health and Safety Code. Compliance with these measures would reduce any potential risk or impact associated with the release of hazardous materials into the environment. This impact is less than significant.

Exploratory Wells: As noted above, the exploratory wells associated with the Proposed Project would require the storage of hazardous materials; however, hazardous substances would be stored in transportable containment trailers at locations within the construction staging area to minimize potential for accidental releases and/or spills. No other hazardous or potentially hazardous materials will be brought to the well sites. Further, the Proposed Project would be required to comply with all applicable rules and regulations involving hazardous materials, including the State of California CCR Title 23 Health and Safety Regulations, the California Division of Occupational Safety and Health (Cal/OSHA) requirements, the Hazardous Waste Control Act, the California Accidental Release Prevention (CalARP) Program, and the California Health and Safety Code. Compliance with these measures would reduce any potential risk or impact associated with the release of hazardous materials into the environment. This impact is less than significant.

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter ☐ ☐ ☐ ☒

	Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)

mile of an existing or proposed school?

c) Geophysical Survey: The nearest school to the geophysical survey area is West Shores High School, approximately 2 miles to the northeast. The Proposed Project would not result in a release of hazardous emissions, hazardous or acutely hazardous materials, or substances within 0.25 mile of an existing or proposed school. No impact would occur.

Exploratory Wells: The nearest school to the exploratory wells associated with the Proposed Project is West Shores High School, approximately 3 miles to the northeast to the closest well site. The Proposed Project would not result in a release of hazardous emissions, hazardous or acutely hazardous materials, or substances within 0.25 mile of an existing or proposed school. No impact would occur.

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? ☐ ☐ ☐ ☒

d) Geophysical Survey: A review of federal and state standard and supplemental databases indicated that the geophysical survey area is not located within any identified hazardous material site pursuant to Government Code Section 65962.5. No hazardous materials sites are located within 0.25 mile of the Proposed Project area (DTSC 2109; SWRCB 2019). The Proposed Project would not create a significant hazard to the public or environment. No impacts would occur.

Exploratory Wells: A review of federal and state standard and supplemental databases indicated that the exploratory well sites are not located within any identified hazardous material site pursuant to Government Code Section 65962.5. No hazardous materials sites are located within 0.25 mile of the Proposed Project area (DTSC 2109; SWRCB 2019). The Proposed Project would not create a significant hazard to the public or environment. No impacts would occur.

e) For a project located within 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 result in a safety hazard or excessive noise for people residing or working in the project area? ☐ ☐ ☐ ☒

e) Geophysical Survey: The geophysical survey area is within 2 miles of the Salton City Airport, though the survey would be temporary in nature, lasting an anticipated 12 to 14 days. Following construction, no permanent workers or structures would remain on site. As such, the project will not result in exposure to a safety hazard or excessive noise from proximity to the Salton City Airport. No impact would occur.

Exploratory Wells: The exploratory well sites are located within 2 miles of the Salton City Airport; however, implementation of the exploratory wells associated with the Proposed Project would not result in people permanently residing or working in the area. Following construction, no permanent workers would be located on site and work in the area would be restricted to maintenance activities at well sites that are determined to have a viable geothermal resource; the exploratory wells do not involve housing. As such, the project will not result in exposure to a safety hazard or excessive noise from proximity to the Salton City Airport. No impact would occur.

f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan? ☐ ☐ ☐ ☒

f) Geophysical Survey: The geophysical survey associated with the Proposed Project would not involve blocking or restricting any access routes. The geophysical survey would not interfere with emergency response plans or operations near the survey area. No impacts are expected.

Exploratory Wells: The construction of the exploratory wells associated with the Proposed Project would not involve blocking or restricting any access routes. The exploratory wells would not interfere with emergency response plans or operations near the well sites. No impacts are expected.

g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires? ☐ ☐ ☐ ☒

g) Geophysical Survey: The potential for a wildfire in the unincorporated areas of the County is generally low (County of Imperial 1997) and the survey area is not located within a fire hazard severity zone (CalFire 2007). The geophysical survey would not introduce features that directly or indirectly increase the risk of wildfire throughout the survey area. No impact would occur.

Exploratory Wells: The potential for a wildfire in the unincorporated areas of the County is generally low (County of Imperial 1997) and the exploratory well sites are not located within a fire hazard severity zone (CalFire 2007). The exploratory wells would not introduce features that directly or indirectly increase the risk of wildfire throughout the Proposed Project area. No impact would occur.

	Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)

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? ☐ ☐ ☒ ☐

a) Geophysical Survey: The geophysical survey associated with the Proposed Project is not expected to affect water quality due to the lack of ground-disturbing activities incorporated and the temporary nature of the survey. Geophone sensors will be deployed into the top 3 inches of soil at maximum, and flotation tires will prevent vibration trucks from causing major soil compaction. Additionally, vibrator trucks will avoid drainage crossings to the extent possible and vibrational source generation would not occur within 328 feet (100 meters) of springs, water wells, and stock ponds. The survey is also anticipated to last only 12 to 14 days. The character of surface and ground water following the geophysical survey should remain substantially similar to current surface and ground water conditions; thus, impacts would be less than significant.

Exploratory Wells: No known or reasonably expected surface water quality issues are anticipated to result from implementation of the exploratory wells; however, because ground-disturbing activities will occur in an area greater than one acre, a SWPPP will be developed that implements BMPs (as previously discussed) that sufficiently control degradation of water quality on site and adjacent to a drill pad or access road. In addition, the SWPPP will be implemented such that stormwater discharges would not adversely impact human health or the environment, nor contribute to any exceedances of any applicable water quality standard contained in the Basin Plan (Lahontan Regional Water Quality Control Board). This impact is less than significant.

b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin? ☐ ☐ ☒ ☐

b) Geophysical Survey: The geophysical survey associated with the Proposed Project would not require water use beyond filling the 100-gallon bucket available as a fire safety precaution for the helicopter. This water bucket would be filled using a fire hydrant with water purchased from the Coachella Valley Water District; therefore, the survey would not decrease groundwater supplies of interfere with groundwater recharge and impacts would be less than significant.

Exploratory Wells: Construction of the exploratory wells associated with the Proposed Project would require the use of 50,000 gallons of water per day; however, the use of water would be temporary in nature (30 days per proposed well site), and water necessary for these activities would be purchased from the Coachella Valley Water District via a fire hydrant. The exploratory wells would not result in a decrease in groundwater supplies and would not interfere with groundwater recharge; therefore, the exploratory wells would result in less than significant impacts associated with groundwater depletion.

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

(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? ☐ ☒ ☐ ☐

c) Geophysical Survey: As previously discussed, the geophysical survey would not result in ground-disturbing activities and therefore would not substantially change the character of surface or ground waters in the survey area. Minor soil compaction may occur as a result of vibrator trucks despite flotation tires; although, trucks would both avoid passing over the same ground more than once and avoid drainage crossings to the extent possible. Additionally, the SWPPP would identify BMPs which would minimize drainage impacts. If crossing is unavoidable, the drainage will be reconstructed to approximate the original contours to BLM standards. Further, vibrational

source generation would not occur within 328 feet (100 meters) of springs, water wells, and stock ponds and the survey is anticipated to last only up to 14 days. Therefore, impacts would be less than significant.

Exploratory Wells: As previously discussed, the construction of the exploratory wells would result in ground-disturbing activities in an area greater than one acre; therefore, a SWPPP would be required. The SWPPP would be developed to identify BMPs that sufficiently avoid any onsite or offsite erosion and runoff from areas proposed for ground disturbance. Operation of the exploratory wells would not have an impact of a stormwater drainage system as the wells would not result in an increase in the amount of runoff from any proposed well site. Impacts would, therefore, be less than significant.

It should be noted that proposed well sites 18-32, and 47-32 would require access roads that are located within a 100-year Federal Emergency Management Administration (FEMA) floodplain. Prior to construction, a Waters of the US determination would be required to determine the appropriate permitting requirements. It is possible that the Proposed Project would require compliance with Section 401 and 404 of the Clean Water Act (CWA) and Fish and Game Code 1600. If it is determined the exploratory wells associated with the Proposed Project would result in impacts to jurisdictional waters, the appropriate permits will be secured prior to impacts to the waters. This impact is less than significant.

Due to potential impacts associated with construction of the access roads for proposed well pads 47-32 and 18-32, the Proposed Project would implement Mitigation Measures MM-BIO-10 to reduce impacts associated with state or federally protected wetlands.

d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation? ☐ ☐ ☐ ☒

d) Geophysical Survey: The geophysical survey associated with the Proposed Project area is not located in an area at risk of tsunami or seiche (Count of Imperial 1997). No impact would occur.

Exploratory Wells: The exploratory wells associated with the Proposed Project are not located in an area at risk of tsunami or seiche (Count of Imperial 1997). No impact would occur.

e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan? ☐ ☐ ☐ ☒

e) Geophysical Survey: As noted previously, the geophysical survey would not substantially alter the water quality or groundwater in the area; therefore, the survey would be in compliance with all city, state, and federal regulations including active water quality control plans and groundwater management plans. No impact would occur.

Exploratory Wells: As discussed above, the exploratory wells would be compliant with all city, state, and federal regulations, including compliance with the NPDES permits with the implementation of BMPs; compliance with the referenced regulations would reduce any potential impact associated with a water quality control plan to a less than significant. Additionally, as discussed above, implementation of the exploratory wells would not require water supplies beyond the supplies purchased from Coachella Valley Water District. No impact would occur.

XI. *LAND USE AND PLANNING Would the project:*

a) Physically divide an established community? ☐ ☐ ☐ ☒

a) Geophysical Survey: The geophysical survey associated with the Proposed Project would require four vibration trucks and receiving equipment that would not physically divide an established community. Temporary signage would be placed to close off the survey area for an anticipated 12 to 14 days, but the area is predominantly vacant currently and no facilities or structures are proposed that would prohibit travel through the survey area long-term. Moreover, land use designations within the survey area would remain the same. Thus, no impact would occur.

Exploratory Wells: The Proposed Project includes the drilling, testing, and monitoring of the proposed geothermal resource wells. The exploratory wells would not physically divide an established community, as no facilities are proposed that would prohibit travel throughout the Proposed Project area. Components of the exploratory wells associated with the Proposed Project would not physically divide or block residents from accessing public areas or facilities. Land use designations within the well sites would remain the same. No impact would occur.

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? ☐ ☐ ☐ ☒

b) Geophysical Survey: The geophysical survey area associated with the Proposed Project is located within the Truckhaven

Geothermal Leasing Area of Imperial County (County of Imperial 2015); the land uses associated with the Proposed Project are allowable under the Imperial County Renewable Energy and Transmission Element (2015). The Proposed Project is not in conflict with the County adopted land use plans or policies. It is consistent with the County's General Plan, the Renewable Energy and Transmission Element Update and the applicable sections of the Imperial County Land Use Ordinance (Title 9); therefore, no impact would occur.

Exploratory Wells: The exploratory wells associated with the Proposed Project are located within the Truckhaven Geothermal Leasing Area of Imperial County (County of Imperial 2015); the land uses associated with the Proposed Project are allowable under the Imperial County Renewable Energy and Transmission Element (2015). The Proposed Project is not in conflict with the County adopted land-use plans or policies. It is consistent with the County's General Plan, the Renewable Energy and Transmission Element Update, and the applicable sections of the Imperial County Land Use Ordinance (Title 9); therefore, no impact would occur.

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? ☐ ☐ ☐ ☒

a) A number of mineral resources in Imperial County are currently being extracted, including gold, gypsum, sand, gravel, lime, clay, stone, kyanite, limestone, sericite, mica, tuff, salt, potash, and manganese. Several issues influence the extraction of mineral deposits in Imperial County, including the location of geologic deposition, the potential for impacts to the environment, and land use conflicts. As a result, the extraction of mineral resources is limited to a relatively small number of sites throughout the County.

Geophysical Survey: The geophysical survey associated with the Proposed Project would not result in any impacts to known mineral resources or mineral resource recovery sites. Additionally, the survey would not preclude future mineral resource exploration throughout the Proposed Project area. No impacts would occur.

Exploratory Wells: Construction of the exploratory wells associated with the Proposed Project would not result in any impacts to known mineral resources or mineral resource recovery sites. Additionally, the exploratory wells would not preclude future mineral resource exploration throughout the Proposed Project area. No impacts would occur.

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? ☐ ☐ ☐ ☒

b) Geophysical Survey: As noted above, implementation of the geophysical survey associated with the Proposed Project would not result in any impacts to known mineral resources or mineral resource recovery sites. Additionally, the geophysical survey would not preclude future mineral resource exploration throughout the Proposed Project area. No impacts would occur.

Exploratory Wells: As noted in Impact a), implementation of the exploratory wells associated with the Proposed Project would not result in any impacts to known mineral resources or mineral resource recovery sites. Additionally, the exploratory wells would not preclude future mineral resource exploration throughout the Proposed Project area. No impacts would occur.

XIII. *NOISE*

This section describes the existing noise setting and potential noise and vibration effects from project implementation on the site and its surrounding area. Construction noise modeling was performed through use of the Roadway Construction Noise Model (RCNM) Version 1.1. The model output is provided in Appendix H.

Environmental Setting

The proposed wells sites are located on the southwest side of Salton City, which is an unincorporated area located in the western portion of Imperial County. The primary sources of noise within the study area consists of vehicle noise on State Route 86 and the local roads, aircraft noise from Salton Sea Airport (Airport), and from off-road equipment operating at the Salton City Landfill. It should be noted that due to the distances these sources are located from the proposed well sites, these noise sources only provide nominal increases to the very low ambient noise levels at the proposed well sites.

County of Imperial Noise Standards

The General Plan Noise Element (County of Imperial, 2015) provides the applicable noise standards for the Proposed project. The Noise Element limits the noise level from any noise generating property to 50 dBA between 7 a.m. and 10 p.m. and to 45 dBA between 10 p.m. and 7 a.m. at the property line of the nearest home. The Noise Element exempts construction noise from these standards, provided construction activities

	Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)

occur between 7 a.m. and 7 p.m. Monday thru Friday and between 9 a.m. and 5 p.m. on Saturday and construction noise does not exceed 75 dBA Leq averaged over 8 hours.

Would the project result in:

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?	☐	☒	☐	☐

a) Geophysical Survey: The Proposed Project involves a geophysical survey that requires equipment that would have the potential to generate noise in excess of standards. The General Plan Noise Element exempts construction activities from the applicable noise standards, provided that construction activities are limited to between 7 a.m. and 7 p.m. Monday thru Friday and between 9 a.m. and 5 p.m. on Saturday and do not exceed 75 dBA Leq at the nearby homes. The geophysical survey would adhere to the allowable times for construction activities as detailed in the General Plan.

The geophysical survey would map a 23.5-square-mile area that includes several sensitive receptors within the survey area. The geophysical survey would utilize two sets of two Vibroseis trucks that produce a noise level as high as 84.5 dBA at 20 meters (66 feet) (Schlumberger 2014), that would exceed the County's 75-dBA construction noise standard, if the Vibroseis trucks are operated in close proximity to the homes located within the survey area. This would be considered a significant impact.

Mitigation measure MM-NOI-1 is proposed that would require the Vibroseis trucks to be located a minimum of 200 feet away from any occupied home. Implementation of MM-NOI-1 would reduce the noise from the Vibroseis trucks to 74.8 dBA, which is based on the standard noise propagation rate of 6 dB of noise reduction per doubling of the distance between noise source and receptor. Impacts would be less than significant with implementation of MM NOI-1.

Exploratory Wells: The Proposed Project would consist of development of six exploratory geothermal wells. Both construction and operation of the exploratory wells would have the potential to generate noise in excess of standards and have been analyzed separately below.

Construction-Related Noise

Construction activities for the exploratory wells associated with the Proposed Project are anticipated to begin in early 2020 and each well would take approximately two months to complete, or approximately one year for all six wells as it is anticipated that after a well is completed the crew would move to the next well location, so no concurrent well construction activities are anticipated. The anticipated construction phases for each well location would include: (1) Well pad and access road construction; (2) Well drilling; (3) Well testing; and (4) Well clean-up.

The General Plan Noise Element exempts construction activities from the applicable noise standards, provided that construction activities are limited to between 7 a.m. and 7 p.m. Monday thru Friday and between 9 a.m. and 5 p.m. on Saturday and do not exceed 75 dBA Leq at the nearby homes. The well pad and access road construction, well testing, and well clean-up activities will adhere to these time limits, as such the construction noise level threshold for these activities is 75 dBA Leq at the property lines of the nearest homes. However, the well drilling phase of construction is required to operate 24-hours per day in order to minimize a risk of cave-in of the borehole. As such, the noise level threshold for the well drilling phase of construction is 45 dBA at the property line of the nearest home, which is based on the most restrictive nighttime residential noise standard.

The Federal Highway Administration (FHWA) compiled noise level data regarding the noise generating characteristics of several different types of construction equipment used during the Central Artery/Tunnel project in Boston. Table 11 below provides a list of the construction equipment measured, along with the associated measured noise emissions and measured percentage of typical equipment use per day. From this acquired data, FHWA developed the Roadway Construction Noise Model (RCNM). The RCNM, which uses the Spec 721.560 L_{max} at 50 feet, has been used to calculate the construction equipment noise emissions (see Appendix H).

Table 9: Construction Equipment Emissions and Usage Factors

Equipment	Acoustical Use Factor[1] (Percent)	Spec 721.560 L_{max} @ 50 Feet[2] (dBA, slow[3])	Actual Measured L_{max} @ 50 feet[4] (dBA, slow)
Auger Drill Rig	20	85	N/A
Backhoe	40	80	78
Compressor (air)	40	80	78
Concrete Mixer Truck	40	85	79
Concrete Pump	20	82	81
Concrete Saw	20	90	90
Crane	16	85	81
Dozer	40	85	82
Dump Truck	40	84	76
Excavator	40	85	81
Flatbed Truck	40	84	74
Front End Loader	40	80	79
Generator	50	82	81
Gradall (Forklift)	40	85	83
Mounted Impact Hammer	20	90	90
Paver	50	85	77
Roller	20	85	80
Tractor	40	84	N/A
Welder/Torch	40	73	74

1 Acoustical use factor is the percentage of time each piece of equipment is operational during a typical workday.

2 Spec 721.560 is the equipment noise level utilized by the Roadway Construction Noise Model program.

3 The "slow" response averages sound levels over 1-second increments. A "fast" response averages sound levels over 0.125-second increments.

4 Actual Measured is the average noise level measured of each piece of equipment during the Central Artery/Tunnel project in Boston, Massachusetts primarily during the 1990s.

Source: Federal Highway Administration, 2006.

The anticipated areas of construction and construction equipment that will be utilized during development of each area were obtained from the Project applicant. For each proposed well pad area, all equipment was placed at the shortest distance of the proposed well pad area to the nearest home. The results are shown below in Table 12.

Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)

Table 10: Proposed Project Construction Noise Levels at Nearby Homes Prior to Mitigation

Sensitive Receptor Location	Distance to Receptor (mile)	Construction Noise Level during: (dBA L_{eq})			
		Well Pad & Access Road Construction	Well Drilling	Well Testing	Well Cleanup
Nearest Home to Well 32-5	0.34	53	53	51	53
Nearest Home to Well 47-5	0.44	51	51	51	51
Nearest Home to Well 18-32	0.4	52	52	52	52
Nearest Home to Well 47-32	0.2	58	58	56	56
Nearest Home to Well 14-4	0.28	55	55	55	55
Nearest Home to Well 17-4	0.58	49	49	49	49
Construction Noise Threshold[1]		75	45	75	75
Exceed Threshold?		No	Yes	No	No

Notes:

[1] Construction Noise Thresholds from the General Plan Noise Element (County of Imperial, 2015).

Source: RCNM Version 1.1 (see Appendix C).

Table 12 shows that construction noise created during well pad and access road construction, well testing, and well cleanup and abandonment would be below the County's 75 dBA noise standard that is applicable when construction activities are exempt from the County's residential noise standards. Table 12 also shows that well drilling activities that would occur 24-hours per day until completion of the well, would exceed the County's residential nighttime noise standard of 45 dBA at the nearest home to each of the six proposed well sites. This would be considered a significant impact.

The mitigation measure MM-NOI-2 is proposed that would require the implementation of various sound control measures during well drilling phase of construction that are anticipated to reduce nighttime noise levels by up to 15 dB.

The well drilling phase of construction has been recalculated based on implementation of MM-NOI-2 and the results are shown in Table 13. As shown in Table 13 with implementation of MM-NOI-2, the well drilling noise levels would be lowered to within the County's residential nighttime noise standard of 45 dBA at the nearest home to each of the six proposed well sites. Impacts would be less than significant with implementation of MM NOI-2.

Table 11: Mitigated Proposed Project Construction Noise Levels at Nearby Homes

Sensitive Receptor Location	Distance to Receptor (mile)	Construction Noise Level during: (dBA L_{eq})			
		Well Pad & Access Road Construction	Well Drilling[1]	Well Testing	Well Cleanup
Nearest Home to Well 32-5	0.34	53	38	51	53
Nearest Home to Well 47-5	0.44	51	36	51	51
Nearest Home to Well 18-32	0.4	52	37	52	52
Nearest Home to Well 47-32	0.2	58	43	56	56
Nearest Home to Well 14-4	0.28	55	40	55	55
Nearest Home to Well 17-4	0.58	49	34	49	49
Construction Noise Threshold[2]		75	45	75	75
Exceed Threshold?		No	No	No	No

Notes:

[1] Well Drilling noise levels includes implementation of MM NOI-2.

[2] Construction Noise Thresholds from the General Plan Noise Element (County of Imperial, 2015).

Source: RCNM Version 1.1 (see Appendix C).

Operation-Related Noise

The Proposed Project consists of development of six exploratory geothermal wells, which would be tested after completion of the well drilling phase in order to determine the commercial potential of each well, and a geophysical survey to better model geothermal reservoirs in the area. If a well is judged to have commercial potential, well monitoring may be continued indefinitely until the applicant proceeds with the approval process to place the well into commercial service. Therefore, the operational emissions would be limited to well monitoring activities that may be limited to weekly or monthly vehicle trips to the well sites to obtain pressure and temperature measurements. As such, only nominal operational noise levels would be created from the on-going operation of the Proposed Project and operations-related noise would be less than significant for the Proposed Project.

Accordingly, with implementation of MM-NOI-1 and MM-NOI-2, the Proposed Project would not expose persons to noise levels in excess of standards established by Imperial County.

MM-NOI-1: During the geophysical survey, the project applicant shall require that the Vibroseis trucks are operated a minimum of 200 feet away from any occupied home.

MM-NOI-2: During construction of the exploratory wells, the project applicant shall require the well drilling contractor to implement the following noise reduction measures:

- All construction equipment shall use noise-reduction features (e.g., mufflers and engine shrouds that are no less effective than those originally installed by the manufacturer;
- All non-essential well drilling equipment and truck deliveries shall be limited to operating during the allowable construction times of between 7 a.m. and 7 p.m. Monday thru Friday and between 9 a.m. and 5 p.m. on Saturday;

The portable office and any storage containers used during the well drilling phase shall be placed between the drilling equipment and nearest home, in order to effectively act as a sound wall and provide attenuation to the nearest home.

b)	Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐

b) Construction activities would require the operation of off-road equipment and trucks that are known sources of vibration. Construction activities may occur as near as 0.2 mile (1,060 feet) from the home located in the proximity of proposed Exploratory Well 47-32.

A vibration monitoring study was prepared for the proposed project by Southwest Geophysics, Inc., January 17, 2018. However, it should be noted that the vibration study was limited to calculating the vibration propagation rates of the existing geological conditions of the project study area and does not provide any information about the proposed project vibration levels at the nearby sensitive homes, however the average attenuation rate of 1.28 calculated by the vibration study has been utilized to calculate the vibration levels at the nearby homes.

Since neither the County's General Plan nor the Municipal Code provide any thresholds related to vibration, Caltrans guidance has been utilized, which defines the threshold of perception from transient sources at 0.25 inch-per-second peak particle velocity (PPV). Table 14 shows the typical PPV produced from some common construction equipment.

	Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)

Table 12: Typical Construction Equipment Vibration Emissions

Equipment	Peak Particle Velocity in inches per second at 25 feet	Vibration Level (L_v) at 25 feet
Pile Driver (impact)	0.644	104
Pile Driver (sonic)	0.170	93
Clam Shovel Drop	0.202	94
Hydromill		
- in soil	0.008	66
- in rock	0.017	75
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Large Bulldozer	0.089	87
Caisson Drill	0.089	87
Loaded truck (off road)	0.076	86
Jackhammer	0.035	79
Small Bulldozer	0.003	58

Source: Federal Transit Administration 2006.

From the list of equipment shown in Table 14, a large bulldozer with a vibration level of 0.089 inch-per-second PPV would be the source of the highest vibration levels of all equipment utilized during construction activities for the Proposed Project. Based on typical propagation rates this would result in a vibration level of 0.001 inch-per-second PPV at the nearest home to construction activities. The construction-related vibration levels would be within the 0.25 inch-per-second PPV threshold detailed above. Construction-related vibration impacts would be less than significant.

The ongoing operation of the Proposed Project would not result in the creation of any known vibration sources. Therefore, a less than significant vibration impact is anticipated from the operation of the Proposed Project.

Accordingly, the Proposed Project would not expose persons to 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? ☐ ☐ ☒ ☐

c) Geophysical Survey: The closest receiving line required for the geophysical survey would be deployed as near as 400 feet from the runway for Salton Sea Airport, and an 8-foot by 8-foot staging area would be set up at the Airport. It should be noted that Noise Element of the General Plan (Imperial County, 2015) states that current airport activity at Salton Sea Airport is negligible; and, due to the low levels of activity, the County did not prepare noise contours for Salton Sea Airport. Therefore, it is likely that Salton Sea Airport does not have activity to create 65-dBA CNEL noise contours. It should also be noted that the geophysical survey is anticipated to last 12 to 14 days, and airport noise levels are typically calculated based on annual average activity noise levels; therefore, airport and airstrip noise impacts would be less than significant.

Exploratory Wells: The proposed well sites are located as near as 400 feet from the runway for Salton Sea Airport. It should be noted that Noise Element of the General Plan (Imperial County, 2015) states that current airport activity at Salton Sea Airport is negligible and due to the low levels of activity, the County did not prepare noise contours for Salton Sea Airport. Therefore, it is likely that Salton Sea Airport does not have activity to create 65-dBA CNEL noise contours. It should also be noted that the Proposed Project would consist of the development of six exploratory wells, where the operation of the proposed wells would be limited to well monitoring activities that may be limited to weekly or monthly vehicle trips to the well sites to obtain pressure and temperature measurements. The Proposed Project would consist of a very limited increase in people working in the project area and the only source of airport noise is Salton Sea Airport that produces noise levels below County noise standards. As such, airport and airstrip noise impacts would be less than significant.

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 ☐ ☐ ☐ ☒

	Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)

business) or indirectly (for example, through extension of roads or other infrastructure)?

a) Geophysical Survey: The geophysical survey associated with the Proposed Project would not induce unplanned population growth or displace existing people or housing. No residential units are in the survey area that would require relocation, and access roads associated with the Proposed Project would be used only for accessing the survey area. No development of new roads or infrastructure is proposed that would introduce new populations to the survey area. No impact would occur.

Exploratory Wells: The exploratory wells associated with the Proposed Project would not induce unplanned population growth or displace existing people or housing. The Proposed Project consists of the installation of exploratory wells within a predominantly undeveloped, vacant area of Imperial County. No residential units are on the proposed well sites that would require relocation, and access roads associated with the Proposed Project would be used only for accessing the proposed well sites. No development of new roads or infrastructure is proposed that would introduce new populations to the Proposed Project area. No impact would occur.

b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere? ☐ ☐ ☐ ☒

b) Geophysical Survey: The geophysical survey associated with the Proposed Project does not include any activities that would displace people or housing with the Proposed Project area. No impact would occur.

Exploratory Wells: The exploratory wells associated with the Proposed Project do not include any activities that would displace people or housing within the Proposed Project area. No impact would occur.

XV. *PUBLIC SERVICES*

a) 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 public services:

1) Fire Protection? ☐ ☐ ☐ ☒

1) Geophysical Survey: The geophysical survey associated with the Proposed Project would not result in substantial adverse physical impacts to fire protection. The survey would not involve the modification of any fire protection services or their facilities. The survey also would not invite new populations to the survey area that would result in the permanent, and increased need of fire protection services. No impact would occur.

Exploratory Wells: The exploratory wells associated with the Proposed Project would not result in substantial adverse physical impacts to fire protection. The exploratory wells would not involve the modification of any fire protection services or their facilities. The exploratory wells would not invite new populations to the proposed well locations that would result in the permanent, and increased need of fire protection services. No impact would occur.

2) Police Protection? ☐ ☐ ☐ ☒

2) Geophysical Survey: The geophysical survey associated with the Proposed Project would not result in substantial adverse physical impacts to fire protection. The survey would not involve the modification of any fire protection services or their facilities. The survey also would not invite new populations to the survey area that would result in the permanent, and increased need of fire protection services. No impact would occur.

Exploratory Wells: The exploratory wells associated with the Proposed Project would not result in substantial adverse physical impacts to police protection. The Proposed Project would not involve the modification of any police protection services or their facilities. The Proposed Project would not invite new populations to the proposed well locations that would result in the permanent, and increased need of police protection services. No impact would occur.

3) Schools? ☐ ☐ ☐ ☒

3) Geophysical Survey: The geophysical survey associated with the Proposed Project would not result in substantial adverse physical impacts to school facilities. The survey would not involve the modification of any schools or their facilities. In addition, the survey would not invite new populations to the survey area that would result in the permanent, and increased need for schools. No impact would occur.

	Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)

Exploratory Wells: The exploratory wells associated with the Proposed Project would not result in substantial adverse physical impacts to school facilities. The exploratory wells would not involve the modification of any schools or their facilities. Additionally, the proposed wells would not invite new populations to the proposed well locations that would result in the permanent, and increased need for schools. No impact would occur.

4) Parks? ☐ ☐ ☐ ☒

4) Geophysical Survey: The geophysical survey would not result in substantial adverse physical impacts to parks. The geophysical survey would not involve the modification of any parks or their facilities. Moreover, the survey would not invite new populations to the survey area that would result in the permanent and increased need for parks. No impact would occur.

Exploratory Wells: The exploratory wells would not result in substantial adverse physical impacts to parks. The exploratory wells would not involve the modification of any parks or their facilities. Furthermore, the exploratory wells would not invite new populations to the proposed well locations that would result in the permanent and increased need for parks. No impact would occur.

5) Other Public Facilities? ☐ ☐ ☐ ☒

5) Geophysical Survey: The geophysical survey associated with the Proposed Project would not result in substantial adverse physical impacts to public facilities. The survey would not involve the modification of any public facilities. Further, the survey would not invite new populations to the survey area that would result in the permanent and increased need of public facilities. No impact would occur.

Exploratory Wells: The exploratory wells associated with the Proposed Project would not result in substantial adverse physical impacts to public facilities. The exploratory wells would not involve the modification of any public facilities. The exploratory wells would not invite new populations to the proposed well locations that would result in the permanent and increased need of public facilities. No impact would occur.

XVI. *RECREATION*

a) Would the project increase the use of the existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated? ☐ ☐ ☐ ☒

a) Geophysical Survey: Implementation of the geophysical survey associated with the Proposed Project would not increase the use of existing neighborhood parks, campgrounds, trails, or other recreational facilities and would not include the construction or expansion of new recreational facilities. The survey would not induce new populations that would result in the substantial physical deterioration of recreational facilities or require new facilities. Trails within the Ocotillo Wells SVRA would be used to access source points, thus vibrational trucks may cross-paths with recreational vehicles during the survey. To discourage public travel on vibroseis paths located off-trail, signage will be placed to clarify that the tracks are not open to public travel and entry points will be broomed or hand raked to simulate undisturbed soil. No impact would occur.

Exploratory Wells: Construction of the exploratory wells associated with the Proposed Project would not increase the use of existing neighborhood parks, campgrounds, trails, or other recreational facilities and would not include the construction or expansion of new recreational facilities. The exploratory wells would not induce new populations that would result in the substantial physical deterioration of recreational facilities or require new facilities. No impact would occur.

b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse effect on the environment? ☐ ☐ ☐ ☒

b) Geophysical Survey: Implementation of the geophysical survey associated with the Proposed Project would not include recreational facilities or require the construction or expansion of recreational facilities. The survey would not induce new populations that would result in the substantial physical deterioration of recreational facilities or require new facilities. No impact would occur.

Exploratory Wells: Construction of the exploratory wells associated with the Proposed Project would not include recreational facilities or require the construction or expansion of recreational facilities. The exploratory wells would not induce new populations that would result in the substantial physical deterioration of recreational facilities or require new facilities. No impact would occur.

XVII. *TRANSPORTATION* *Would the project:*

a) Conflict with a program plan, ordinance or policy addressing ☐ ☐ ☒ ☐

	Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)

the circulation system, including transit, roadway, bicycle and pedestrian facilities?

a) Geophysical Survey: Primary highway access to the Project vicinity is provided by State Highway 86, a four-lane highway running north-south through Imperial County on the west side of the Salton Sea. Immediate access to the survey area is from State Highway 86 to a number of two-way, paved roads in the survey area, including the Borrego Salton Sea Way, Harvard Avenue, and Air Park Drive. All existing designated roads and trails that bisect eligible sites would be available to be used as access; though, because the geophysical survey is short-term and temporary and the traffic volumes generated by the survey consists of four vehicles, the potential for the geophysical survey to cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system is negligible. This impact is less than significant.

Exploratory Wells: Primary highway access to the Project area and some of the proposed well sites is from State Highway 86 to Airpark Drive. Access to the rest of the proposed well sites is from State Highway 86 to County Dump Road. Both Airpark Drive and County Dump Road are two-lane roads with very low traffic volume. Because the drilling of the exploratory wells is short-term and temporary, and the traffic volumes generated by construction and well drilling so minor, the potential for the Proposed Project to cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system is negligible. This impact is less than significant.

b) Would the project conflict or be inconsistent with the CEQA Guidelines section 15064.3, subdivision (b)? ☐ ☐ ☒ ☐

b) Geophysical Survey: As noted above, any increase in traffic would be short-term and temporary, and the traffic volume generated by the geophysical survey would be so minor, the potential for the geophysical survey to cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system is negligible. This impact is less than significant.

Exploratory Wells: As noted in Impact a), any increase in traffic would be short-term and temporary, and the traffic volumes generated by construction and well drilling so minor, the potential for the exploratory wells associated with the Proposed Project to cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system is negligible. Additionally, operation of the Proposed Project would not increase vehicle miles travelled (VMT) as only routine maintenance activities would be required during operation. This impact is less than significant.

c) Substantially increases hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)? ☐ ☐ ☒ ☐

c) Geophysical Survey: The geophysical survey associated with the Proposed Project does not include any alteration to the existing public road network. The access roads to the geophysical survey would be limited to approved travel corridors, many of them designated roadways. To discourage public OHV travel on source routes and reduce the visual appearance following the completion of the survey, entry and exit points would be broomed or hand raked. This impact is less than significant.

Exploratory Wells: The exploratory wells associated with the Proposed Project do not include any alteration to the existing public road network. The access roads to the exploratory wells associated with the Proposed Project would be designed to accommodate trucks delivering heavy drill equipment to each proposed well site. The access roads would not be open to the public and would only be maintained as long as the proposed well site is being constructed or in use. Once a proposed well site is retired or abandoned, the access road would be return to the existing condition. This impact is less than significant.

d) Result in inadequate emergency access? ☐ ☐ ☐ ☒

d) Geophysical Survey: The geophysical survey associated with the Proposed Project would not involve blocking or restricting any access routes. The geophysical survey would not interfere with emergency response plans or operations near the survey area. No impacts would occur.

Exploratory Wells: The construction of the exploratory wells associated with the Proposed Project would not involve blocking or restricting any access routes. The exploratory wells would not interfere with emergency response plans or operations near the Proposed Project area. No impacts would occur.

XVIII. *TRIBAL CULTURAL RESOURCES*

a) 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

	Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)
value to a California Native American tribe, and that is:				
(i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as define in Public Resources Code Section 5020.1(k), or	☐	☐	☒	☐
(ii) 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) of Public Resources Code Section 5024.1. In applying the criteria set forth is 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.	☐	☐	☒	☐

a) As discussed in Section V, the records search identified 219 archaeological sites and 183 historic-era isolates within one-half mile of the Proposed Project area, which includes both the geophysical survey area and exploratory well sites. In 2017, POWER recorded 12 sites and 12 isolates during the 2017 field season as part of the Proposed Project. Seven of these sites are in the Proposed Project area. Because the Proponents' geophysical contractor and POWER archaeological staff were tasked with moving Proposed Project features away from historic sites listed by the SCIC, no tribal cultural resources are located within a feature of the Proposed Project.

The archaeological sites previously recorded in and within one-half mile from the Proposed Project area consist mainly of artifact scatters, although sites bearing stacked rock features and what appears to be habitation foundations are plentiful near large washes, especially the wash banks just west of State Route 86. No sites have been recorded on the floor of any wash, although a few isolates are known. Sites bearing the remnants of prehistoric fish traps or weir foundations, which in this area take the form of V-or J-shaped single-coursed cobble alignments (Dice et.al. 2018) are also recorded in the Proposed Project area. Many of these can be seen on high-resolution aerial photographs. Historic trash and metal debris do occur near older roads, including dummy bombs and rounds that may have been dropped by World War II training planes between approximately 1940 and 1943 within the Proposed Project area. Trash litters both sides of the State Route 86 right-of-way and some of this is mixed with debris that may be more than 50 years old.

Attempts were made before any fieldwork began to move projected location of project features into locations where no sites had been previously located. Nonetheless, the inventory encountered 175 archaeological resources and 91 isolated artifacts. Proposed Project features have been moved to positions that would avoid the recorded site boundaries; however, construction of the access road associated with proposed well site 87-6 has the potential to impact a historic resource. Implementation of MM-CUL-1 would reduce the impact to less than significant.

Additionally, the County sent formal AB 52 consultation letters to Torres - Martinez Tribes and Quechan Tribes on August 7th, 2019 and no formal consultation has been requested.

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 stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction of which could cause significant environmental effects?	☐	☐	☒	☐

a) Geophysical Survey: The geophysical survey area does not currently contain any public utilities or services. The geophysical survey would not require the construction of any water, wastewater, stormwater, or energy facilities to accommodate the demands of the survey. Water use associated with the survey would be limited to the 100-gallon water bucket kept on site should the helicopter be needed to fight fire in the area; this water would be purchased from the Coachella Valley Water District via a nearby fire hydrant. The geophysical survey would not generate wastewater that would need to be treated by a wastewater treatment facility. Due to the lack of public utilities and services available within the Proposed Project area and the lack of need to provide expanded services to accommodate the geophysical survey these impacts are less than significant.

Exploratory Wells: The proposed exploratory well sites do not currently contain any public utilities or services. The exploratory wells would not require the construction of any water, wastewater, stormwater, or energy facilities to accommodate the demands of the exploratory wells associated with the Proposed Project. Water use associated with the exploratory wells would be limited to the

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construction phase, and no infrastructure would be required to provide water to the proposed well sites; water for dust control and drilling would be purchased from the Coachella Valley Water District via a nearby fire hydrant. The exploratory wells would not generate wastewater that would need to be treated by a wastewater treatment facility. Storm water control would be implemented for each well pad and access road. Due to the lack of public utilities and services available within the Proposed Project area, and the lack of need to provide expanded services to accommodate the exploratory wells, these impacts are less than significant.

b) Have sufficient water supplies available to serve the project from existing and reasonably foreseeable future development during normal, dry and multiple dry years? ☐ ☐ ☒ ☐

b) Geophysical Survey: As described above, the geophysical survey associated with the Proposed Project would not require a significant amount of water. Water use associated with the survey would be limited to fire prevention measures and purchased from the Coachella Valley Water District via a nearby fire hydrant. This impact is less than significant.

Exploratory Wells: As noted in Impact a), the exploratory wells associated with the Proposed Project would not require a significant amount of water. Water use associated with the exploratory wells would be limited to drilling and dust control measures. Water for dust control and drilling would be purchased from the Coachella Valley Water District via a nearby fire hydrant. Operation of the exploratory wells would not require significant amount of water and would be limited to general maintenance activities. This impact is less than significant.

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? ☐ ☐ ☐ ☒

c) Geophysical Survey: As described above, the geophysical survey associated with the Proposed Project would not generate wastewater that would need to be treated by a wastewater treatment facility. Onsite wastewater needs will be accommodated by the use of portable toilets that would be removed from the site once construction is complete. No impact would occur.

Exploratory Wells: As noted in Impact b), the exploratory wells associated with the Proposed Project would not generate wastewater that would need to be treated by a wastewater treatment facility. Onsite wastewater needs will be accommodated by the use of portable toilets that would be removed from the site once construction is complete. No impact would occur.

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? ☐ ☐ ☒ ☐

d) Solid wastes generated by the Proposed Project would be handled in conformance with all applicable statutes and regulations. The potential for the small amount of waste generated by the Project to exceed the available landfill disposal capacity is negligible.

Geophysical Survey: All solid waste or trash created during the geophysical survey associated with the Proposed Project will be transported for disposal at an approved solid waste disposal facility. All survey debris, including flagging, stakes, and pin flags, will be gathered on cleared pathways daily and disposed of at an approved site or landfill. Impact is therefore less than significant.

Exploratory Wells: Small amounts drilling mud and cuttings would be generated from drilling operations associated with the Proposed Project. These wastes would be temporarily stored in the onsite containment basin or tanks. The solid contents remaining in each containment basin, typically consisting of non-hazardous, non-toxic drilling mud and rock cuttings, will be tested as required by the CRWQCB. The solids will be removed and disposed of in a waste disposal facility authorized by the CRWQCB to receive and dispose of these materials. If allowed they may be used as daily cover at the nearby landfill. This impact is less than significant.

e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste? ☐ ☐ ☒ ☐

e) Geophysical Survey: The Proposed Project would comply with all applicable statutes and regulations related to solid waste, as described above. Solid waste generated from the survey is expected to be minimal. This impact is less than significant.

Exploratory Wells: As noted in Impact d), the exploratory wells associated with the Proposed Project would comply with all applicable statutes and regulations related to solid waste. Solid waste generated from the exploratory wells is expected to be minimal. This impact is less than significant.

XX. *WILDFIRE*

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the Project:

		Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)
a)	Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒

a) Geophysical Survey: As described in Section IX, the geophysical survey associated with the Proposed Project would not occur within a fire hazard severity zone (CalFire 2007). As previously noted, construction of the survey would not involve blocking or restricting any emergency access routes. The geophysical survey would not interfere with emergency response plans or operations near the Proposed Project area. No impact would occur.

Exploratory Wells: As noted above in Section IX, the exploratory wells associated with the Proposed Project are not located within a fire hazard severity zone (CalFire 2007). As previously noted, construction of the exploratory wells would not involve blocking or restricting any emergency access routes. The well site construction would not interfere with emergency response plans or operations near the Proposed Project area. No impact would occur.

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?	☐	☐	☐	☒

b) Geophysical Survey: The geophysical survey would not involve development of structures of infrastructure that would introduce new populations to the Proposed Project area that could result in impacts involving wildfires. The survey would comply to the goals and policies identified in the County of Imperial General Plan Seismic and Public Safety Element to provide adequate safety measures to protect residents within the Proposed Project area. No impact would occur.

Exploratory Wells: The exploratory wells associated with the Proposed Project would not involve development of structures of infrastructure that would introduce new populations to the Proposed Project area that could result in impacts involving wildfires. The exploratory wells would comply to the goals and policies identified in the County of Imperial General Plan Seismic and Public Safety Element to provide adequate safety measures to protect residents within the Proposed Project area. No impact would occur.

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?	☐	☐	☐	☒

c) Geophysical Survey: As noted above, the geophysical survey associated with the Proposed Project would not involve development of structures of infrastructure that would introduce new populations to the Proposed Project area that could result in impacts involving wildfires. No impact would occur.

Exploratory Wells: As noted in Impact b), the exploratory wells associated with the Proposed Project would not involve development of structures of infrastructure that would introduce new populations to the Proposed Project area that could result in impacts involving wildfires. No impact would occur.

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?	☐	☐	☐	☒

d) Geophysical Survey: As noted above, the geophysical survey would not involve development of structures of infrastructure that would introduce new populations to the Proposed Project area that could result in impacts involving wildfires. No impact would occur.

Exploratory Wells: As noted throughout this section, the exploratory wells would not involve development of structures of infrastructure that would introduce new populations to the Proposed Project area that could result in impacts involving wildfires. No impact would occur.

Note: Authority cited: Sections 21083 and 21083.05, Public Resources Code. Reference: Section 65088.4, Gov. Code; Sections 21080(c), 21080.1, 21080.3, 21083, 21083.05, 21083.3, 21093, 21094, 21095, and 21151, Public Resources Code; Sundstrom v. County of Mendocino,(1988) 202 Cal.App.3d 296; Leonoff v. Monterey Board of Supervisors, (1990) 222 Cal.App.3d 1337; Eureka Citizens for Responsible Govt. v. City of Eureka (2007) 147 Cal.App.4th 357; Protect the Historic Amador Waterways v. Amador Water Agency (2004) 116 Cal.App.4th at 1109; San Franciscans Upholding the Downtown Plan v. City and County of San Francisco (2002) 102 Cal.App.4th 656.

Revised 2009- CEQA

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Revised 2011- ICPDS
Revised 2016 – ICPDS
Revised 2017 – ICPDS
Revised 2019 – ICPDS

	Potentially Significant Impact (PSI)	Potentially Significant Unless Mitigation Incorporated (PSUMI)	Less Than Significant Impact (LTSI)	No Impact (NI)

SECTION 3
III. MANDATORY FINDINGS OF SIGNIFICANCE

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

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, eliminate tribal cultural resources or eliminate important examples of the major periods of California history or prehistory?

☐ ☒ ☐ ☐

a) As identified in Section IV of this IS, the Proposed Project has the potential to 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, and/or reduce the number or restrict the range of a rare or endangered plant or animal. However, the Proposed Project would implement MM-BIO-1 through MM-BIO-10 to reduce any potentially significant impacts to biological resources. Additionally, the Proposed Project was determined to result in potentially significant impacts associated with California history or prehistory. Implementation of MM-CUL-1 through MM-CUL-4 would reduce these impacts to less than significant. Therefore, the Proposed Project would result in less than significant impacts with mitigation incorporated.

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.)

☐ ☒ ☐ ☐

b) Implementation of the Proposed Project would not result in a cumulative impact. All potentially significant impacts can be reduced to less than significant vie the implementation of mitigation measures. The cumulative impacts associated with the Proposed Project are less than significant.

c) Does the project have environmental effects, which will cause substantial adverse effects on human beings, either directly or indirectly?

c) As noted above, all environmental impacts associated with implementation of the Proposed Project can be reduce to less than significant via implementation of mitigation measures. The Proposed Project would not result in significant impacts on human beings. This impact is less than significant

☐ ☒ ☐ ☐

c) As noted above, all environmental impacts associated with implementation of the Proposed Project can be reduce to less than significant via implementation of mitigation measures. The Proposed Project would not result in significant impacts on human beings. This impact is less than significant.

IV. PERSONS AND ORGANIZATIONS CONSULTED

This section identifies those persons who prepared or contributed to preparation of this document. This section is prepared in accordance with Section 15129 of the CEQA Guidelines.

A. COUNTY OF IMPERIAL

- Jim Minnick, Director of Planning & Development Services
- Michael Abraham, AICP, Assistant Director of Planning & Development Services
- David Black, Project Planner
- Imperial County Air Pollution Control District
- Department of Public Works
- Fire Department
- Ag Commissioner
- Environmental Health Services
- Sheriff's Office

B. OTHER AGENCIES/ORGANIZATIONS

- Bureau of Land Management
- California State Parks
- California State Lands Commission
- California Department of Conservation

V. REFERENCES

Applied Earthworks, Inc.

2017 Paleontological Resource Assessment and Survey for the Ormat Nevada, Inc. Truckhaven 3D Geophysical Project, Imperial County, California

Association of Environmental Professionals (AEP)

2016 Beyond 2020 and Newhall: A Field Guide to New CEQA Greenhouse Gas Thresholds and Climate Action Plan Targets for California. Available online at: https://www.califaep.org/images/climate-change/AEP-2016_Final_White_Paper.pdf.

Bureau of Land Management (BLM)

2016 Desert Renewable Energy Conservation Plan: Land Use Amendment. Figure 5. DRECP LUPA Conservation Designations. Available Online at: https://www.drecp.org/maps/LUPA_maps/Figure5_DRECP_LUPA_Conservation.pdf

California Air Pollution Control Officers Association (CAPCOA)

2009 Health Risk Assessments for Proposed Land Use Projects. Available Online at: http://www.capcoa.org/wp-content/uploads/2012/03/CAPCOA_HRA_LU_Guidelines_8-6-09.pdf

2008 Recommended Approaches for Setting Interim Significance Thresholds for Greenhouse Gases under the California Environmental Quality Act, on October 24, 2008.

California Air Resources Board (CARB)

2018 Area Designations Maps / State and National. Available Online at: https://ww3.arb.ca.gov/desig/adm/adm.htm

2016 Ambient Air Quality Standards. Available Online at: https://ww3.arb.ca.gov/research/aaqs/aaqs2.pdf.

California Department of Conservation

2019 California Important Farmland Finder. Available Online at: https://maps.conservation.ca.gov/DLRP/CIFF/

2016 Imperial County Williamson Act FY 2016/2017. Available Online at: file:///C:/Users/tstrand/Downloads/Imperial_16_17_WA%20(1).pdf

California Department of Forestry and Fire Protection

2007 Fire Hazard Severity Zones in SRA. Available Online at: https://osfm.fire.ca.gov/media/6680/fhszs_map13.pdf

California Department of Transportation (Caltrans)

2013 Transportation and Construction Vibration Guidance Manual. Available Online at: http://www.dot.ca.gov/hq/env/noise/pub/TCVGM_Sep13_FINAL.pdf

County of Imperial

2016 County of Imperial General Plan EIR. Available Online at: http://www.icpds.com/?pid=571.

2105 County of Imperial Renewable Energy and Transmission Element. Available Online at: http://www.icpds.com/CMS/Media/Renewable-Energy-and-Transmission-Element-2015.pdf.

1997 County of Imperial General Plan Geophysical and Public Safety Element. Available Online at: http://www.icpds.com/CMS/Media/Geophysical-and-Public-Safety-Element.pdf.

Department of Toxic Substances Control (DTSC)

2019 EnviroStor Database. Available Online at: http://www.envirostor.dtsc.ca.gov/public/

Flat-tailed Horned Lizard Interagency Coordinating Committee (ICC)

2003 Flat-tailed Horned Lizard Rangewide Management Strategy, 2003 Revision. Available Online at: https://www.fws.gov/carlsbad/TEspecies/Documents/Flattailed_horned_lizard/PDFs/RMS%20-%20Final%202003.pdf

Federal Transit Administration (FTA)

2018 Transit Noise and Vibration Impact Assessment Manual. Available Online at: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf

Imperial County Air Pollution Control District (ICAPCD)

2018 High Wind Exceptional Event Fugitive Dust Plan for Imperial County. Available Online at: https://www.co.imperial.ca.us/AirPollution/otherpdfs/MitigationPlan.pdf

2017 CEQA Air Quality Handbook. Available Online at: https://www.co.imperial.ca.us/AirPollution/PlanningDocs/CEQAHandbk.pdf

State Water Resources Control Board (SWRCB)

2017 GeoTracker Database. Available online at: https://geotracker.waterboards.ca.gov/

Trinity Consultants

2017 California Emissions Estimator Model (CalEEMod) version 2016.3.2. Available Online at: http://www.caleemod.com/

VI. FINDINGS

This is to advise that the County of Imperial, acting as the lead agency, has conducted an Initial Study to determine if the project may have a significant effect on the environmental and is proposing this Negative Declaration based upon the following findings:

☐ The Initial Study shows that there is no substantial evidence that the project may have a significant effect on the environment and a NEGATIVE DECLARATION will be prepared.

☒ The Initial Study identifies potentially significant effects but:

(1) Proposals made or agreed to by the applicant before this proposed Mitigated Negative Declaration was released for public review would avoid the effects or mitigate the effects to a point where clearly no significant effects would occur.

(2) There is no substantial evidence before the agency that the project may have a significant effect on the environment.

(3) Mitigation measures are required to ensure all potentially significant impacts are reduced to levels of insignificance.

A NEGATIVE DECLARATION will be prepared.

If adopted, the Negative Declaration means that an Environmental Impact Report will not be required. Reasons to support this finding are included in the attached Initial Study. The project file and all related documents are available for review at the County of Imperial, Planning & Development Services Department, 801 Main Street, El Centro, CA 92243 (442) 265-1736.

NOTICE

The public is invited to comment on the proposed Negative Declaration during the review period.

Date of Determination Jim Minnick, Director of Planning & Development Services

The Applicant hereby acknowledges and accepts the results of the Environmental Evaluation Committee (EEC) and hereby agrees to implement all Mitigation Measures, if applicable, as outlined in the MMRP.

Applicant Signature Date

EEC ORIGINAL PKG

Table 13: Potential for Occurrence – Special Status Plant Species

Species	Status	Habitat	Blooming Period	Potential for Occurrence
Abronia villosa var. *aurita* chaparral sand-verbena	Fed: None State: None CNPS: 1B.1 BLM: S	Annual herb occurring in chaparral, Coastal scrub, and Desert dunes, on sandy soils. From 245 to 5,250 feet in elevation.	March – September	Moderate Suitable habitat occurs within the Proposed Project area, and observed within 0.5-miles.
Astragalus crotalariae Salton milk-vetch	Fed: None State: None CNPS: 4.3	Perennial herb occurring in desert wash and Sonoran desert scrub, on sandy or gravelly soils. From 195 to 820 feet in elevation.	January – April	Present. Observed within the Proposed Project area during the survey.
Astragalus insularis var. *harwoodii* Harwood's milk-vetch	Fed: None State: None CNPS: 2B.2	Annual herb occurring on desert dunes, desert wash, and Mojavean desert scrub, on sandy or gravelly soils. From 0 to 2,330 feet in elevation.	January – May	Moderate. Suitable habitat occurs within the Proposed Project area.
Astragalus magdalenae var. *peirsonii* Peirson's milk-vetch	Fed: THR State: END CNPS: 1B.2	Perennial herb occurring on desert dunes. From 195 to 740 feet in elevation.	December – April	Absent. No suitable habitat occurs within the Proposed Project area.
Bursera microphylla littleleaf elephant tree	Fed: None State: None CNPS: 2B.3	Perennial deciduous tree occurring in desert wash, Sonoran desert scrub, on rocky soils. From 655 to 2,300 feet in elevation.	June – July	Absent. The Proposed Project area is below the known elevation range for the species.
Castela emoryi crucifixion thorn	Fed: None State: None CNPS: 2B.2	Perennial deciduous shrub occurring on alkali playa, desert wash, Mojavean desert scrub and Sonoran desert scrub, on gravelly soils. From 300 to 2,380 feet in elevation.	June – July	Low. Suitable habitat occurs on site, but the Proposed Project area is below the known elevation range for the species.
Chaenactis carphoclinia var. *peirsonii* Peirson's pincushion	Fed: None State: None CNPS: 1B.3	Annual herb occurring in Sonoran desert scrub, on sandy soils. From 10 to 1,640 feet in elevation.	March – April	Moderate Suitable habitat occurs within the Proposed Project area, and observed within 0.5-miles.
Chaenactis glabriuscula var. *orcuttiana* Orcutt's pincushion	Fed: None State: None CNPS: 1B.1 BLM: S	Annual herb occurring in coastal bluff scrub and coastal dunes. From 0 to 330 feet in elevation.	January – August	Absent. No suitable habitat occurs within the Proposed Project area.
Chorizanthe polygonoides var. *longispina* long-spined spineflower	Fed: None State: None CNPS: 1B.2 BLM: S	Annual herb occurring in chaparral, coastal scrub, meadows and seeps, valley and foothill grassland, ultramafic soils, and vernal pools in clay soils. From 100 to 5,020 feet in elevation.	April – June	Absent. No suitable habitat occurs within the Proposed Project area.
Croton wigginsii Wiggin's croton	Fed: None State: Rare CNPS: 2B.2 BLM: S	Perennial shrub occurring on desert dunes and Sonoran desert scrub, on sandy soils. From 165 to 330 feet in elevation.	March – May	Moderate. Suitable habitat occurs within the Proposed Project area.
Cylindropuntia fosbergii pink teddy-bear cholla	Fed: None State: None CNPS: 1B.3 BLM: S	Perennial stem succulent occurring in Sonoran desert scrub. From 280 to 2,790 feet in elevation.	March – May	Low. Suitable habitat occurs on site, but the Proposed Project area is below the known elevation range for the species.
Cylindropuntia munzii Munz's cholla	Fed: None State: None CNPS: 1B.3 BLM: S	Perennial stem succulent occurring Sonoran desert scrub, on sandy or gravelly soils. From 490 to 1,970 feet in elevation.	May	Low. Suitable habitat occurs on site, but the Proposed Project area is below the known elevation range for the species.

Species	Status	Habitat	Blooming Period	Potential for Occurrence
Dieteria asteroids var. lagunensis Mount Laguna aster	Fed: None State: Rare CNPS: 2B.1 BLM: S	Perennial herb occurring in cismontane woodland and lower montane coniferous forest. From 2,590 to 7,875 feet in elevation.	July – August	Absent. The Proposed Project area is below the known elevation range for the species.
Euphorbia abramsiana Abram's spurge	Fed: None State: None CNPS: 2B.2	Annual herb occurring in Mojavean desert scrub and Sonoran desert scrub, on sandy soils. From -15 to 4,300 feet in elevation.	August – November	Moderate. Suitable habitat occurs within the Proposed Project area.
Euphorbia platysperma flat-seeded spurge	Fed: None State: None CNPS: 1B.2 BLM: S	Annual herb occurring in desert dunes and Sonoran desert scrub, on sandy soils. From 215 to 330 feet in elevation.	February – September	Low. Suitable habitat occurs on site, but the Proposed Project area is below the known elevation range for the species, and there are no known occurrences within 10 miles.
Fremontodendron mexicanum Mexican flannelbush	Fed: END State: Rare CNPS: 1B.1	Perennial evergreen shrub occurring in chaparral, cismontane woodlands, and closed-cone coniferous forest, on gabbroic, metavolcanic, or serpentinite soils. From 30 to 2,350 feet in elevation.	March – June	Absent. No suitable habitat occurs within the Proposed Project area.
Grindelia hallii San Diego sunflower	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial herb occurring in chaparral, lower montane coniferous forest, meadows and seeps, and valley and foothill grassland. From 605 to 5,725 feet in elevation.	May – October	Absent. No suitable habitat occurs within the Proposed Project area, and is below the known elevation range for the species.
Helianthus niveus ssp. *tephrodes* Algodones Dunes sunflower	Fed: None State: END CNPS: 1B.2 BLM: S	Perennial herb occurring on desert dunes. From 165 to 330 feet in elevation.	September – May	Absent. No suitable habitat occurs within the Proposed Project area.
Hulsea californica San Diego sunflower	Fed: None State: None CNPS: 1B.3 BLM: S	Perennial herb occurring in chaparral, lower montane coniferous forest, and upper montane coniferous forest in openings and burned areas. From 3,000 to 9,560 feet in elevation.	April – June	Absent. No suitable habitat occurs within the Proposed Project area, and is below the known elevation range for the species.
Johnstonella costata (=*Cryptantha costata*) ribbed cryptantha	Fed: None State: None CNPS: 4.3 BLM: S	Annual herb occurring in desert dunes, Mojavean desert scrub, and Sonoran desert scrub, on sandy soils. From -195 to 1,640 feet in elevation.	February – May	Moderate Suitable habitat occurs within the Proposed Project area, and observed within 0.5-miles.
Lepidium flavum var. *felipense* Borrego Valley pepper-grass	Fed: None State: None CNPS: 1B.2 BLM: S	Annual herb occurring in pinon and juniper woodlands and Sonoran desert scrub, on sandy soils. From 1,490 to 2,755 feet in elevation.	March – May	Absent. The Proposed Project area is below the known elevation range for the species.
Lupinus excubitus var. *medius* Mountain Springs bush lupine	Fed: None State: None CNPS: 1B.3	Perennial shrub occurring in pinyon and juniper woodlands and Sonoran desert scrub. From 1,395 to 4,495 feet in elevation.	March – May	Absent. The Proposed Project area is below the known elevation range for the species.
Lycium parishii Parish's desert-thorn	Fed: None State: None CNPS: 2B.3	Perennial shrub occurring in coastal scrub and Sonoran desert scrub. From 440 to 3,280 feet in elevation.	March – April	Absent. The Proposed Project area is below the known elevation range for the species.

Species	Status	Habitat	Blooming Period	Potential for Occurrence
Malperia tenuis brown turbans	Fed: None State: None CNPS: 2B.3	Annual herb occurring in Sonoran desert scrub, on sandy or gravelly soils. From 50 to 1,100 feet in elevation.	March – April	Low. Suitable habitat occurs within the Proposed Project area, but there are no known occurrences within 10 miles.
Monardella nana ssp. *leptosiphon* San Felipe monardella	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial rhizomatous herb occurring in chaparral and lower montane coniferous forest. From 3,940 to 6,085 feet in elevation.	June – July	Absent. No suitable habitat occurs within the Proposed Project area, and is below the known elevation range for the species.
Monardella robisonii Robison's monardella	Fed: None State: None CNPS: 1B.3 BLM: S	Perennial rhizomatous herb occurring in pinon & juniper woodlands. From 2,000 to 4,920 feet in elevation.	April – September	Absent. No suitable habitat occurs within the Proposed Project area, and is below the known elevation range for the species.
Palafoxia arida var. *gigantea* giant Spanish needle	Fed: None State: None CNPS: 1B.3 BLM: S	Annual to perennial herb occurring on desert dunes. From 50 to 330 feet in elevation.	February – May	Absent. No suitable habitat occurs within the Proposed Project area.
Pholisma sonorae sand food	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial parasitic herb occurring on desert dunes and Sonoran desert scrub on sandy soils. From 0 to 655 feet in elevation.	April – June	Moderate. Suitable habitat occurs within the Proposed Project area.
Pilostyles thurberi Thurber's pilostyles	Fed: None State: None CNPS: 4.3	Perennial parasitic herb occurring on *Psorothamnus* in Sonoran desert scrub. From 0 to 1,120 feet in elevation.	December – April	Moderate Suitable habitat occurs within the Proposed Project area, and observed within 1-mile.
Salvia greatae Orocopia sage	Fed: None State: None CNPS: 1B.3 BLM: S	Perennial evergreen shrub occurring in desert wash, Mojavean desert scrub, and Sonoran desert scrub. From -130 to 2,705 feet in elevation.	March – April	Low. Suitable habitat occurs within the Proposed Project area, but all known populations occur on northeastern portion of the Salton Sea.
Schoenoplectus americanus Olney's three-square bulrush	Fed: None State: None CNPS: None State Parks: S	Perennial rhizomatous herb occurring in mineral-rich or brackish marshes, shores, fens, seeps, and springs. Up to 7,220 feet in elevation.	May - August	Absent. No suitable habitat occurs within the Proposed Project area.
Senna covesii Cove's senna	Fed: None State: None CNPS: 2B.2	Perennial herb occurring in sandy desert washes and slopes, and in Sonoran desert scrub. From 740 to 4,250 feet in elevation.	March – June	Absent. The Proposed Project area is below the known elevation range for the species.
Streptanthus campestris Southern jewel-flower	Fed: None State: None CNPS: 1B.3 BLM: S	Perennial rhizomatous herb occurring in chaparral, lower montane coniferous forest, and pinon and juniper woodlands, on rocky soils. From 2,950 to 7,545 feet in elevation.	May – July	Absent. No suitable habitat occurs within the Proposed Project area, and is below the known elevation range for the species.
Symphyotrichum defoliatum San Bernardino aster	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial rhizomatous herb occurring in cismontane woodland, coastal scrub, lower montane coniferous forest, marsh and swamps, meadows and seeps, and valley and foothill grassland. From 5 to 6,690 feet in elevation.	July – November	Absent. No suitable habitat occurs within the Proposed Project area.

Species	Status	Habitat	Blooming Period	Potential for Occurrence
Thermopsis californica var. *semota* velvety false lupine	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial rhizomatous herb occurring in cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, and wetlands. From 3,280 to 6,150 feet in elevation	March – June	Absent. No suitable habitat occurs within the Proposed Project area, and is below the known elevation range for the species.
Thysanocarpus rigidus ridge fringepod	Fed: None State: None CNPS: 1B.2 BLM: S	Annual herb occurring in pinon and juniper woodlands, often on dry rocky slopes. From 1,970 to 7,220 feet in elevation.	February – May	Absent. No suitable habitat occurs within the Proposed Project area, and is below the known elevation range for the species.
Xylorhiza cognata Mecca aster	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial herb occurring in Sonoran desert scrub. From 65 to 1,310 feet in elevation.	January – June	Low. Suitable habitat occurs within the Proposed Project area, but all known populations occur on northeastern portion of the Salton Sea.
Xylorhiza orcuttii Orcutt's woody aster	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial herb occurring in desert wash and Sonoran desert scrub. From 0 to 1,200 feet in elevation.	March – April	Moderate Suitable habitat occurs within the Proposed Project area, and observed within 0.5-miles.

Absent: Species or sign not observed on the site, outside of the known range, and conditions unsuitable for occurrence.
Low: Species or sign not observed on the site, but conditions marginal for occurrence.
Moderate: Species or sign not observed on the site, but conditions suitable for occurrence and/or an historical record exists in the vicinity.
High: Species or sign not observed on the site, but reasonably certain to occur on the site based on conditions, species ranges, and recent records.
Present: Species or sign of their presence recently observed on the site.
Federal status
END = listed as Endangered under the federal Endangered Species Act
Delisted = previously listed under the federal Endangered Species Act but now removed
State status
END = listed as Endangered under the California Endangered Species Act
BLM status
S = designated as a Sensitive species
State Parks status
S = designated as a Sensitive species
SRPR State Rare Plant Rank
1A: Plants presumed extirpated in California and either rare or extinct elsewhere.
1B: Considered rare, threatened, or endangered in California and elsewhere.
2A: Plants presumed extirpated in California, but more common elsewhere
2B: Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere
3: Plants About Which More Information is Needed – A Review List
4: Plants of Limited Distribution - A Watch List
Threat Ranks/ Decimal notations: A California Native Plant Society extension added to the SSRPR
.1 Seriously threatened in California (over 80 percent of occurrences threatened / high degree and immediacy of threat)
.2 Moderately threatened in California (20-80 percent occurrences threatened / moderate degree and immediacy of threat)
.3 Not very threatened in California (less than 20 percent of occurrences threatened / low degree and immediacy of threat or no current threats known)

Table 14: Potential for Occurrence – Special Status Wildlife Species

Species	Status	Habitat	Potential for Occurrence
Antrozous pallidus pallid bat	Fed: None State: SSC BLM: S	Occurs in chaparral, coastal scrub, desert wash, Great Basin grassland, Great Basin scrub, Mojavean desert scrub, riparian woodland, Sonoran desert scrub, upper montane coniferous forest, and valley and foothills grassland. Most common in open, dry habitats with rock areas for roosting. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	Low. This species has been detected within the SVRA within five miles of the BSA (personal communication, State Parks 2017), and suitable foraging habitat for this species occurs within the BSA, but roosting habitat is of low quality, combined with frequent anthropogenic disturbance.
Athene cunicularia burrowing owl	Fed: None State: SSC BLM: S	Occurs in open, dry annual or perennial grasslands, deserts, and scrublands with low-growing vegetation. This includes a wide variety of vegetation communities, including coastal prairies, coastal scrub, Great Basin grassland, Great Basin scrub, Mojavean desert scrub, Sonoran desert scrub, and valley and foothill grasslands. Depends on fossorial mammals for burrows.	Moderate. There is only one record of this species in the general Project vicinity (CDFW 2017). There were occasional suitable burrows within the survey area that could support this species, but there were few insects observed for prey.
Charadrius alexandrines nivosus western snowy plower	Fed: THR State: SSC BLM: S	Occurs in Great Basin standing waters, sand shores, salt pond levees and shores of large alkali lakes, and wetlands. Requires sandy, gravelly, or friable soils for nesting.	Absent. No suitable habitat is present within the BSA.
Charadrius montanus mountain plover	Fed: None State: SSC BLM: S	Occurs in chenopod scrub, short grasslands, freshly-plowed fields, newly-sprouting grain fields, and occasionally sod farms. Needs a mixture of short vegetation and bare ground, along with flat topography. Prefers grazed areas and areas with fossorial rodents.	Absent. No suitable habitat is present within the BSA.
Falco mexicanus prairie falcon	Fed: None State: WL	Occurs in Great Basin grassland, Great Basin scrub, Mojavean desert scrub, Sonoran desert scrub, and valley and foothill grassland.	Low. Some suitable habitat for this species occurs within the BSA.
Lasiurus blossevillii western red bat	Fed: None State: SSC	Occurs in cismontane woodland, lower montane coniferous forest, riparian forest, and riparian woodland. Roosts primarily in trees 2-40 feet above ground, preferring habitat edges and mosaics with trees that are protected from above and open below with opens areas for foraging.	Low. This species has been detected within the SVRA within five miles of the BSA (personal communication, State Parks 2017), but no suitable foraging or roosting habitat for this species occurs within the BSA.
Oliarces clara cheeseweed owlfly	Fed: None State: None	Occurs in the lower Colorado River drainage. It is found under rocks or in flight over streams. Larrea tridentata is the suspected larval host.	Low. *Larrea tridentata* occurs within the BSA, but one confirmed observation in the vicinity is more than five miles from the site.
Pelecanus occidentalis californicus California brown pelican	Fed: Delisted State: FP BLM: S	This colonial rooster and nester generally occurs on coastal islands outside of the survey line, but also nests on small islands of small to moderate size which afford immunity from attack by ground-dwelling predators.	Absent. No suitable habitat is present within the BSA.
Perognathus longimembris bangsi Palm Springs pocket mouse	Fed: None State: SSC BLM: S	Occurs in desert riparian, desert washes and Sonoran desert scrub. Most common in desert scrub dominated by creosote. Rarely found on rock sites.	Moderate. Suitable habitat for this species occurs within the BSA.
Phrynosoma mcallii flat-tailed horned lizard	Fed: None State: SSC BLM: S	Occurs in desert dunes, Mojavean desert scrub, and Sonoran desert scrub in central Riverside, eastern San Diego, and Imperial Counties.	High. Suitable habitat for this species occurs within the BSA.
Toxostoma lecontei Le Conte's thrasher	Fed: None State: SSC	Occurs primarily in open desert wash, desert scrub, alkali desert scrub, and desert succulent scrub habitats. Commonly nests in dense, spiny shrubs or densely-branched cacti.	Low. Some suitable habitat for this species occurs within the BSA.

Species	Status	Habitat	Potential for Occurrence
Xantusia gracilis sandstone night lizard	Fed: None State: None BLM: S	Known only from the Truckhaven Rocks in the eastern part of Anza-Borrego State Park. Found in fissures or under slabs of exfoliating sandstone and rodent burrows in compacted sandstone and mudstone.	Absent. The Truckhaven Rocks is a highly localized area more than five miles from the BSA.

Absent: Species or sign not observed on the site, outside of the known range, and conditions unsuitable for occurrence.
Low: Species or sign not observed on the site, but conditions marginal for occurrence.
Moderate: Species or sign not observed on the site, but conditions suitable for occurrence and/or an historical record exists in the vicinity.
High: Species or sign not observed on the site, but reasonably certain to occur on the site based on conditions, species ranges, and recent records.
Present: Species or sign of their presence recently observed on the site.

Federal status
END = listed as Endangered under the federal Endangered Species Act
THR = listed as Threatened under the federal Endangered Species Act
State status
END = listed as Endangered under the California Endangered Species Act
THR = listed as Threatened under the California Endangered Species Act
SSC = designated as a Species of Concern
FP = designated as a Fully Protected species
WL = watch list species
BLM status
S = designated as a Sensitive species
Other
CNDDB = this species is only listed by the CNDDB and may be locally sensitive or its occurrences may be monitored to see if further protection is needed

APPENDIX A – CalEEMod AIR QUALITY MODEL RUN PRINTOUTS

 # EDMS 5.1.2 Emissions Inventory Report
Emissions Inventory Summary for 224 Landings and Takeoffs (16 per day for 14 days)
Study: Multiple Scenarios Study
Scenario - Airport: Baseline - Hagerstown
Year: 2020
Units: Pounds per Year
Generated: 10/17/19 10:18:44

# Category	CO2	CO	THC	NMHC	VOC	TOG	NOx	SOx	PM-10	PM-2.5	Fuel Consum
Aircraft	53,185	1,623	330	381	379	381	37	22	N/A	N/A	16,857
GSE	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
APUs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Parking Facilities	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roadways	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Stationary Sources	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Training Fires	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grand Total (pounds)	53,185	1,623	330	381	379	381	37	22	N/A	N/A	16,857
Grand Total (tons)	26.59										
Daily Emissions	3,798.89	115.94	23.55	27.23	27.08	27.23	2.62	1.56			1204

Truckhaven Geothermal Exploration Wells - 1 Well Calculations

Imperial County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	160.00	1000sqft	3.67	160,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	3.4	**Precipitation Freq (Days)**	12
Climate Zone	15			**Operational Year**	2021
Utility Company	Imperial Irrigation District				
CO2 Intensity (lb/MWhr)	1270.9	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Truckhaven Geothermal Exploration Wells - 1 Well Calculations - Imperial County, Summer

Project Characteristics -

Land Use - 1 Well Pad = 400 ft x 400 ft = 3.67 acres

Construction Phase - Construction Schedule Provided by Applicant

Off-road Equipment - Well Cleanup - 1 Rubber Tired Loader, 2 Tractor/Loader/Backhoe

Off-road Equipment - Well Drilling - 1 Drill Rig 24-hours, 1 Mud Tank (Pump) 24-hours, 1 diesel generator (for lights) 12 hours, 1 Forklift 8 hours, 1 air compressor 8 hours

Off-road Equipment - Well Pad - 1 Rubber Tired Dozer, 1 Grader, and 2 Tractor/Loader/Backhoe

Off-road Equipment - Well Testing - 1 Crane 8 hours, 1 pump 24 hours, 1 Tractor/Loader/Backhoe 8 hours

Trips and VMT - 6 vendor truck trips per day added to Well Pad Construction and Well Cleanup to account for Water Trucks (already accounted for in Well Drilling)

On-road Fugitive Dust - 90% of construction trips on pavement

Grading -

Construction Off-road Equipment Mitigation - Water Exposed Area 2x per day selected to account for ICAPCD Regulation VIII minimum requirements

Off-road Equipment - Geo Survey - 4 Off-hwy trucks 8 hr/dy

Off-road Equipment - Well Pad - 1 Grader, 1 Dozer, 2 Tractors

Vehicle Trips - 2 trips per week

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	5.00	10.00
tblConstructionPhase	NumDays	230.00	45.00
tblConstructionPhase	NumDays	8.00	5.00
tblConstructionPhase	NumDaysWeek	5.00	7.00
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00

Truckhaven Geothermal Exploration Wells - 1 Well Calculations - Imperial County, Summer

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	4.00
tblOffRoadEquipment	PhaseName		Well Pad Construction
tblOffRoadEquipment	PhaseName		Well Drilling
tblOffRoadEquipment	PhaseName		Well Drilling
tblOffRoadEquipment	PhaseName		Well Drilling
tblOffRoadEquipment	PhaseName		Well Testing
tblOffRoadEquipment	PhaseName		Well Testing
tblOffRoadEquipment	PhaseName		Well Testing
tblOffRoadEquipment	PhaseName		Well Cleanup-Abandoment
tblOffRoadEquipment	PhaseName		Geophysical Survey
tblOffRoadEquipment	UsageHours	8.00	12.00
tblOnRoadDust	HaulingPercentPave	50.00	90.00
tblOnRoadDust	HaulingPercentPave	50.00	90.00
tblOnRoadDust	HaulingPercentPave	50.00	90.00
tblOnRoadDust	HaulingPercentPave	50.00	90.00
tblOnRoadDust	HaulingPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00

tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	WorkerTripNumber	15.00	8.00
tblTripsAndVMT	WorkerTripNumber	10.00	20.00
tblVehicleTrips	CC_TTP	0.00	100.00
tblVehicleTrips	PR_TP	0.00	100.00
tblVehicleTrips	ST_TR	0.00	0.02

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	3.7504	33.1484	30.9164	0.0756	106.5738	1.4856	108.0594	10.7298	1.4525	12.1823	0.0000	7,320.0557	7,320.0557	1.6744	0.0000	7,350.1154
Maximum	**3.7504**	**33.1484**	**30.9164**	**0.0756**	**106.5738**	**1.4856**	**108.0594**	**10.7298**	**1.4525**	**12.1823**	**0.0000**	**7,320.0557**	**7,320.0557**	**1.6744**	**0.0000**	**7,350.1154**

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	3.7504	33.1484	30.9164	0.0756	106.5738	1.4856	108.0594	10.7298	1.4525	12.1823	0.0000	7,320.0557	7,320.0557	1.6744	0.0000	7,350.1154
Maximum	**3.7504**	**33.1484**	**30.9164**	**0.0756**	**106.5738**	**1.4856**	**108.0594**	**10.7298**	**1.4525**	**12.1823**	**0.0000**	**7,320.0557**	**7,320.0557**	**1.6744**	**0.0000**	**7,350.1154**

	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**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	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					
Area	0.0765	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0350	0.0350	9.0000e-005		0.0373
Energy	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
Mobile	0.0106	0.0664	0.1030	2.4000e-004	5.9614	1.6000e-004	5.9615	0.5950	1.5000e-004	0.5951		24.9731	24.9731	2.0700e-003		25.0249
Total	**0.0871**	**0.0665**	**0.1194**	**2.4000e-004**	**5.9614**	**2.2000e-004**	**5.9616**	**0.5950**	**2.1000e-004**	**0.5952**		**25.0081**	**25.0081**	**2.1600e-003**	**0.0000**	**25.0622**

Mitigated Operational

	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					
Area	0.0765	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0350	0.0350	9.0000e-005		0.0373
Energy	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
Mobile	0.0106	0.0664	0.1030	2.4000e-004	5.9614	1.6000e-004	5.9615	0.5950	1.5000e-004	0.5951		24.9731	24.9731	2.0700e-003		25.0249
Total	**0.0871**	**0.0665**	**0.1194**	**2.4000e-004**	**5.9614**	**2.2000e-004**	**5.9616**	**0.5950**	**2.1000e-004**	**0.5952**		**25.0081**	**25.0081**	**2.1600e-003**	**0.0000**	**25.0622**

	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	0.00	0.00	0.00	0.00	0.00	0.00	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	Geophysical Survey	Trenching	2/11/2020	2/29/2020	5	14	
2	Well Pad Construction	Site Preparation	3/1/2020	3/14/2020	5	10	
3	Well Drilling	Building Construction	3/15/2020	4/28/2020	7	45	
4	Well Testing	Trenching	4/29/2020	4/30/2020	5	2	
5	Well Cleanup-Abandoment	Grading	5/1/2020	5/7/2020	5	5	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 3.67

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Truckhaven Geothermal Exploration Wells - 1 Well Calculations - Imperial County, Summer

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Well Pad Construction	Graders	1	8.00	187	0.41
Well Pad Construction	Rubber Tired Dozers	1	8.00	247	0.40
Well Pad Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Well Drilling	Air Compressors	1	8.00	78	0.48
Well Drilling	Bore/Drill Rigs	1	24.00	221	0.50
Well Drilling	Forklifts	1	8.00	89	0.20
Well Drilling	Generator Sets	1	12.00	84	0.74
Well Drilling	Pumps	1	24.00	84	0.74
Well Testing	Cranes	1	8.00	231	0.29
Well Testing	Pumps	1	24.00	84	0.74
Well Testing	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Well Cleanup-Abandoment	Rubber Tired Loaders	1	8.00	203	0.36
Well Cleanup-Abandoment	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Geophysical Survey	Off-Highway Trucks	4	8.00	402	0.38

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
Well Pad Construction	4	10.00	6.00	0.00	7.30	8.90	20.00	LD_Mix	HDT_Mix	HHDT
Well Drilling	10	67.00	26.00	0.00	7.30	8.90	20.00	LD_Mix	HDT_Mix	HHDT
Well Testing	3	8.00	2.00	0.00	7.30	8.90	20.00	LD_Mix	HDT_Mix	HHDT
Well Cleanup-Abandoment	6	8.00	6.00	0.00	7.30	8.90	20.00	LD_Mix	HDT_Mix	HHDT
Geophysical Survey	4	20.00	6.00	0.00	7.30	8.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Geophysical Survey - 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	2.6524	25.2909	15.2404	0.0528		0.9214	0.9214		0.8477	0.8477		5,114.4880	5,114.4880	1.6541		5,155.8412
Total	**2.6524**	**25.2909**	**15.2404**	**0.0528**		**0.9214**	**0.9214**		**0.8477**	**0.8477**		**5,114.4880**	**5,114.4880**	**1.6541**		**5,155.8412**

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	0.0268	0.6797	0.1876	1.9500e-003	7.9048	4.1500e-003	7.9090	0.7976	3.9700e-003	0.8016		204.0450	204.0450	0.0106		204.3106
Worker	0.1393	0.0862	1.0128	1.1500e-003	21.5880	7.6000e-004	21.5887	2.1712	7.0000e-004	2.1719		113.2805	113.2805	9.6200e-003		113.5209
Total	**0.1661**	**0.7659**	**1.2004**	**3.1000e-003**	**29.4928**	**4.9100e-003**	**29.4977**	**2.9688**	**4.6700e-003**	**2.9735**		**317.3255**	**317.3255**	**0.0203**		**317.8316**

3.2 Geophysical Survey - 2020

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	2.6524	25.2909	15.2404	0.0528		0.9214	0.9214		0.8477	0.8477	0.0000	5,114.4880	5,114.4880	1.6541		5,155.8412
Total	**2.6524**	**25.2909**	**15.2404**	**0.0528**		**0.9214**	**0.9214**		**0.8477**	**0.8477**	**0.0000**	**5,114.4880**	**5,114.4880**	**1.6541**		**5,155.8412**

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	0.0268	0.6797	0.1876	1.9500e-003	7.9048	4.1500e-003	7.9090	0.7976	3.9700e-003	0.8016		204.0450	204.0450	0.0106		204.3106
Worker	0.1393	0.0862	1.0128	1.1500e-003	21.5880	7.6000e-004	21.5887	2.1712	7.0000e-004	2.1719		113.2805	113.2805	9.6200e-003		113.5209
Total	**0.1661**	**0.7659**	**1.2004**	**3.1000e-003**	**29.4928**	**4.9100e-003**	**29.4977**	**2.9688**	**4.6700e-003**	**2.9735**		**317.3255**	**317.3255**	**0.0203**		**317.8316**

3.3 Well Pad Construction - 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					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	1.9743	21.8681	10.5055	0.0214		1.0234	1.0234		0.9416	0.9416		2,071.5982	2,071.5982	0.6700		2,088.3481
Total	**1.9743**	**21.8681**	**10.5055**	**0.0214**	**6.5523**	**1.0234**	**7.5758**	**3.3675**	**0.9416**	**4.3091**		**2,071.5982**	**2,071.5982**	**0.6700**		**2,088.3481**

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	0.0268	0.6797	0.1876	1.9500e-003	7.9048	4.1500e-003	7.9090	0.7976	3.9700e-003	0.8016		204.0450	204.0450	0.0106		204.3106
Worker	0.0696	0.0431	0.5064	5.7000e-004	10.7940	3.8000e-004	10.7944	1.0856	3.5000e-004	1.0860		56.6403	56.6403	4.8100e-003		56.7605
Total	**0.0965**	**0.7228**	**0.6940**	**2.5200e-003**	**18.6988**	**4.5300e-003**	**18.7033**	**1.8832**	**4.3200e-003**	**1.8875**		**260.6852**	**260.6852**	**0.0154**		**261.0711**

3.3 Well Pad Construction - 2020

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					2.9486	0.0000	2.9486	1.5154	0.0000	1.5154			0.0000			0.0000
Off-Road	1.9743	21.8681	10.5055	0.0214		1.0234	1.0234		0.9416	0.9416	0.0000	2,071.5982	2,071.5982	0.6700		2,088.3481
Total	**1.9743**	**21.8681**	**10.5055**	**0.0214**	**2.9486**	**1.0234**	**3.9720**	**1.5154**	**0.9416**	**2.4569**	**0.0000**	**2,071.5982**	**2,071.5982**	**0.6700**		**2,088.3481**

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	0.0268	0.6797	0.1876	1.9500e-003	7.9048	4.1500e-003	7.9090	0.7976	3.9700e-003	0.8016		204.0450	204.0450	0.0106		204.3106
Worker	0.0696	0.0431	0.5064	5.7000e-004	10.7940	3.8000e-004	10.7944	1.0856	3.5000e-004	1.0860		56.6403	56.6403	4.8100e-003		56.7605
Total	**0.0965**	**0.7228**	**0.6940**	**2.5200e-003**	**18.6988**	**4.5300e-003**	**18.7033**	**1.8832**	**4.3200e-003**	**1.8875**		**260.6852**	**260.6852**	**0.0154**		**261.0711**

3.4 Well Drilling - 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	3.1676	29.9144	26.7104	0.0633		1.4650	1.4650		1.4329	1.4329		6,056.3711	6,056.3711	1.1241		6,084.4743
Total	**3.1676**	**29.9144**	**26.7104**	**0.0633**		**1.4650**	**1.4650**		**1.4329**	**1.4329**		**6,056.3711**	**6,056.3711**	**1.1241**		**6,084.4743**

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	0.1163	2.9452	0.8129	8.4600e-003	34.2541	0.0180	34.2721	3.4563	0.0172	3.4735		884.1949	884.1949	0.0460		885.3460
Worker	0.4665	0.2888	3.3930	3.8500e-003	72.3197	2.5500e-003	72.3222	7.2735	2.3500e-003	7.2758		379.4897	379.4897	0.0322		380.2952
Total	**0.5828**	**3.2340**	**4.2060**	**0.0123**	**106.5738**	**0.0206**	**106.5944**	**10.7298**	**0.0196**	**10.7494**		**1,263.6846**	**1,263.6846**	**0.0783**		**1,265.6412**

3.4 Well Drilling - 2020

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	3.1676	29.9144	26.7104	0.0633		1.4650	1.4650		1.4329	1.4329	0.0000	6,056.3711	6,056.3711	1.1241		6,084.4743
Total	**3.1676**	**29.9144**	**26.7104**	**0.0633**		**1.4650**	**1.4650**		**1.4329**	**1.4329**	**0.0000**	**6,056.3711**	**6,056.3711**	**1.1241**		**6,084.4743**

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	0.1163	2.9452	0.8129	8.4600e-003	34.2541	0.0180	34.2721	3.4563	0.0172	3.4735		884.1949	884.1949	0.0460		885.3460
Worker	0.4665	0.2888	3.3930	3.8500e-003	72.3197	2.5500e-003	72.3222	7.2735	2.3500e-003	7.2758		379.4897	379.4897	0.0322		380.2952
Total	**0.5828**	**3.2340**	**4.2060**	**0.0123**	**106.5738**	**0.0206**	**106.5944**	**10.7298**	**0.0196**	**10.7494**		**1,263.6846**	**1,263.6846**	**0.0783**		**1,265.6412**

3.5 Well Testing - 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	1.9324	18.0838	15.6827	0.0286		0.9770	0.9770		0.9486	0.9486		2,728.6619	2,728.6619	0.3898		2,738.4074
Total	**1.9324**	**18.0838**	**15.6827**	**0.0286**		**0.9770**	**0.9770**		**0.9486**	**0.9486**		**2,728.6619**	**2,728.6619**	**0.3898**		**2,738.4074**

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	8.9400e-003	0.2266	0.0625	6.5000e-004	2.6349	1.3800e-003	2.6363	0.2659	1.3200e-003	0.2672		68.0150	68.0150	3.5400e-003		68.1035
Worker	0.0557	0.0345	0.4051	4.6000e-004	8.6352	3.0000e-004	8.6355	0.8685	2.8000e-004	0.8688		45.3122	45.3122	3.8500e-003		45.4084
Total	**0.0646**	**0.2611**	**0.4677**	**1.1100e-003**	**11.2701**	**1.6800e-003**	**11.2718**	**1.1344**	**1.6000e-003**	**1.1360**		**113.3272**	**113.3272**	**7.3900e-003**		**113.5119**

3.5 Well Testing - 2020

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	1.9324	18.0838	15.6827	0.0286		0.9770	0.9770		0.9486	0.9486	0.0000	2,728.6618	2,728.6618	0.3898		2,738.4074
Total	**1.9324**	**18.0838**	**15.6827**	**0.0286**		**0.9770**	**0.9770**		**0.9486**	**0.9486**	**0.0000**	**2,728.6618**	**2,728.6618**	**0.3898**		**2,738.4074**

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	8.9400e-003	0.2266	0.0625	6.5000e-004	2.6349	1.3800e-003	2.6363	0.2659	1.3200e-003	0.2672		68.0150	68.0150	3.5400e-003		68.1035
Worker	0.0557	0.0345	0.4051	4.6000e-004	8.6352	3.0000e-004	8.6355	0.8685	2.8000e-004	0.8688		45.3122	45.3122	3.8500e-003		45.4084
Total	**0.0646**	**0.2611**	**0.4677**	**1.1100e-003**	**11.2701**	**1.6800e-003**	**11.2718**	**1.1344**	**1.6000e-003**	**1.1360**		**113.3272**	**113.3272**	**7.3900e-003**		**113.5119**

3.6 Well Cleanup-Abandoment - 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					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	0.7931	8.6199	6.1948	0.0125		0.4126	0.4126		0.3796	0.3796		1,206.6969	1,206.6969	0.3903		1,216.4537
Total	**0.7931**	**8.6199**	**6.1948**	**0.0125**	**6.5523**	**0.4126**	**6.9650**	**3.3675**	**0.3796**	**3.7471**		**1,206.6969**	**1,206.6969**	**0.3903**		**1,216.4537**

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	0.0268	0.6797	0.1876	1.9500e-003	7.9048	4.1500e-003	7.9090	0.7976	3.9700e-003	0.8016		204.0450	204.0450	0.0106		204.3106
Worker	0.0557	0.0345	0.4051	4.6000e-004	8.6352	3.0000e-004	8.6355	0.8685	2.8000e-004	0.8688		45.3122	45.3122	3.8500e-003		45.4084
Total	**0.0825**	**0.7142**	**0.5927**	**2.4100e-003**	**16.5400**	**4.4500e-003**	**16.5444**	**1.6661**	**4.2500e-003**	**1.6703**		**249.3572**	**249.3572**	**0.0145**		**249.7190**

3.6 Well Cleanup-Abandoment - 2020

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					2.9486	0.0000	2.9486	1.5154	0.0000	1.5154			0.0000			0.0000
Off-Road	0.7931	8.6199	6.1948	0.0125		0.4126	0.4126		0.3796	0.3796	0.0000	1,206.6969	1,206.6969	0.3903		1,216.4537
Total	**0.7931**	**8.6199**	**6.1948**	**0.0125**	**2.9486**	**0.4126**	**3.3612**	**1.5154**	**0.3796**	**1.8950**	**0.0000**	**1,206.6969**	**1,206.6969**	**0.3903**		**1,216.4537**

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	0.0268	0.6797	0.1876	1.9500e-003	7.9048	4.1500e-003	7.9090	0.7976	3.9700e-003	0.8016		204.0450	204.0450	0.0106		204.3106
Worker	0.0557	0.0345	0.4051	4.6000e-004	8.6352	3.0000e-004	8.6355	0.8685	2.8000e-004	0.8688		45.3122	45.3122	3.8500e-003		45.4084
Total	**0.0825**	**0.7142**	**0.5927**	**2.4100e-003**	**16.5400**	**4.4500e-003**	**16.5444**	**1.6661**	**4.2500e-003**	**1.6703**		**249.3572**	**249.3572**	**0.0145**		**249.7190**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	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					
Mitigated	0.0106	0.0664	0.1030	2.4000e-004	5.9614	1.6000e-004	5.9615	0.5950	1.5000e-004	0.5951		24.9731	24.9731	2.0700e-003		25.0249
Unmitigated	0.0106	0.0664	0.1030	2.4000e-004	5.9614	1.6000e-004	5.9615	0.5950	1.5000e-004	0.5951		24.9731	24.9731	2.0700e-003		25.0249

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	3.20	0.00	832	832
Total	0.00	3.20	0.00	832	832

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	6.70	5.00	8.90	0.00	100.00	0.00	100	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.509486	0.032430	0.160670	0.124446	0.017653	0.005129	0.019157	0.119824	0.003361	0.001189	0.005223	0.000739	0.000694

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	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					
NaturalGas Mitigated	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
NaturalGas Unmitigated	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

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	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
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	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
Total		**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**

Mitigated

	NaturalGas Use	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
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	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
Total		**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**

6.0 Area Detail

6.1 Mitigation Measures Area

Truckhaven Geothermal Exploration Wells - 1 Well Calculations - Imperial County, Summer

	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					
Mitigated	0.0765	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0350	0.0350	9.0000e-005		0.0373
Unmitigated	0.0765	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0350	0.0350	9.0000e-005		0.0373

6.2 Area by SubCategory

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
SubCategory	lb/day										lb/day					
Architectural Coating	0.0183					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0567					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.5300e-003	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0350	0.0350	9.0000e-005		0.0373
Total	**0.0765**	**1.5000e-004**	**0.0164**	**0.0000**		**6.0000e-005**	**6.0000e-005**		**6.0000e-005**	**6.0000e-005**		**0.0350**	**0.0350**	**9.0000e-005**		**0.0373**

6.2 Area by SubCategory

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
SubCategory	lb/day										lb/day					
Architectural Coating	0.0183					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0567					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.5300e-003	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0350	0.0350	9.0000e-005		0.0373
Total	**0.0765**	**1.5000e-004**	**0.0164**	**0.0000**		**6.0000e-005**	**6.0000e-005**		**6.0000e-005**	**6.0000e-005**		**0.0350**	**0.0350**	**9.0000e-005**		**0.0373**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Truckhaven Geothermal Exploration Wells - 1 Well Calculations

Imperial County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	160.00	1000sqft	3.67	160,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	3.4	**Precipitation Freq (Days)**	12
Climate Zone	15			**Operational Year**	2021
Utility Company	Imperial Irrigation District				
CO2 Intensity (lb/MWhr)	1270.9	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Truckhaven Geothermal Exploration Wells - 1 Well Calculations - Imperial County, Winter

Project Characteristics -

Land Use - 1 Well Pad = 400 ft x 400 ft = 3.67 acres

Construction Phase - Construction Schedule Provided by Applicant

Off-road Equipment - Well Cleanup - 1 Rubber Tired Loader, 2 Tractor/Loader/Backhoe

Off-road Equipment - Well Drilling - 1 Drill Rig 24-hours, 1 Mud Tank (Pump) 24-hours, 1 diesel generator (for lights) 12 hours, 1 Forklift 8 hours, 1 air compressor 8 hours

Off-road Equipment - Well Pad - 1 Rubber Tired Dozer, 1 Grader, and 2 Tractor/Loader/Backhoe

Off-road Equipment - Well Testing - 1 Crane 8 hours, 1 pump 24 hours, 1 Tractor/Loader/Backhoe 8 hours

Trips and VMT - 6 vendor truck trips per day added to Well Pad Construction and Well Cleanup to account for Water Trucks (already accounted for in Well Drilling)

On-road Fugitive Dust - 90% of construction trips on pavement

Grading -

Construction Off-road Equipment Mitigation - Water Exposed Area 2x per day selected to account for ICAPCD Regulation VIII minimum requirements

Off-road Equipment - Geo Survey - 4 Off-hwy trucks 8 hr/dy

Off-road Equipment - Well Pad - 1 Grader, 1 Dozer, 2 Tractors

Vehicle Trips - 2 trips per week

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	5.00	10.00
tblConstructionPhase	NumDays	230.00	45.00
tblConstructionPhase	NumDays	8.00	5.00
tblConstructionPhase	NumDaysWeek	5.00	7.00
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00

Truckhaven Geothermal Exploration Wells - 1 Well Calculations - Imperial County, Winter

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	4.00
tblOffRoadEquipment	PhaseName		Well Pad Construction
tblOffRoadEquipment	PhaseName		Well Drilling
tblOffRoadEquipment	PhaseName		Well Drilling
tblOffRoadEquipment	PhaseName		Well Drilling
tblOffRoadEquipment	PhaseName		Well Testing
tblOffRoadEquipment	PhaseName		Well Testing
tblOffRoadEquipment	PhaseName		Well Testing
tblOffRoadEquipment	PhaseName		Well Cleanup-Abandoment
tblOffRoadEquipment	PhaseName		Geophysical Survey
tblOffRoadEquipment	UsageHours	8.00	12.00
tblOnRoadDust	HaulingPercentPave	50.00	90.00
tblOnRoadDust	HaulingPercentPave	50.00	90.00
tblOnRoadDust	HaulingPercentPave	50.00	90.00
tblOnRoadDust	HaulingPercentPave	50.00	90.00
tblOnRoadDust	HaulingPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00

tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	WorkerTripNumber	15.00	8.00
tblTripsAndVMT	WorkerTripNumber	10.00	20.00
tblVehicleTrips	CC_TTP	0.00	100.00
tblVehicleTrips	PR_TP	0.00	100.00
tblVehicleTrips	ST_TR	0.00	0.02

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	3.6628	33.2174	30.1988	0.0747	106.5738	1.4858	108.0596	10.7298	1.4527	12.1825	0.0000	7,227.2488	7,227.2488	1.6737	0.0000	7,257.2827
Maximum	**3.6628**	**33.2174**	**30.1988**	**0.0747**	**106.5738**	**1.4858**	**108.0596**	**10.7298**	**1.4527**	**12.1825**	**0.0000**	**7,227.2488**	**7,227.2488**	**1.6737**	**0.0000**	**7,257.2827**

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	3.6628	33.2174	30.1988	0.0747	106.5738	1.4858	108.0596	10.7298	1.4527	12.1825	0.0000	7,227.2488	7,227.2488	1.6737	0.0000	7,257.2827
Maximum	**3.6628**	**33.2174**	**30.1988**	**0.0747**	**106.5738**	**1.4858**	**108.0596**	**10.7298**	**1.4527**	**12.1825**	**0.0000**	**7,227.2488**	**7,227.2488**	**1.6737**	**0.0000**	**7,257.2827**

	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**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	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					
Area	0.0765	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0350	0.0350	9.0000e-005		0.0373
Energy	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
Mobile	8.1000e-003	0.0662	0.0862	2.2000e-004	5.9614	1.7000e-004	5.9615	0.5950	1.6000e-004	0.5951		22.3799	22.3799	2.0800e-003		22.4320
Total	**0.0846**	**0.0663**	**0.1026**	**2.2000e-004**	**5.9614**	**2.3000e-004**	**5.9616**	**0.5950**	**2.2000e-004**	**0.5952**		**22.4149**	**22.4149**	**2.1700e-003**	**0.0000**	**22.4693**

Mitigated Operational

	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					
Area	0.0765	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0350	0.0350	9.0000e-005		0.0373
Energy	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
Mobile	8.1000e-003	0.0662	0.0862	2.2000e-004	5.9614	1.7000e-004	5.9615	0.5950	1.6000e-004	0.5951		22.3799	22.3799	2.0800e-003		22.4320
Total	**0.0846**	**0.0663**	**0.1026**	**2.2000e-004**	**5.9614**	**2.3000e-004**	**5.9616**	**0.5950**	**2.2000e-004**	**0.5952**		**22.4149**	**22.4149**	**2.1700e-003**	**0.0000**	**22.4693**

	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**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**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	Geophysical Survey	Trenching	2/11/2020	2/29/2020	5	14	
2	Well Pad Construction	Site Preparation	3/1/2020	3/14/2020	5	10	
3	Well Drilling	Building Construction	3/15/2020	4/28/2020	7	45	
4	Well Testing	Trenching	4/29/2020	4/30/2020	5	2	
5	Well Cleanup-Abandoment	Grading	5/1/2020	5/7/2020	5	5	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 3.67

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Truckhaven Geothermal Exploration Wells - 1 Well Calculations - Imperial County, Winter

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Well Pad Construction	Graders	1	8.00	187	0.41
Well Pad Construction	Rubber Tired Dozers	1	8.00	247	0.40
Well Pad Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Well Drilling	Air Compressors	1	8.00	78	0.48
Well Drilling	Bore/Drill Rigs	1	24.00	221	0.50
Well Drilling	Forklifts	1	8.00	89	0.20
Well Drilling	Generator Sets	1	12.00	84	0.74
Well Drilling	Pumps	1	24.00	84	0.74
Well Testing	Cranes	1	8.00	231	0.29
Well Testing	Pumps	1	24.00	84	0.74
Well Testing	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Well Cleanup-Abandoment	Rubber Tired Loaders	1	8.00	203	0.36
Well Cleanup-Abandoment	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Geophysical Survey	Off-Highway Trucks	4	8.00	402	0.38

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
Well Pad Construction	4	10.00	6.00	0.00	7.30	8.90	20.00	LD_Mix	HDT_Mix	HHDT
Well Drilling	10	67.00	26.00	0.00	7.30	8.90	20.00	LD_Mix	HDT_Mix	HHDT
Well Testing	3	8.00	2.00	0.00	7.30	8.90	20.00	LD_Mix	HDT_Mix	HHDT
Well Cleanup-Abandoment	6	8.00	6.00	0.00	7.30	8.90	20.00	LD_Mix	HDT_Mix	HHDT
Geophysical Survey	4	20.00	6.00	0.00	7.30	8.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Geophysical Survey - 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	2.6524	25.2909	15.2404	0.0528		0.9214	0.9214		0.8477	0.8477		5,114.4880	5,114.4880	1.6541		5,155.8412
Total	**2.6524**	**25.2909**	**15.2404**	**0.0528**		**0.9214**	**0.9214**		**0.8477**	**0.8477**		**5,114.4880**	**5,114.4880**	**1.6541**		**5,155.8412**

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	0.0278	0.6923	0.2137	1.8800e-003	7.9048	4.2100e-003	7.9090	0.7976	4.0300e-003	0.8016		196.7490	196.7490	0.0118		197.0446
Worker	0.1119	0.0904	0.7649	9.6000e-004	21.5880	7.6000e-004	21.5887	2.1712	7.0000e-004	2.1719		95.0146	95.0146	7.7600e-003		95.2085
Total	**0.1397**	**0.7827**	**0.9786**	**2.8400e-003**	**29.4928**	**4.9700e-003**	**29.4977**	**2.9688**	**4.7300e-003**	**2.9735**		**291.7636**	**291.7636**	**0.0196**		**292.2531**

3.2 Geophysical Survey - 2020

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	2.6524	25.2909	15.2404	0.0528		0.9214	0.9214		0.8477	0.8477	0.0000	5,114.4880	5,114.4880	1.6541		5,155.8412
Total	**2.6524**	**25.2909**	**15.2404**	**0.0528**		**0.9214**	**0.9214**		**0.8477**	**0.8477**	**0.0000**	**5,114.4880**	**5,114.4880**	**1.6541**		**5,155.8412**

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	0.0278	0.6923	0.2137	1.8800e-003	7.9048	4.2100e-003	7.9090	0.7976	4.0300e-003	0.8016		196.7490	196.7490	0.0118		197.0446
Worker	0.1119	0.0904	0.7649	9.6000e-004	21.5880	7.6000e-004	21.5887	2.1712	7.0000e-004	2.1719		95.0146	95.0146	7.7600e-003		95.2085
Total	**0.1397**	**0.7827**	**0.9786**	**2.8400e-003**	**29.4928**	**4.9700e-003**	**29.4977**	**2.9688**	**4.7300e-003**	**2.9735**		**291.7636**	**291.7636**	**0.0196**		**292.2531**

3.3 Well Pad Construction - 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					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	1.9743	21.8681	10.5055	0.0214		1.0234	1.0234		0.9416	0.9416		2,071.5982	2,071.5982	0.6700		2,088.3481
Total	**1.9743**	**21.8681**	**10.5055**	**0.0214**	**6.5523**	**1.0234**	**7.5758**	**3.3675**	**0.9416**	**4.3091**		**2,071.5982**	**2,071.5982**	**0.6700**		**2,088.3481**

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	0.0278	0.6923	0.2137	1.8800e-003	7.9048	4.2100e-003	7.9090	0.7976	4.0300e-003	0.8016		196.7490	196.7490	0.0118		197.0446
Worker	0.0560	0.0452	0.3825	4.8000e-004	10.7940	3.8000e-004	10.7944	1.0856	3.5000e-004	1.0860		47.5073	47.5073	3.8800e-003		47.6043
Total	**0.0837**	**0.7375**	**0.5961**	**2.3600e-003**	**18.6988**	**4.5900e-003**	**18.7034**	**1.8832**	**4.3800e-003**	**1.8876**		**244.2563**	**244.2563**	**0.0157**		**244.6489**

3.3 Well Pad Construction - 2020

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					2.9486	0.0000	2.9486	1.5154	0.0000	1.5154			0.0000			0.0000
Off-Road	1.9743	21.8681	10.5055	0.0214		1.0234	1.0234		0.9416	0.9416	0.0000	2,071.5982	2,071.5982	0.6700		2,088.3481
Total	**1.9743**	**21.8681**	**10.5055**	**0.0214**	**2.9486**	**1.0234**	**3.9720**	**1.5154**	**0.9416**	**2.4569**	**0.0000**	**2,071.5982**	**2,071.5982**	**0.6700**		**2,088.3481**

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	0.0278	0.6923	0.2137	1.8800e-003	7.9048	4.2100e-003	7.9090	0.7976	4.0300e-003	0.8016		196.7490	196.7490	0.0118		197.0446
Worker	0.0560	0.0452	0.3825	4.8000e-004	10.7940	3.8000e-004	10.7944	1.0856	3.5000e-004	1.0860		47.5073	47.5073	3.8800e-003		47.6043
Total	**0.0837**	**0.7375**	**0.5961**	**2.3600e-003**	**18.6988**	**4.5900e-003**	**18.7034**	**1.8832**	**4.3800e-003**	**1.8876**		**244.2563**	**244.2563**	**0.0157**		**244.6489**

3.4 Well Drilling - 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	3.1676	29.9144	26.7104	0.0633		1.4650	1.4650		1.4329	1.4329		6,056.3711	6,056.3711	1.1241		6,084.4743
Total	**3.1676**	**29.9144**	**26.7104**	**0.0633**		**1.4650**	**1.4650**		**1.4329**	**1.4329**		**6,056.3711**	**6,056.3711**	**1.1241**		**6,084.4743**

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	0.1203	3.0000	0.9260	8.1600e-003	34.2541	0.0183	34.2724	3.4563	0.0175	3.4738		852.5789	852.5789	0.0512		853.8599
Worker	0.3750	0.3030	2.5624	3.2200e-003	72.3197	2.5500e-003	72.3222	7.2735	2.3500e-003	7.2758		318.2988	318.2988	0.0260		318.9485
Total	**0.4953**	**3.3030**	**3.4884**	**0.0114**	**106.5738**	**0.0208**	**106.5946**	**10.7298**	**0.0198**	**10.7496**		**1,170.8777**	**1,170.8777**	**0.0772**		**1,172.8084**

3.4 Well Drilling - 2020

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	3.1676	29.9144	26.7104	0.0633		1.4650	1.4650		1.4329	1.4329	0.0000	6,056.3711	6,056.3711	1.1241		6,084.4743
Total	**3.1676**	**29.9144**	**26.7104**	**0.0633**		**1.4650**	**1.4650**		**1.4329**	**1.4329**	**0.0000**	**6,056.3711**	**6,056.3711**	**1.1241**		**6,084.4743**

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	0.1203	3.0000	0.9260	8.1600e-003	34.2541	0.0183	34.2724	3.4563	0.0175	3.4738		852.5789	852.5789	0.0512		853.8599
Worker	0.3750	0.3030	2.5624	3.2200e-003	72.3197	2.5500e-003	72.3222	7.2735	2.3500e-003	7.2758		318.2988	318.2988	0.0260		318.9485
Total	**0.4953**	**3.3030**	**3.4884**	**0.0114**	**106.5738**	**0.0208**	**106.5946**	**10.7298**	**0.0198**	**10.7496**		**1,170.8777**	**1,170.8777**	**0.0772**		**1,172.8084**

3.5 Well Testing - 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	1.9324	18.0838	15.6827	0.0286		0.9770	0.9770		0.9486	0.9486		2,728.6619	2,728.6619	0.3898		2,738.4074
Total	**1.9324**	**18.0838**	**15.6827**	**0.0286**		**0.9770**	**0.9770**		**0.9486**	**0.9486**		**2,728.6619**	**2,728.6619**	**0.3898**		**2,738.4074**

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	9.2500e-003	0.2308	0.0712	6.3000e-004	2.6349	1.4000e-003	2.6363	0.2659	1.3400e-003	0.2672		65.5830	65.5830	3.9400e-003		65.6815
Worker	0.0448	0.0362	0.3060	3.8000e-004	8.6352	3.0000e-004	8.6355	0.8685	2.8000e-004	0.8688		38.0058	38.0058	3.1000e-003		38.0834
Total	**0.0540**	**0.2669**	**0.3772**	**1.0100e-003**	**11.2701**	**1.7000e-003**	**11.2718**	**1.1344**	**1.6200e-003**	**1.1360**		**103.5888**	**103.5888**	**7.0400e-003**		**103.7649**

3.5 Well Testing - 2020

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	1.9324	18.0838	15.6827	0.0286		0.9770	0.9770		0.9486	0.9486	0.0000	2,728.6618	2,728.6618	0.3898		2,738.4074
Total	**1.9324**	**18.0838**	**15.6827**	**0.0286**		**0.9770**	**0.9770**		**0.9486**	**0.9486**	**0.0000**	**2,728.6618**	**2,728.6618**	**0.3898**		**2,738.4074**

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	9.2500e-003	0.2308	0.0712	6.3000e-004	2.6349	1.4000e-003	2.6363	0.2659	1.3400e-003	0.2672		65.5830	65.5830	3.9400e-003		65.6815
Worker	0.0448	0.0362	0.3060	3.8000e-004	8.6352	3.0000e-004	8.6355	0.8685	2.8000e-004	0.8688		38.0058	38.0058	3.1000e-003		38.0834
Total	**0.0540**	**0.2669**	**0.3772**	**1.0100e-003**	**11.2701**	**1.7000e-003**	**11.2718**	**1.1344**	**1.6200e-003**	**1.1360**		**103.5888**	**103.5888**	**7.0400e-003**		**103.7649**

3.6 Well Cleanup-Abandoment - 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					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	0.7931	8.6199	6.1948	0.0125		0.4126	0.4126		0.3796	0.3796		1,206.6969	1,206.6969	0.3903		1,216.4537
Total	**0.7931**	**8.6199**	**6.1948**	**0.0125**	**6.5523**	**0.4126**	**6.9650**	**3.3675**	**0.3796**	**3.7471**		**1,206.6969**	**1,206.6969**	**0.3903**		**1,216.4537**

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	0.0278	0.6923	0.2137	1.8800e-003	7.9048	4.2100e-003	7.9090	0.7976	4.0300e-003	0.8016		196.7490	196.7490	0.0118		197.0446
Worker	0.0448	0.0362	0.3060	3.8000e-004	8.6352	3.0000e-004	8.6355	0.8685	2.8000e-004	0.8688		38.0058	38.0058	3.1000e-003		38.0834
Total	**0.0725**	**0.7285**	**0.5196**	**2.2600e-003**	**16.5400**	**4.5100e-003**	**16.5445**	**1.6661**	**4.3100e-003**	**1.6704**		**234.7548**	**234.7548**	**0.0149**		**235.1280**

3.6 Well Cleanup-Abandoment - 2020

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					2.9486	0.0000	2.9486	1.5154	0.0000	1.5154			0.0000			0.0000
Off-Road	0.7931	8.6199	6.1948	0.0125		0.4126	0.4126		0.3796	0.3796	0.0000	1,206.6969	1,206.6969	0.3903		1,216.4537
Total	**0.7931**	**8.6199**	**6.1948**	**0.0125**	**2.9486**	**0.4126**	**3.3612**	**1.5154**	**0.3796**	**1.8950**	**0.0000**	**1,206.6969**	**1,206.6969**	**0.3903**		**1,216.4537**

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	0.0278	0.6923	0.2137	1.8800e-003	7.9048	4.2100e-003	7.9090	0.7976	4.0300e-003	0.8016		196.7490	196.7490	0.0118		197.0446
Worker	0.0448	0.0362	0.3060	3.8000e-004	8.6352	3.0000e-004	8.6355	0.8685	2.8000e-004	0.8688		38.0058	38.0058	3.1000e-003		38.0834
Total	**0.0725**	**0.7285**	**0.5196**	**2.2600e-003**	**16.5400**	**4.5100e-003**	**16.5445**	**1.6661**	**4.3100e-003**	**1.6704**		**234.7548**	**234.7548**	**0.0149**		**235.1280**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	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					
Mitigated	8.1000e-003	0.0662	0.0862	2.2000e-004	5.9614	1.7000e-004	5.9615	0.5950	1.6000e-004	0.5951		22.3799	22.3799	2.0800e-003		22.4320
Unmitigated	8.1000e-003	0.0662	0.0862	2.2000e-004	5.9614	1.7000e-004	5.9615	0.5950	1.6000e-004	0.5951		22.3799	22.3799	2.0800e-003		22.4320

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	3.20	0.00	832	832
Total	0.00	3.20	0.00	832	832

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	6.70	5.00	8.90	0.00	100.00	0.00	100	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.509486	0.032430	0.160670	0.124446	0.017653	0.005129	0.019157	0.119824	0.003361	0.001189	0.005223	0.000739	0.000694

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	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					
NaturalGas Mitigated	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
NaturalGas Unmitigated	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

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	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
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	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
Total		**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**

Mitigated

	NaturalGas Use	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
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	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
Total		**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**

6.0 Area Detail

6.1 Mitigation Measures Area

	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					
Mitigated	0.0765	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0350	0.0350	9.0000e-005		0.0373
Unmitigated	0.0765	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0350	0.0350	9.0000e-005		0.0373

6.2 Area by SubCategory

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
SubCategory	lb/day										lb/day					
Architectural Coating	0.0183					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0567					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.5300e-003	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0350	0.0350	9.0000e-005		0.0373
Total	**0.0765**	**1.5000e-004**	**0.0164**	**0.0000**		**6.0000e-005**	**6.0000e-005**		**6.0000e-005**	**6.0000e-005**		**0.0350**	**0.0350**	**9.0000e-005**		**0.0373**

6.2 Area by SubCategory

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
SubCategory	lb/day										lb/day					
Architectural Coating	0.0183					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0567					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.5300e-003	1.5000e-004	0.0164	0.0000		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005		0.0350	0.0350	9.0000e-005		0.0373
Total	**0.0765**	**1.5000e-004**	**0.0164**	**0.0000**		**6.0000e-005**	**6.0000e-005**		**6.0000e-005**	**6.0000e-005**		**0.0350**	**0.0350**	**9.0000e-005**		**0.0373**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

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APPENDIX B – BIOLOGICAL RESOURCES EVALUATION REPORT

August 2018

ORMAT NEVADA, INC.

Truckhaven Geothermal Project

Proposed 3D Geophysical Survey
Biological Resources Evaluation Report

PROJECT NUMBER:
149090

PROJECT CONTACT:
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POWER ENGINEERS

Truckhaven Geothermal Project
Proposed 3D Geophysical Survey
Biological Resources Evaluation Report

PREPARED FOR: *ORMAT NEVADA, INC.*

PREPARED BY: *KEN MCDONALD*
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ACRONYMS AND ABBREVIATIONS

3D	Three Dimensional
BLM	Bureau of Land Management
BSA	Biological Survey Area
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
msl	mean sea level
Ormat	Ormat Nevada, Inc.
POWER	POWER Engineers, Inc.
Project	Truckhaven Geothermal Project
State Parks	State Parks Ocotillo Wells Field Office
SVRA	State Vehicular Recreation Area
USFWS	US Fish and Wildlife Service

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1.0 INTRODUCTION

This document presents the findings of the biological resources evaluation survey for the Ormat Nevada, Inc. (Ormat) Truckhaven Geothermal Project (Project). This survey focused exclusively on portions of the Project that will be affected by the seismic survey described below.

1.1 Project Description

Ormat is proposing to conduct a three-dimensional (3D) geophysical data acquisition seismic survey to evaluate potential subsurface geothermal resources located at the north end of the joint U.S. Department of the Interior, Bureau of Land Management (BLM)-State of California Truckhaven Geothermal Lease Area in Imperial County, California.

Land within the seismic survey footprint consists of a block of approximately 24 square miles. These lands are managed by public (state, federal) agencies or are owned privately. The public lands are managed by the BLM and the California Department of Parks and Recreation as part of the Ocotillo Wells State Vehicular Recreation Area (SVRA).

The 3D seismic data collection process requires the use of off-road buggy vibrators that must cross uneven terrain within the Project footprint. The biological resources survey was conducted to provide clearance for the vibrators to conduct the seismic data collection within defined corridors of vehicular movement. The results of the biological resources survey will allow for the evaluation of potential impacts to sensitive biological resources within the Project corridors prior to the seismic data collection.

This report combines the results of the 2016 and 2018 biological resources surveys conducted within the seismic survey footprint.

1.2 Project Location

The proposed Project is located within and south of Salton City, west of the Salton Sea in the northern portion of Imperial Valley, California (Figure 1). The outer site boundaries of the Biological Survey Area (BSA) are immediately south of the intersection of U.S. Highway 86 and South Marina Drive on the north, 0.3 mile west of the Salton City landfill on the west, 1.7 miles south of the Salton City landfill on the south, and 0.6 mile from the Thomas R. Cannell Waste Water Treatment Facility on the east. The elevation of the BSA ranges from approximately 125 feet above mean sea level (msl) to the northwest and 215 feet below msl to the northeast. The BSA is bisected by Highway 86. The majority of the BSA is sparsely vegetated with native and non-native plant species and is comprised of low-density residential housing and associated infrastructure and off-road vehicle usage. The BSA itself consists only of the proposed corridors of vehicular movement.

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Legend

Project Area

ORMAT NEVADA, INC. TRUCKHAVEN

Figure 1
Project Location

0 2 4 6 8 10
Miles
N

POWER ENGINEERS

Date: 4/26/2018

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2.0 METHODS

2.1 Approach to Data Collection

The first step in the approach to data collection for this analysis included the identification and characterization of biological resources, including vegetation community types, and special-status plant and animal species that are known to occur or have potential to occur in the BSA.

"Special-status," as used in this report, refers to species that are:

- Listed, proposed for listing, or candidates for listing as threatened or endangered under the Endangered Species Act (50 Code of Federal Regulations [CFR] Part 17.12 [listed plants], 50 CFR Part 17.11 [listed animals], 67 Federal Register 40657 [candidate species], and various notices in the Federal Register [proposed species]);
- Listed or proposed for listing by the State of California as threatened or endangered under the California Endangered Species Act (California Department of Fish and Wildlife [CDFW] 2016a and 2018);
- Identified by the CDFW as species of concern or fully protected species, including fish and wildlife that do not have State or federal threatened or endangered status but may still be threatened with extinction (CDFW 2016a and 2018);
- California Species of Special Concern: vertebrate species that have been designated as "species of special concern" by the CDFW because declining population levels, limited range, and/or continuing threats have made them vulnerable to extinction (CDFW 2016a and 2018);
- Included in the California Native Plant Society (CNPS) Rare Plant Inventory (CNPS 2016 and 2018);
- Otherwise defined as rare, threatened, or endangered under the California Environmental Quality Act;
- Identified by State Parks Ocotillo Wells Field Office (State Parks) as a sensitive species; or
- Identified by the BLM or the BLM El Centro Field Office as a sensitive species.

Prior to conducting fieldwork, the biologists reviewed records of known occurrences to identify special-status species that may occur within the BSA. Those records were then compared with lists of federal- or State-listed threatened, endangered, or other special-status species. Details of all survey work and approaches to collecting data are described below.

2.2 Literature Review

Preliminary investigation included review of information obtained from literature searches, examinations of habitat as discernible from aerial photographs, database searches including CNPS and the California Natural Diversity Database (CNDDB) records (CDFW 2016a and 2018), and previous surveys (POWER Engineers, Inc. [POWER] 2017). No changes were noted between the CDFW and CNPS 2016 and 2018 data. To identify the existing and potential biological resources present in the vicinity of the proposed Project, a geographic information system search was performed. This consisted of mapping baseline biological resource data (e.g., vegetation mapping, CNDDB records).

2.3 Field Survey

Biological resource evaluation surveys were conducted in April and May of 2016 and March and April of 2018. POWER provided a wildlife biologist and a botanist for the survey. The role of the wildlife biologist was to record observations of wildlife species, with emphasis on special-status species such as flat-tailed horned lizard (*Phrynosoma mcallii*) and burrowing owl (*Athene cunicularia*), and record active or potential burrows for a variety of wildlife species.

The botanist was tasked with creating a vegetation map of the corridors that were surveyed, extending as far as they could reliably determine using line-of-sight and aerial imagery, and identifying and recording plant species encountered, with emphasis on special-status plant species. Botanists also recorded occurrences of seeps encountered. All biologists were preauthorized for conducting surveys on private, BLM, and State Parks land by State Parks and CDFW.

All detected wildlife and botanical species were recorded, as were observed vegetation communities within and adjacent to the survey corridors. Wildlife species were detected either by observation, by vocalization, or by sign (e.g., tracks, burrows, scat). The botanical inventory was floristic in nature, meaning that all plants observed were identified to the taxonomic level needed to determine whether they were special-status plant species. Vegetation communities were classified according to Holland (1986).

3.0 RESULTS

Vegetation communities consisted primarily of Sonoran creosote bush scrub and desert saltbush scrub (Figure 2). A more detailed description of this vegetation community is provided below. Seven special-status plant species were observed during the surveys. A list of plant species observed during the field surveys is provided in Appendix A. One special-status, wildlife species, flat-tailed horned lizard, was detected within the BSA during the surveys. Few wildlife species were observed within the BSA, but wildlife sign was observed more frequently. Burrows of varying sizes were present intermittently throughout the BSA, including rodent and potential burrowing owl burrows. A small number of unoccupied bird nests were also observed. Appendix B provides a list of observed animal species. The potential for occurrence of special-status plant and animal species are presented in Sections 3.2 and 3.3, respectively.

3.1 Vegetation Community Descriptions

The following vegetation communities were named according to Holland (1986), and are shown in Figure 2. Table 1 provides approximate vegetation community acreages found within the BSA.

TABLE 1 VEGETATION COMMUNITIES WITHIN THE BIOLOGICAL SURVEY AREA

VEGETATION COMMUNITY	ACRES
Sonoran Creosote Bush Scrub	884.2
Desert Saltbush Scrub	349.3
Desert Sink Scrub	18.4
Desert Wash	199.9
Bare/Disturbed	133.2
Total Acres	1,585

3.1.1 Sonoran Creosote Bush Scrub

Sonoran creosote bush scrub is a widely spaced open community generally dominated by creosote (*Larrea tridentata*) and burro bush (*Ambrosia dumosa*), usually with abundant bare ground between larger shrubs. Growth in this community occurs from winter to early spring and later, with sufficient rainfall, with the shrubs often dormant for long periods. During years of sufficient rainfall, the bare ground is filled with ephemeral herbs. This community typically occurs on well-drained secondary soils of slopes, fans, and valley, rather than upland sites, with winter temperatures seldom below freezing (Holland 1986).

This community was noted to be very sparse in areas constituting a separate mapping layer of "sparse" Sonoran creosote bush scrub. In these areas, the community appeared to be essentially bare of vegetation, but remnant components of the community were present in sufficient number to classify the vegetation type.

3.1.2 Desert Saltbush Scrub

Desert saltbush scrub is a low-growing open community dominated by chenopod bushes (*Atriplex* spp.), usually with a low-growing herbaceous cover. Total cover in this community is often low, with abundant bare ground between widely spaced shrubs. Stands of shrubs are typically dominated by a

single Atriplex species. Common species in this community include four-wing saltbush (*Atriplex canescens*), desert holly (*Atriplex hymenolytra*), shadscale (*Atriplex confertifolia*), allscale (*Atriplex polycarpa*), and hop sage (*Grayia spinosa*). This community typically occurs on fine-textured, poorly drained soils with high alkalinity and/or salinity (Holland 1986).

This community was noted to be very sparse in areas constituting a separate mapping layer of "sparse" saltbush scrub. In these areas, the community appeared to be essentially bare of vegetation, but remnant components of the community were present in sufficient number to classify the vegetation type.

ORMAT NEVADA, INC. TRUCKHAVEN

Figure 2
Biological Resources

Legend

Project Components
- Surveyed Area
- Survey Area: 2016
- Survey Area: 2018

Sensitive Areas

Flora
- Abronia villosa var. aurita
- Astragalus crotalariae
- Chaenactis carphoclinia ssp. peirsonii
- Cryptantha costata
- Pilostyles thurberi
- Schoenoplectus americanus
- Xylorhiza orcuttii

Fauna
- FTHL
- FTHL: dead
- FTHL: potential burrow
- horned lizard scat
- unidentified horned lizard
- nighthawk nesting
- kit fox burrow
- prairie falcon (State Parks 2016 observation)
- prairie falcon nest (State Parks 2016 observation)
- prairie falcon: foraging
- CORA: nest
- MODO: nest
- BUOW: potential burrow

Other Biological Areas
- sand dune/blowing sand
- seep
- saltgrass area

Vegetation
- Sonoran creosote bush scrub
- sparse Sonoran creosote bush scrub
- desert sink scrub
- desert saltbush scrub
- sparse desert saltbush scrub
- desert wash
- seep
- bare ground/disturbed

Base Data
- State Highway
- Local Road
- Dirt Road
- Trail
- Section
- Intermittent Stream, Wash, or Ditch
- Ocotillo Wells SVRA

0 500 1,000 1,500
Meters

N

POWER ENGINEERS

Date: 7/28/2018

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3.1.3 Desert Sink Scrub

Desert sink scrub is similar to desert saltbush scrub, but plants are more widely spaced and with a higher proportion of succulent chenopod species. It occurs on poorly drained soils with high alkalinity and/or salt content. This community often has a higher water table and with visible salt crust on the surface Holland (1986). This community was dominated by pickleweed (*Salicornia* sp.), with varying amounts of saltbush scrub species and occasional creosote scrub species.

3.1.4 Desert Wash

Desert wash is a sparsely vegetated to bare community occurring throughout the BSA. These sandy to hardened silty-mud substrate washes most closely resemble the Holland (1986) vegetation descriptions of tamarisk scrub and arrowweed scrub communities. Where vegetation occurs in the washes, tamarisk (*Tamarix* sp.) was the largest shrub, while arrowweed (*Pluchea sericea*) was the most common. Occasionally, these washes also harbored Sonoran creosote bush scrub and desert saltbush scrub vegetation. Seeps occurred intermittently within desert washes, and were comprised mainly of salt grass (*Distichlis spicata*).

3.1.5 Bare Ground/Disturbed

Bare ground and disturbed areas within the BSA occurred mainly adjacent to developed areas and infrastructure, generally in the form of bare, compacted soils from human activities or paved roads. Vegetation in these areas tended to be sparse and weedy. Occasional individuals of the special-status Salton milk-vetch (*Astragalus crotalariae*), which thrives on disturbance, occur in disturbed areas and the edges of developed areas.

3.2 Special-Status Plant Species

A total of 36 special-status plant species were targeted for the survey, as determined by the literature review and consultation with State Parks and BLM. Their habitat description, status, and potential for occurrence within the BSA are provided in Table 2. Two additional special-status species that were not originally included in the list were observed during the course of the survey and were added to the potential for occurrence table, bringing the number to 38. Of the 38 plant species considered to have a potential to occur within the vicinity, seven were observed during the survey. Refer to Figure 2 for the species and location. Three species were determined to have a moderate potential for occurrence within the BSA, and seven had a low potential, while the remaining were determined to be absent. Potential for occurrence was based on habitat, elevation, soil, and proximity to known recorded occurrences of a species. The species accounts below include only those species that were observed or were determined to have at least a moderate potential to occur within the BSA. Appendix C provides the potential for occurrence of special-status plant species.

3.2.1 Chaparral Sand-verbena

Chaparral sand-verbena (*Abronia villosa* var. *aurita*) is a BLM sensitive species and is included on List 1B.1 of the CNPS online inventory (CNPS 2018). It is a pink-flowered annual herb in the Four o-clock Family (Nyctaginaceae) that occurs in south coast ranges and Sonoran desert. It occurs in coastal scrub and desert dunes, on sandy soils, ranging from 245 to 5,250 feet in elevation, and blooms from March to September (CNPS 2016). Suitable habitat for this species occurs within the BSA. Chaparral sand-verbena was observed within the BSA during the survey.

3.2.2 Salton Milk-vetch

Salton milk-vetch (*Astragalus crotalariae*) is included on List 4.3 of the CNPS online inventory (CNPS 2018). It is a red-purple to white flowered perennial herb in the Pea Family (Fabaceae). Salton milk-vetch occurs from the southeastern-most portion of California and into Arizona; documented in Imperial, Riverside, and San Diego counties. This species occurs in desert wash and Sonoran desert scrub, on sandy or gravelly soils. It ranges from 195 to 820 feet in elevation, and blooms from January to April (CNPS 2018). Suitable habitat for this species occurs within the BSA. Salton milk-vetch was observed within the BSA during the survey.

3.2.3 Harwood's Milk-vetch

Harwood's milk-vetch (*Astragalus insularis* var. *harwoodii*) is included on List 2B.2 of the CNPS online inventory (CNPS 2018). It is a pink to violet flowered annual herb in the Pea Family (Fabaceae). Harwood's milk-vetch occurs from the south easternmost portion of California and into Arizona and Mexico; documented in Imperial, Riverside, and San Diego counties. This species occurs in desert dunes, desert wash, and desert scrub, on sandy or gravelly soils. It ranges from msl to 2,330 feet in elevation, and blooms from January to May (CNPS 2018). Suitable habitat for this species occurs within the BSA. Harwood's milk-vetch has a moderate potential to occur within the BSA, and has a known occurrence within five miles of the site.

3.2.4 Peirson's Pincushion

Peirson's pincushion (*Chaenactis carphoclinia* var. *peirsonii*) is included on List 1B.3 of the CNPS online inventory (CNPS 2018). It is a pink to white flowered annual herb in the Sunflower Family (Asteraceae). Peirson's pincushion is known from the Sonoran desert. This species occurs in Sonoran desert scrub, on sandy soils. It ranges from 10 to 1,640 feet in elevation, and blooms from March to April. Suitable habitat for this species occurs within the BSA. Peirson's pincushion was observed within the BSA during the survey.

3.2.5 Wiggin's Croton

Wiggin's croton (*Croton wigginsii*) is a BLM sensitive species and is included on List 2B.2 of the CNPS online inventory (CNPS 2018). It is a petal-lacking perennial shrub in the Spurge Family (Euphorbiaceae). Wiggin's croton is known from the Sonoran desert. This species occurs in desert dunes and Sonoran desert scrub, on sandy soils. It ranges from 165 to 330 feet in elevation, and blooms from March to May (CNPS 2018). Suitable habitat for this species occurs within the BSA. Wiggin's croton has a moderate potential to occur within the BSA.Abram's Spurge

Abram's spurge (*Euphorbia abramsiana*) is included on List 2B.2 of the CNPS online inventory (CNPS 2018). It is a petal-lacking annual herb in the Spurge Family (Euphorbiaceae). Abram's spurge is known from the southeastern-most portion of California and into Arizona and Mexico; documented in Imperial, Riverside, and San Bernardino counties. This species occurs in desert scrub, on sandy soils. It ranges from -15 feet below msl to 4,300 feet in elevation, and blooms from August to November (CNPS 2018). Suitable habitat for this species occurs within the BSA. Abram's spurge has a moderate potential to occur within the BSA.

3.2.6 Ribbed Cryptantha

Ribbed cryptantha (*Johnstonella costata*) is a BLM sensitive species and is included on List 4.3 of the CNPS online inventory (CNPS 2018). It is a white flowered annual herb in the Waterleaf Family

(Boraginaceae). Ribbed cryptantha is known from the southeastern-most portion of California and into Arizona and Mexico; documented in Imperial, Riverside, and San Diego counties. This species occurs in desert dunes and Sonoran desert scrub, on sandy soils. It ranges from -195 feet below msl to 1,640 feet in elevation, and blooms from February to May (CNPS 2018). Suitable habitat for this species occurs within the BSA. Ribbed cryptantha was observed within the BSA during the survey.

3.2.7 Sand Food

Sand food (*Pholisma sonorae*) is a BLM sensitive species and is included on List 1B.2 of the CNPS online inventory (CNPS 2018). It is a pink to purple flowered perennial parasitic herb in the Waterleaf Family (Boraginaceae). Sand food occurs from the south easternmost portion of California and into Arizona; documented in Imperial County. This species occurs in desert dunes and Sonoran desert scrub, on sandy soils. It ranges from -305 feet below msl to 1,120 feet in elevation, and blooms from April to June (CNPS 2018). Suitable habitat for this species occurs within the BSA. Sand food has a moderate potential to occur within the BSA.

3.2.8 Olney's Three-square Rush

Olney's three-square rush (*Schoenoplectus americanus*) is a State Parks sensitive species. It is a grass-like perennial rhizomatous herb in the Sedge Family (Cyperaceae). Olney's three-square rush is known from a variety of ranges throughout California. This species occurs in mineral-rich or brackish marshes, shores, fens, seeps, and springs. It ranges from msl to 7,220 feet in elevation, and blooms from May to August. Suitable habitat for this species occurs within the BSA. Olney's three-square rush was observed within the BSA during the survey.

3.2.9 Orcutt's Woody Aster

Orcutt's woody aster (*Xylorhiza orcuttii*) is included on List 1B.2 of the CNPS online inventory (CNPS 2018). It is lavender to light blue flowered perennial herb in the Aster Family (Asteraceae). Orcutt's woody aster is known from the south easternmost portion of California and into Mexico; documented in Imperial, Riverside, and San Diego counties. This species occurs in desert wash and Sonoran desert scrub. It ranges from msl to 1,200 feet in elevation, and blooms from March to April (CNPS 2018). Orcutt's woody aster was observed within the BSA during the survey.

3.3 Special-Status Wildlife Species

A total of 10 special-status wildlife species were initially determined by the literature review to potentially occur within the BSA. Two additional species were added, based on personal communication with State Parks (2017), bringing the number to 12. Of the 12 wildlife species, one species was present, one had a high potential for occurrence within the BSA, three had a moderate potential, one had a low potential, and the remainder were determined to be absent. Their habitat description, status, and potential for occurrence within the survey area are provided in Appendix D.

One special-status wildlife species, flat-tailed horned lizard, was detected during the field surveys. In addition to these confirmed sightings, there were occasional small mammal burrows throughout the BSA that can provide suitable cover for the lizard and for burrowing owls (Figure 2).

The accounts below include species that are determined to have at least a moderate potential to occur in the BSA, or were observed during the field surveys. Appendix D provides the potential for occurrence of special-status wildlife species.

3.3.1 Burrowing Owl

Burrowing owl is designated as a Priority 2 Bird Species of Special Concern by CDFW due to rapid habitat loss and degradation from urbanization. It is also designated as a BLM Sensitive species and a U.S. Fish and Wildlife Service (USFWS) Bird of Conservation Concern. Its range extends through all states west of the Mississippi Valley and into Mexico, Central America, and South America. In California, it typically inhabits lowlands, including those in the Central Valley, northeastern plateau, southeastern deserts, and coastal areas. For shelters, the burrowing owl uses rodent burrows in sparse grassland, desert, and agricultural habitats, as well as open areas of pinyon-juniper or ponderosa pine habitats (CDFW [as California Department of Fish and Game (CDFG)] 2008). Breeding populations generally display greater site fidelity than winter populations, which tend to move about more, even taking refuge into vegetation instead of nearby burrows (Poulin et al. 2011). Individuals in California, particularly southern California, are mostly residents. Nesting begins from late March to August, peaking in April and May (CDFW [as CDFG] 2008). While some pairs have been observed to have double broods within a single breeding season, it is considered to be uncommon and is not always successful (Poulin et al. 2011). Burrowing owls are typically active at dusk and dawn, but can sometimes be active at night as well.

Observations of burrowing owl within one mile of the BSA have been noted by parks in spring 2018 (in Campbell Wash, south of the BSA) and in Summer of 2018 (west of the confluence of Bus Wash and Arroyo Salado), indicating that burrowing owls do occur in the vicinity. These observations are not shown on the figures. Approximate coordinates to both observations are as follows: Summer 2018: 11S 592193 E 3679421 N and Spring 2018: 11S 597759 E 3673009 N.

Suitable burrows for burrowing owls were observed during the survey, but no burrowing owls and no sign of burrowing owls were detected. Burrowing owls have a moderate potential to occur within the BSA.

3.3.2 Prairie Falcon

The prairie falcon (*Falco mexicanus*) is designated by the USFWS as a Species of Special Concern and by CDFW as a Watch List species. It inhabits dry, open terrain in level and hilly areas. Breeding sites are located on cliffs. Foraging habitat includes marshlands and ocean shores (CNDDB 2018).

There are two State Park records of this species within the BSA (State Parks 2017). Suitable habitat for this species occurs within the BSA. The prairie falcon has a high potential to utilize the BSA, but a low potential to nest within the BSA.

3.3.3 Palm Springs Pocket Mouse

The Palm Springs pocket mouse (*Perognathus longimembris bangsi*) is designated by the CDFW as a Species of Special Concern and by BLM as sensitive. It occurs in desert dunes, Mojavean desert scrub, and Sonoran desert scrub in central Riverside, eastern San Diego, and Imperial Counties. It often occurs in habitat with gently sloping topography, sparse to moderate vegetative cover, and loosely packed or sandy soils (Dodd 1996).

There are three CNDDB records of this species in the general vicinity of the Project area (CDFW 2018). Suitable habitat for this species occurs within the BSA. The Palm Springs pocket mouse has a moderate potential to occur.

3.3.4 Flat-tailed Horned Lizard

The flat-tailed horned lizard is designated by the CDFW as a Species of Special Concern and by BLM as sensitive. It has the smallest range of all horned lizards (Sherbrooke 2003), being restricted to southeastern California, extreme southwestern Arizona, and adjacent portions of northeastern Baja California and northwestern Sonora, Mexico (Funk 1981). In California, it is distributed throughout much of the Salton Trough, sections of San Diego County, central Riverside County, and western and southern Imperial County (CDFW 2018). Flat-tailed horned lizard occurs in desert dunes, Mojavean desert scrub, and Sonoran desert scrub with sandy soils in central Riverside, eastern San Diego, and Imperial Counties. It requires loose, friable soils for burrowing, and scattered perennial vegetation for cover and thermoregulation, as well as a sufficient population of ants (Barrows and Allen 2009).

Nine flat-tailed horned lizards were observed during the surveys, plus two dead individuals. Suitable burrows for the species were observed intermittently throughout the BSA.

3.3.5 Le Conte's Thrasher

Le Conte's thrasher (*Toxostoma lecontei*) is a Species of Special Concern and a USFWS Bird of Conservation Concern. In California, Le Conte's thrasher is a resident species in the San Joaquin Valley and the Mojave and Colorado deserts in southeastern California. It occurs in desert washes, desert scrub, alkali desert scrub, and desert succulent shrub habitat (CDFW 2018). Because creosote bush is unable to sufficiently support nests, Le Conte's thrashers typically do not occur in monotypic creosote bush scrub habitat or in massive Sonoran Desert woodlands (Prescott 2005). Preferred nest substrate includes thorny shrubs or cholla cactus (Sheppard 1996). Breeding activity occurs from January to early June, peaking from mid-March to mid-April (CDFW [as CDFG] 2008). Pairs typically attempt up to three broods each year. Le Conte's thrashers forage for food by digging and probing in the soil with their bills, searching for arthropods (the majority of their diet), small lizards and snakes, other vertebrates, and seeds and fruit (Sheppard 1996, CDFW [as CDFG] 2008).

No Le Conte's thrashers were observed during the survey. Some suitable habitat is present within the BSA, and Le Conte's thrasher has a moderate potential to occur.

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4.0 RECOMMENDATIONS

The following recommendations are provided for avoidance and minimization of effects to biological resources during the seismic survey:

1. Coordinate with State Parks, BLM, and CDFW to obtain any necessary permits, memorandums of understanding, or permissions prior to seismic activities.
2. A qualified biologist(s) will monitor all off-road seismic testing activities to ensure that standard and special-status species-specific avoidance and minimization recommendations are adhered to. The monitor will retain stop work authority in the event there is the likelihood of eminent take of special-status species. The monitor will conduct a daily survey in and around work areas before seismic surveys start, including the drive path of any off-road vehicular seismic testing activities, as previously observed potential burrows may no longer exist and new burrows may be present, as well as wildlife entering the work area. All biological monitors will be approved by State Parks, BLM, and CDFW prior to commencement of the geophysical data acquisition seismic survey.
3. A worker environmental awareness program will be prepared and presented to all employees working on the Project site in listed species habitat. The education program will include identification of target species and their habitats, any Project mitigation measures and stipulations, reporting requirements, and penalties for failure of compliance.
4. Should seismic surveys occur between February 15 and August 15, the time period typically referenced in California for the general bird nesting season, daily nesting surveys will be conducted in and around work areas before seismic surveys start, including the drive path of any off-road vehicular seismic testing activities. If no active bird nests are found within this area, no further mitigation is required. If an active nest is found, a buffer shall be instated around the nest if it belongs to a non-listed or migratory bird. If the nest belongs to a listed or fully-protected species, a larger buffer shall be instated around the nest, at a distance approved prior to seismic survey activities.
5. Avoid burrows that may be utilized by special-status wildlife species with a minimum buffer of 20-feet from burrows suitable for flat-tailed horned lizard and a minimum buffer of 30-feet from burrows suitable for burrowing owls for seismic testing. Buggies may drive within five-feet of these burrows with a biological monitor present.
6. If burrowing owls are observed within the Project area prior to or during the seismic survey, occupied burrows shall not be disturbed during the owl nesting season, February 1 through August 31. If new burrows are found during the non-breeding season the agreed upon project, minimum buffer of 30-feet (reduced buffered approved by CDFW for this data acquisition seismic survey phase of the project [CDFW 2016c]), or a buffer deemed appropriate by the qualified biological monitor, shall be instated until occupancy status is determined. If the buffer cannot be maintained during the non-breeding season, owls may be temporarily evicted from the burrows using accepted methodology as outlined in by CDFW (2012) and approved by resource agencies. Eviction will not occur during the breeding season. If flat-tailed horned lizards are observed within the seismic survey path, the qualified biological monitor, with prior approval through Project acquired permits or permissions from BLM and State Parks, will relocate the individual out of the seismic path, adjacent to where it was moved from.
7. Avoid special-status perennial plant species with a minimum buffer of 5 to 10 feet, depending on the root structure and as determined by the biological monitor.
8. Impacts to special-status species shall first be avoided where feasible, and where not feasible, impacts to special-status species shall be compensated on a case-by-case basis through methods agreed upon prior to seismic survey activities.

9. Any disturbance will be minimized to the maximum extent feasible. Access to sites will be via pre-existing access routes, to the greatest extent possible. Any newly identified biological resources will be temporarily flagged with pin-flags, which will be removed following seismic testing.
10. Vehicles and equipment will be maintained and free of leaks. All hazardous material, oil, hydraulic, or other fluid leaks will be contained and cleaned immediately to reduce the risk of negatively impacting water or soil quality.
11. To avoid attracting predators and nuisance species, the areas of survey testing will be kept clear of debris, where possible. All food-related trash items will be enclosed in sealed containers and regularly removed.
12. Project-related equipment will be washed prior to entering the Project area for the first time to reduce the chance of transporting noxious weed seeds from outside the area.
13. Fire extinguishers, water, and shovels shall be kept on-site during survey activities.

5.0 REFERENCES

Barrows, C.W., and M.F. Allen. 2009. *Conserving species in fragmented habitats: Population dynamics of the flat-tailed horned lizard,* Phrynosoma mcallii. The Southwestern Naturalist 54(3):307-316.

California Department of Fish and Wildlife (CDFW; as CDFG) 2008. *California Interagency Wildlife Task Group*. Sacramento, CA.

_____. 2012. Staff Report on Burrowing Owl Mitigation.

_____. 2016a. California Natural Diversity Database. RareFind, commercial version 3.1.1.

_____. 2016b. *Report to the Fish and Game Commission; A Status Review of the Flat-tailed Horned Lizard (*Phrynosoma mcallii*) in California*. State of California Natural Resources Agency. Sacramento, CA. September.

_____. 2016c. Personal communication with Magdalena Rodriguez, CDFW, and Ken McDonald, POWER Engineers, Inc. April 2016.

_____. 2018. California Natural Diversity Database. RareFind, commercial 5.2.14.

California Native Plant Society (CNPS). 2016. *Inventory of Rare and Endangered Plants* (online edition, v8-01a). California Native Plant Society. Sacramento, CA.

_____. 2018. *Inventory of Rare and Endangered Plants* (online edition, v7-18mar 3-19-18). California Native Plant Society. Sacramento, CA.

Dodd, S.C. 1996. *Report of the 1996 Palm Springs pocket mouse (*Perognathus longimembris bangsi*) surveys*. Palm Desert, CA. Unpublished report to the Coachella Valley Association of Governments.

Funk, R.S. 1981. *Phrynosoma mcallii* (Hallowell) *Flat-tailed horned lizard*. Catalogue of American Amphibians and Reptiles 281:1-2.

Holland, R.F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California* (California Department of Fish and Game The Resources Agency, ed.). Sacramento, CA.

Poulin, R., L.D. Todd, E.A. Haug, B.A. Millsap, and M.S. Martell. 2011. *Burrowing Owl* (*Athene cunicularia*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/061

POWER Engineers, Inc. (POWER). 2017. Truckhaven Geothermal Project. Proposed 3D Geophysical Survey Interim Biological Resources Evaluation Report.

Prescott, B.G. 2005. *Le Conte's Thrasher Species Account, West Mojave Plan, Bureau of Land Management*. Final environmental impact report and statement for the West Mojave plan: a habitat conservation plan and California desert conservation area plan amendment. Moreno Valley (CA): U.S. Dept. of the Interior, Bureau of Land Management, California Desert District.

Sheppard, J.M. 1996. *Le Conte's Thrasher* (Toxostoma lecontei), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/230.

Sherbrooke, W.C. 2003. *Introduction to horned lizards of North America*. California Natural History Guides No. 64. University of California Press, Berkeley and Los Angeles, California.

State Parks Ocotillo Wells Field Office (State Parks). 2017. Personal communication with Sara Lockett, State Parks, and Ken McDonald, POWER Engineers, Inc. September 2017

_____. *2018. Personal communication with Sara Lockett, State Parks, and Ken McDonald, POWER Engineers, Inc. September 2018.*

APPENDIX A PLANT SPECIES OBSERVED DURING THE FIELD SURVEY

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SCIENTIFIC NAME	COMMON NAME
ANGIOSPERMS (DICOTYLEDONS)	
AIZOACEAE	**FIG-MARIGOLD FAMILY**
*Mesembryanthemum nodiflorum**	slender-leaved iceplant
AMARANTHACEAE	**AMARANTH FAMILY**
Tidestromia oblongifolia	honeysweet
APODANTHACEAE	**STEMSUCKER FAMILY**
Pilostyles thurberi	Thurber's pilostyles
ASCLEPIADACEAE	**MILKWEED FAMILY**
Asclepias erosa	desert milkweed
Asclepias subulata	rush milkweed
ASTERACEAE	**SUNFLOWER FAMILY**
Ambrosia dumosa	burro bush
Bebbia juncea	sweetbush
Chaenactis carphoclinia var. *carphoclinia*	pebble pincushion
Chaenactis carphoclinia var. *piersonii*	Peirson's pincushion
Dicoria canescens	bugseed
Encelia frutescens	rayless encelia
Geraea canescens	desert sunflower
Hymenoclea salsola	cheesebush
Isocoma acradenia	alkali goldenbush
*Lactuca serriola**	prickly lettuce
Malacothrix glabrata	desert dandelion
Palafoxia arida	Spanish needles
Perityle emoryi	Emory rock daisy
Pluchea sericea	arrow weed
*Sonchus asper**	prickly sow thistle
Stephanomeria pauciflora	wire lettuce
Sonchus oleraceus	common sow thistle
Xylorhiza orcuttii	Orcutt's woody aster
BORAGINACEAE	**BORAGE FAMILY**
Cryptantha angustifolia	narrowleaf cryptantha
Cryptantha bargigera	bearded fort-me-not
Cryptantha circumscissa	cushion cryptantha
Cryptantha maritima	Guadalupe forget-me-not
Johnstonella costata	ribbed cryptantha
Pectocarya heterocarpa	chuckwalla combseed
Tiquilia palmeri	Palmer's tiquilia
Tiquilia plicata	plicate tiquilia

SCIENTIFIC NAME	COMMON NAME
BRASSICACEAE	**MUSTARD FAMILY**
*Brassica tournefortii**	Sahara mustard
Lepidium densifolium	desert peppergrass
Lepidium sp.	peppergrass
CACTACEAE	**CACTUS FAMILY**
Cylindropuntia echinocarpa	golden cholla
CHENOPODIACEAE	**GOOSEFOOT FAMILY**
Allenrolfea occidentalis	iodine bush
Atriplex canescens	four-wing saltbush
Atriplex elegans	wheel scale
Atriplex hymenelytra	desert holly
Atriplex lentiformis	quail brush
Atriplex polycarpa	allscale
*Beta vulgaris**	beet
*Chenopodium murale**	nettle-leaved goosefoot
Salsola australis	Russian thistle
Salsola sp.*	Russian thistle
Suaeda nigra	bush seepweed
CLEOMACEAE	**SPIDERFLOWER FAMILY**
Cleomella obtusifolia	Mojave stinkweed
EUPHORBIACEAE	**SPURGE FAMILY**
Chamaesyce polycarpa	golondrina
Croton californicus	California croton
Stillingia spinulosa	Mohave stillingia
FABACEAE	**LEGUME FAMILY**
Acacia greggii	cat claw acacia
Astragalus crotalariae	Salton Sea milkvetch
Cercidium floridum	palo verde
*Cystus scoparius**	Scotch broom
Dalea mollis	silky dalea
Prosopis glandulosa	honey mesquite
Psorothamnus emoryi	dye plant
Psorothamnus schottii	indigobush
Psorothamnus spinosus	smokebush
FOUQUIERIACEAE	**OCOTILLO FAMILY**
Fouquieria splendens	ocotillo
GERANIACEAE	**GERANIUM FAMILY**
*Erodium botrys**	broad-lobed filaree
Erodium texanum	Texas filaree

SCIENTIFIC NAME	COMMON NAME
HYDROPHYLLACEAE	**WATERLEAF FAMILY**
Phacelia crenulata	purple phacelia
KRAMERIACEAE	**RHATANY FAMILY**
Krameria bicolor	white rhatany
LOASACEAE	**LOASA FAMILY**
Mentzelia involucrata	bracted blazing star
Petalonyx sp.	sandpaper plant
MALVACEAE	**MALLOW FAMILY**
Eremalche rotundifolia	desert five-spot
MONTIACEAE	**MINER'S LETTUCE FAMILY**
Cistanthe ambigua	desert pussypaws
NYCTAGINACEAE	**FOUR O'CLOCK FAMILY**
Abronia villosa var. *aurita*	chaparral sand-verbena
ONAGRACEAE	**EVENING PRIMROSE FAMILY**
Chylismia cardiophylla	heartleaf suncup
Chylismia claviformis	brown-eyed evening primrose
Eremothera boothii	Booth's evening primrose
PAPAVERACEAE	**POPPY FAMILY**
Eschscholzia minutiflora	pygmy goldenpoppy
PLANTAGINACEAE	**PLANTAIN FAMILY**
Plantago ovata	woolly plantain
POLEMONIACEAE	**PHLOX FAMILY**
Aliciella latifolia	broadleaf gilia
Langloisia setosissima	langlosia
POLYGONACEAE	**BUCKWHEAT FAMILY**
Chorizanthe brevicornu	brittle spineflower
Chorizanthe corrugata	wrinkled spineflower
Chorizanthe rigida	rigid spineflower
Eriogonum deflexum	flat-topped buckwheat
Eriogonum inflatum	desert trumpet
Eriogonum reniforme	buckwheat
Eriogonum thomasii	Thomas eriogonum
Eriogonum trichopes	little trumpet
PORTULACACEAE	**PURSLANE FAMILY**
Portulaca halimoides	desert portulaca
RESDACEAE	**MIGNONETTE FAMILY**
Oligomeris linifolia	narrow-leaved oligomeris

SCIENTIFIC NAME	COMMON NAME
SOLANACEAE	**NIGHTSHADE FAMILY**
Datura discolor	desert thorn apple
Lycium andersonii	Anderson's box-thorn
Lycium brevipes	Baja desert-thorn
TAMARICACEAE	**TAMARISK FAMILY**
*Tamarix aphylla**	athel
*Tamarix ramosissima**	Mediterranean tamarisk
ZYGOPHYLLACEAE	**CALTROP FAMILY**
Larrea tridentata	creosote bush
ANGIOSPERMS (MONOCOTYLEDONS)	
ARECACEAE	**PALM FAMILY**
Arecastrum sp.*	palm
CYPERACEAE	**SEDGE FAMILY**
Schoenoplectus americanus	Olney's three-square rush
LILIACEAE	**LILY FAMILY**
Hesperocallis undulata	desert lily
POACEAE	**GRASS FAMILY**
Aristida adscensionis	six-week's three-awn
Distichlis spicata	saltgrass
Festuca sp.	fescue
*Phalaris minor**	Mediterranean canary grass
Pleuraphis rigida	galleta grass
*Schismus arabicus**	Arabian schismus
*Schismus barbatus**	Mediterranean schismus
TYPHACEAE	**CATTAIL FAMILY**
Typha sp.	cattail

APPENDIX B WILDLIFE SPECIES OBSERVED DURING THE FIELD SURVEY

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SCIENTIFIC NAME	COMMON NAME
CLASS INSECTA	**INSECTS**
POMPILIDAE	**SPIDER WASPS**
Pepsis sp.	tarantula hawk
DANAIDAE	**MILKWEED BUTTERFLIES**
Danaus gilippus	queen
PIERIDAE	**WHITES & SULPHURS**
Pontia bedkerii	Becker's white
Pontia protodice	checkered white
HESPERIIDAE	**TRUE SKIPPERS**
Hesperopsis libya	Mohave sootywing
CLASS REPTILIA	**REPTILES**
IGUANIDAE	**IGUANID LIZARDS**
Callisaurus draconoides draconoides	common zebra-tailed lizard
Dipsosaurus dorsalis	desert iguana
Phrynosoma sp.	horned lizard
Phrynosoma mcalli	flat-tailed horned lizard
Uma notata	Colorado Desert fringe-toed lizard
Uta stansburiana	common side-blotched lizard
TEIIDAE	**WHIPTAIL LIZARDS**
Cnemidophorus sp.	whiptail
COLUBRIDAE	**COLUBRID SNAKES**
Masticophis flagellum fulginosus	Baja California coachwhip
VIPERIDAE	**VIPERS**
Crotalus cerastes laterorepens	Colorado desert sidewinder
CLASS AVES	**BIRDS**
CATHARTIDAE	**NEW WORLD VULTURES**
Cathartes aura	turkey vulture
ACCIPITRIDAE	**HAWKS, KITES, EAGLES**
Buteo jamaicensis	red-tailed hawk
FALCONIDAE	**FALCONS**
Falco mexicanus	prairie falcon
Falco sparverius	American kestrel
ODONTOPHORIDAE	**NEW WORLD QUAIL**
Callipepla gambelii	Gambel's quail
CHARADRIIDAE	**PLOVERS**
Charadrius vociferus	killdeer
COLUMBIDAE	**PIGEONS & DOVES**
Columba livia	rock pigeon
Zenaida macroura	mourning dove

SCIENTIFIC NAME	COMMON NAME
CAPRIMULGIDAE	**NIGHTHAWKS**
Chordeiles acutipennis	lesser nighthawk
APODIDAE	**SWIFTS**
Aeronautes saxatalis	white-throated swift
TYRANNIDAE	**TYRANT FLYCATCHERS**
Empidonax difficilis	Pacific-slope flycatcher
Myiarchus cinerascens	ash-throated flycatcher
Sayornis saya	Say's phoebe
Tyrannus verticalis	western kingbird
ALAUDIDAE	**LARKS**
Eremophila alpestris	horned lark
HIRUNDINIDAE	**SWALLOWS**
Petrochelidon pyrrhonota	cliff swallow
Hirundo rustica	barn swallow
Stelgidopteryx serripennis	northern rough-winged swallow
CORVIDAE	**JAYS & CROWS**
Corvus corax	common raven
STURNIDAE	**STARLINGS**
Sturnus vulgaris	European starling
VIREONIDAE	**VIREOS**
Vireo gilvus	warbling vireo
PARULIDAE	**WOOD WARBLERS**
Vermivora celata	orange-crowned warbler
Vermivora ruficapilla	Nashville warbler
Dendroica townsendi	Townsend's warbler
Oporornis tolmiei	MacGillivray's warbler
Wilsonia pusilla	Wilson's warbler
ICTERIDAE	**BLACKBIRDS**
Icterus bullockii	Bullock’s oriole
Icterus parisorum	Scott's oriole
Sturnella neglecta	western meadowlark
Quiscalus mexicanus	great-tailed grackle
EMBERIZIDAE	**EMBERIZIDS**
Passerculus sandwichensis	savannah sparrow
CARDINALIDAE	**CARDINALS**
Pheucticus melanocephalus	black-headed grosbeak
FRINGILLIDAE	**FINCHES**
Carpodacus mexicanus	house finch
PASSERIDAE	**OLD WORLD SPARROWS**
Passer domesticus	house sparrow

SCIENTIFIC NAME	COMMON NAME
CLASS MAMMALIA	**MAMMALS**
LEPORIDAE	**HARES & RABBITS**
Lepus californicus	black-tailed prabbit
Sylvilagus audubonii	desert cottontail
SCIURIDAE	**SQUIRRELS**
Spermophilus tereticaudus	round-tailed ground squirrel
HETEROMYIDAE	**POCKET MICE & KANGAROO RATS**
Dipodomys sp.	kangaroo rat
FELIDAE	**CATS**
Lynx rufus	bobcat
CANIDAE	**WOLVES & FOXES**
Canis latrans	coyote
Vulpes macrotis	kit fox

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APPENDIX C SPECIAL-STATUS PLANT SPECIES AND THEIR POTENTIAL TO OCCUR WITHIN THE BIOLOGICAL SURVEY AREA

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SPECIAL-STATUS PLANT SPECIES AND THEIR POTENTIAL TO OCCUR WITHIN THE BIOLOGICAL SURVEY AREA

SPECIES	STATUS	HABITAT	BLOOMING PERIOD	POTENTIAL FOR OCCURRENCE
Abronia villosa var. aurita chaparral sand-verbena	Fed: None State: None CNPS: 1B.1 BLM: S	Annual herb occurring in chaparral, coastal scrub, and desert dunes, on sandy soils. From 245 to 5,250 feet in elevation.	March – September	**Present.** Observed within the BSA during the survey.
Astragalus crotalariae Salton milk-vetch	Fed: None State: None CNPS: 4.3	Perennial herb occurring in desert wash and Sonoran desert scrub, on sandy or gravelly soils. From 195 to 820 feet in elevation.	January – April	**Present.** Observed within the BSA during the survey.
Astragalus insularis var. *harwoodii* Harwood's milk-vetch	Fed: None State: None CNPS: 2B.2	Annual herb occurring on desert dunes, desert wash, and Mojavean desert scrub, on sandy or gravelly soils. From 0 to 2,330 feet in elevation.	January – May	**Moderate**. Suitable habitat occurs within the BSA.
Astragalus magdalenae var. *peirsonii* Peirson's milk-vetch	Fed: **THR** State: **END** CNPS: 1B.2	Perennial herb occurring on desert dunes. From 195 to 740 feet in elevation.	December – April	**Absent**. No suitable habitat occurs within the BSA.
Bursera microphylla littleleaf elephant tree	Fed: None State: None CNPS: 2B.3	Perennial deciduous tree occurring in desert wash, Sonoran desert scrub, on rocky soils. From 655 to 2,300 feet in elevation.	June – July	**Absent**. The BSA is below the known elevation range for the species.
Castela emoryi crucifixion thorn	Fed: None State: None CNPS: 2B.2	Perennial deciduous shrub occurring on alkali playa, desert wash, Mojavean desert scrub and Sonoran desert scrub, on gravelly soils. From 300 to 2,380 feet in elevation.	June – July	**Low**. Suitable habitat occurs on site, but the BSA is below the known elevation range for the species.
Chaenactis carphoclinia var. *peirsonii* Peirson's pincushion	Fed: None State: None CNPS: 1B.3	Annual herb occurring in Sonoran desert scrub, on sandy soils. From 10 to 1,640 feet in elevation.	March – April	**Present.** Observed within the BSA during the survey.
Chaenactis glabriuscula var. *orcuttiana* Orcutt's pincushion	Fed: None State: None CNPS: 1B.1 BLM: S	Annual herb occurring in coastal bluff scrub and coastal dunes. From 0 to 330 feet in elevation.	January – August	**Absent**. No suitable habitat occurs within the BSA.
Chorizanthe polygonoides var. *longispina* long-spined spineflower	Fed: None State: None CNPS: 1B.2 BLM: S	Annual herb occurring in chaparral, coastal scrub, meadows and seeps, valley and foothill grassland, ultramafic soils, and vernal pools in clay soils. From 100 to 5,020 feet in elevation.	April – June	**Absent**. No suitable habitat occurs within the BSA.

SPECIES	STATUS	HABITAT	BLOOMING PERIOD	POTENTIAL FOR OCCURRENCE
Croton wigginsii Wiggin's croton	Fed: None State: **Rare** CNPS: 2B.2 BLM: S	Perennial shrub occurring on desert dunes and Sonoran desert scrub, on sandy soils. From 165 to 330 feet in elevation.	March – May	**Moderate**. Suitable habitat occurs within the BSA.
Cylindropuntia fosbergii pink teddy-bear cholla	Fed: None State: None CNPS: 1B.3 BLM: S	Perennial stem succulent occurring in Sonoran desert scrub. From 280 to 2,790 feet in elevation.	March – May	**Low**. Suitable habitat occurs on site, but the BSA is below the known elevation range for the species.
Cylindropuntia munzii Munz's cholla	Fed: None State: None CNPS: 1B.3 BLM: S	Perennial stem succulent occurring in Sonoran desert scrub, on sandy or gravelly soils. From 490 to 1,970 feet in elevation.	May	**Low**. Suitable habitat occurs on site, but the BSA is below the known elevation range for the species.
Dieteria asteroids var. lagunensis Mount Laguna aster	Fed: None State: **Rare** CNPS: 2B.1 BLM: S	Perennial herb occurring in cismontane woodland and lower montane coniferous forest. From 2,590 to 7,875 feet in elevation.	July – August	**Absent**. The BSA is below the known elevation range for the species.
Euphorbia abramsiana Abram's spurge	Fed: None State: None CNPS: 2B.2	Annual herb occurring in Mojavean desert scrub and Sonoran desert scrub, on sandy soils. From -15 to 4,300 feet in elevation.	August – November	**Moderate**. Suitable habitat occurs within the BSA.
Euphorbia platysperma flat-seeded spurge	Fed: None State: None CNPS: 1B.2 BLM: S	Annual herb occurring in desert dunes and Sonoran desert scrub, on sandy soils. From 215 to 330 feet in elevation.	February – September	**Low**. Suitable habitat occurs on site, but the BSA is below the known elevation range for the species, and there are no known occurrences within 10 miles.
Fremontodendron mexicanum Mexican flannelbush	Fed: **END** State: **Rare** CNPS: 1B.1	Perennial evergreen shrub occurring in chaparral, cismontane woodlands, and closed-cone coniferous forest, on gabbroic, metavolcanic, or serpentinite soils. From 30 to 2,350 feet in elevation.	March – June	**Absent**. No suitable habitat occurs within the BSA.
Grindelia hallii San Diego sunflower	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial herb occurring in chaparral, lower montane coniferous forest, meadows and seeps, and valley and foothill grassland. From 605 to 5,725 feet in elevation.	May – October	**Absent**. No suitable habitat occurs within the BSA, and is below the known elevation range for the species.
Helianthus niveus ssp. *tephrodes* Algodones Dunes sunflower	Fed: None State: **END** CNPS: 1B.2 BLM: S	Perennial herb occurring on desert dunes. From 165 to 330 feet in elevation.	September – May	**Absent**. No suitable habitat occurs within the BSA.

SPECIES	STATUS	HABITAT	BLOOMING PERIOD	POTENTIAL FOR OCCURRENCE
Hulsea californica San Diego sunflower	Fed: None State: None CNPS: 1B.3 BLM: S	Perennial herb occurring in chaparral, lower montane coniferous forest, and upper montane coniferous forest in openings and burned areas. From 3,000 to 9,560 feet in elevation.	April – June	**Absent**. No suitable habitat occurs within the BSA, and is below the known elevation range for the species.
Johnstonella costata (=*Cryptantha costata*) ribbed cryptantha	Fed: None State: None CNPS: 4.3 BLM: S	Annual herb occurring in desert dunes, Mojavean desert scrub, and Sonoran desert scrub, on sandy soils. From -195 to 1,640 feet in elevation.	February – May	**Present.** Observed within the BSA during the survey.
Lepidium flavum var. *felipense* Borrego Valley pepper-grass	Fed: None State: None CNPS: 1B.2 BLM: S	Annual herb occurring in pinyon and juniper woodlands and Sonoran desert scrub, on sandy soils. From 1,490 to 2,755 feet in elevation.	March – May	**Absent**. The BSA is below the known elevation range for the species.
Lupinus excubitus var. *medius* Mountain Springs bush lupine	Fed: None State: None CNPS: 1B.3	Perennial shrub occurring in pinyon and juniper woodlands and Sonoran desert scrub. From 1,395 to 4,495 feet in elevation.	March – May	**Absent**. The BSA is below the known elevation range for the species.
Lycium parishii Parish's desert-thorn	Fed: None State: None CNPS: 2B.3	Perennial shrub occurring in coastal scrub and Sonoran desert scrub. From 440 to 3,280 feet in elevation.	March – April	**Absent**. The BSA is below the known elevation range for the species.
Malperia tenuis brown turbans	Fed: None State: None CNPS: 2B.3	Annual herb occurring in Sonoran desert scrub, on sandy or gravelly soils. From 50 to 1,100 feet in elevation.	March – April	**Low**. Suitable habitat occurs within the BSA, but there are no known occurrences within 10 miles.
Monardella nana ssp. *leptosiphon* San Felipe monardella	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial rhizomatous herb occurring in chaparral and lower montane coniferous forest. From 3,940 to 6,085 feet in elevation.	June – July	**Absent**. No suitable habitat occurs within the BSA, and is below the known elevation range for the species.
Monardella robisonii Robison's monardella	Fed: None State: None CNPS: 1B.3 BLM: S	Perennial rhizomatous herb occurring in pinyon and juniper woodlands. From 2,000 to 4,920 feet in elevation.	April – September	**Absent**. No suitable habitat occurs within the BSA, and is below the known elevation range for the species.
Palafoxia arida var. *gigantea* giant Spanish needle	Fed: None State: None CNPS: 1B.3 BLM: S	Annual to perennial herb occurring on desert dunes. From 50 to 330 feet in elevation.	February – May	**Absent**. No suitable habitat occurs within the BSA.

SPECIES	STATUS	HABITAT	BLOOMING PERIOD	POTENTIAL FOR OCCURRENCE
Pholisma sonorae sand food	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial parasitic herb occurring on desert dunes and Sonoran desert scrub on sandy soils. From 0 to 655 feet in elevation.	April – June	**Moderate**. Suitable habitat occurs within the BSA.
Pilostyles thurberi Thurber's pilostyles	Fed: None State: None CNPS: 4.3	Perennial parasitic herb occurring on *Psorothamnus* in Sonoran desert scrub. From 0 to 1,120 feet in elevation.	December – April	**Present.** Observed within the BSA during the survey.
Salvia greatae Orocopia sage	Fed: None State: None CNPS: 1B.3 BLM: S	Perennial evergreen shrub occurring in desert wash, Mojavean desert scrub, and Sonoran desert scrub. From -130 to 2,705 feet in elevation.	March – April	**Low**. Suitable habitat occurs within the BSA, but all known populations occur on northeastern portion of the Salton Sea.
Schoenoplectus americanus Olney's three-square bulrush	Fed: None State: None CNPS: None State Parks: S	Perennial rhizomatous herb occurring in mineral-rich or brackish marshes, shores, fens, seeps, and springs. Up to 7,220 feet in elevation.	May - August	**Present.** Observed within the BSA during the survey.
Senna covesii Cove's senna	Fed: None State: None CNPS: 2B.2	Perennial herb occurring in sandy desert washes and slopes, and in Sonoran desert scrub. From 740 to 4,250 feet in elevation.	March – June	**Absent**. The BSA is below the known elevation range for the species.
Streptanthus campestris Southern jewel-flower	Fed: None State: None CNPS: 1B.3 BLM: S	Perennial rhizomatous herb occurring in chaparral, lower montane coniferous forest, and pinyon and juniper woodlands, on rocky soils. From 2,950 to 7,545 feet in elevation.	May – July	**Absent**. No suitable habitat occurs within the BSA, and is below the known elevation range for the species.
Symphyotrichum defoliatum San Bernardino aster	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial rhizomatous herb occurring in cismontane woodland, coastal scrub, lower montane coniferous forest, marsh and swamps, meadows and seeps, and valley and foothill grassland. From 5 to 6,690 feet in elevation.	July – November	**Absent**. No suitable habitat occurs within the BSA.
Thermopsis californica var. *semota* velvety false lupine	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial rhizomatous herb occurring in cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, and wetlands. From 3,280 to 6,150 feet in elevation	March – June	**Absent**. No suitable habitat occurs within the BSA, and is below the known elevation range for the species.

SPECIES	STATUS	HABITAT	BLOOMING PERIOD	POTENTIAL FOR OCCURRENCE
Thysanocarpus rigidus ridge fringepod	Fed: None State: None CNPS: 1B.2 BLM: S	Annual herb occurring in pinyon and juniper woodlands, often on dry rocky slopes. From 1,970 to 7,220 feet in elevation.	February – May	**Absent**. No suitable habitat occurs within the BSA, and is below the known elevation range for the species.
Xylorhiza cognata Mecca aster	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial herb occurring in Sonoran desert scrub. From 65 to 1,310 feet in elevation.	January – June	**Low**. Suitable habitat occurs within the BSA, but all known populations occur on northeastern portion of the Salton Sea.
Xylorhiza orcuttii Orcutt's woody aster	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial herb occurring in desert wash and Sonoran desert scrub. From 0 to 1,200 feet in elevation.	March – April	**Present.** Observed within the BSA during the survey.

Absent: Species or sign not observed on the site, outside of the known range, and conditions unsuitable for occurrence.
Low: Species or sign not observed on the site, but conditions marginal for occurrence.
Moderate: Species or sign not observed on the site, but conditions suitable for occurrence and/or an historical record exists in the vicinity.
High: Species or sign not observed on the site, but reasonably certain to occur on the site based on conditions, species ranges, and recent records.
Present: Species or sign of their presence recently observed on the site.

Federal status
END = listed as Endangered under the federal Endangered Species Act
Delisted = previously listed under the federal Endangered Species Act but now removed
State status
END = listed as Endangered under the California Endangered Species Act
BLM status
S = designated as a Sensitive species
State Parks status
S = designated as a Sensitive species

SRPR State Rare Plant Rank
1A: Plants presumed extirpated in California and either rare or extinct elsewhere.
1B: Considered rare, threatened, or endangered in California and elsewhere.
2A: Plants presumed extirpated in California, but more common elsewhere
2B: Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere
3: Plants About Which More Information is Needed – A Review List
4: Plants of Limited Distribution - A Watch List

Threat Ranks/ Decimal notations: A California Native Plant Society extension added to the SSRPR
.1 Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2 Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)
.3 Not very threatened in California (less than 20% of occurrences threatened / low degree and immediacy of threat or no current threats known)

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APPENDIX D SPECIAL-STATUS WILDLIFE SPECIES AND THEIR POTENTIAL TO OCCUR WITHIN THE BIOLOGICAL SURVEY AREA

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SPECIAL-STATUS WILDLIFE SPECIES AND THEIR POTENTIAL TO OCCUR WITHIN THE BIOLOGICAL SURVEY AREA

SPECIES	STATUS	HABITAT	POTENTIAL FOR OCCURRENCE
Antrozous pallidus pallid bat	Fed: None State: SSC BLM: S	Occurs in chaparral, coastal scrub, desert wash, Great Basin grassland, Great Basin scrub, Mojavean desert scrub, riparian woodland, Sonoran desert scrub, upper montane coniferous forest, and valley and foothills grassland. Most common in open, dry habitats with rock areas for roosting. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	**Low**. This species has been detected within the SVRA within five miles of the BSA (personal communication, State Parks 2017), and suitable foraging habitat for this species occurs within the BSA, but roosting habitat is of low quality, combined with frequent anthropogenic disturbance.
Athene cunicularia burrowing owl	Fed: None State: SSC BLM: S	Occurs in open, dry annual or perennial grasslands, deserts, and scrublands with low-growing vegetation. This includes a wide variety of vegetation communities, including coastal prairies, coastal scrub, Great Basin grassland, Great Basin scrub, Mojavean desert scrub, Sonoran desert scrub, and valley and foothill grasslands. Depends on fossorial mammals for burrows.	**Moderate**. There is only one record of this species in the general Project vicinity (CDFW 2018), but two observations within one mile of the BSA have been recorded by State Parks (2018). There were occasional suitable burrows within the survey area that could support this species, but there were few insects observed for prey.
Charadrius alexandrines nivosus western snowy plower	Fed: **THR** State: SSC BLM: S	Occurs in Great Basin standing waters, sand shores, salt pond levees and shores of large alkali lakes, and wetlands. Requires sandy, gravelly, or friable soils for nesting.	**Absent**. No suitable habitat is present within the BSA.
Charadrius montanus mountain plover	Fed: None State: SSC BLM: S	Occurs in chenopod scrub, short grasslands, freshly-plowed fields, newly-sprouting grain fields, and occasionally sod farms. Needs a mixture of short vegetation and bare ground, along with flat topography. Prefers grazed areas and areas with fossorial rodents.	**Absent**. No suitable habitat is present within the BSA.
Falco mexicanus prairie falcon	Fed: None State: WL	Occurs in Great Basin grassland, Great Basin scrub, Mojavean desert scrub, Sonoran desert scrub, and valley and foothill grassland.	**Low.** While suitable foraging habitat occurs within the BSA, only some suitable nesting habitat for this species occurs.
Lasiurus blossevillii western red bat	Fed: None State: SSC	Occurs in cismontane woodland, lower montane coniferous forest, riparian forest, and riparian woodland. Roosts primarily in trees 2-40 feet above ground, preferring habitat edges and mosaics with trees that are protected from above and open below with opens areas for foraging.	**Low**. This species has been detected within the SVRA within five miles of the BSA (personal communication, State Parks 2017), but no suitable foraging or roosting habitat for this species occurs within the BSA.

SPECIES	STATUS	HABITAT	POTENTIAL FOR OCCURRENCE
Oliarces clara cheeseweed owlfly	Fed: None State: None	Occurs in the lower Colorado River drainage. It is found under rocks or in flight over streams. *Larrea tridentata* is the suspected larval host.	**Low**. *Larrea tridentata* occurs within the BSA, but one confirmed observation in the vicinity is more than five miles from the site.
Pelecanus occidentalis californicus California brown pelican	Fed: Delisted State: **FP** BLM: S	This colonial rooster and nester generally occurs on coastal islands outside of the survey line, but also nests on small islands of small to moderate size which afford immunity from attack by ground-dwelling predators.	**Absent**. No suitable habitat is present within the BSA.
Perognathus longimembris bangsi Palm Springs pocket mouse	Fed: None State: SSC BLM: S	Occurs in desert riparian, desert washes and Sonoran desert scrub. Most common in desert scrub dominated by creosote. Rarely found on rock sites.	**Moderate**. Suitable habitat for this species occurs within the BSA.
Phrynosoma mcallii flat-tailed horned lizard	Fed: None State: SSC BLM: S	Occurs in desert dunes, Mojavean desert scrub, and Sonoran desert scrub in central Riverside, eastern San Diego, and Imperial Counties.	**High**. Suitable habitat for this species occurs within the BSA.
Toxostoma lecontei Le Conte's thrasher	Fed: None State: SSC	Occurs primarily in open desert wash, desert scrub, alkali desert scrub, and desert succulent scrub habitats. Commonly nests in dense, spiny shrubs or densely-branched cacti.	**Low**. Some suitable habitat for this species occurs within the BSA.
Xantusia gracilis sandstone night lizard	Fed: None State: None BLM: S	Known only from the Truckhaven Rocks in the eastern part of Anza-Borrego State Park. Found in fissures or under slabs of exfoliating sandstone and rodent burrows in compacted sandstone and mudstone.	**Absent**. The Truckhaven Rocks is a highly localized area more than five miles from the BSA.

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Low: Species or sign not observed on the site, but conditions marginal for occurrence.
Moderate: Species or sign not observed on the site, but conditions suitable for occurrence and/or an historical record exists in the vicinity.
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Present: Species or sign of their presence recently observed on the site.

Federal status
END = listed as Endangered under the federal Endangered Species Act
THR = listed as Threatened under the federal Endangered Species Act
State status
END = listed as Endangered under the California Endangered Species Act
THR = listed as Threatened under the California Endangered Species Act
SSC = designated as a Species of Concern
FP = designated as a Fully Protected species
WL = watch list species
BLM status
S = designated as a Sensitive species
Other
CNDDB = this species is only listed by the CNDDB and may be locally sensitive or its occurrences may be monitored to see if further protection is needed

APPENDIX C – PROPOSED WELL SITES BOTANICAL SURVEY REPORT

August 2017

ORMAT NEVADA, INC.

Truckhaven Geothermal Project

Proposed Well Sites

Botanical Survey Report

PROJECT NUMBER:
146567

PROJECT CONTACT:
Ken McDonald
EMAIL:
ken.mcDonald@powereng.com
PHONE:
(714) 507-2700

POWER ENGINEERS

Truckhaven Geothermal Project
Proposed Well Sites
Botanical Survey Report

PREPARED FOR: ORMAT NEVADA, INC.

PREPARED BY: KEN MCDONALD
PHONE: (714) 507-2700
EMAIL: KEN.MCDONALD@POWERENG.COM

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ACRONYMS AND ABBREVIATIONS

BLM	Bureau of Land Management
BSA	biological survey area
CDFW	California Department of Fish and Wildlife
CNPS	California Native Plant Society
CNDDB	California Natural Diversity Database
GPS	global positioning system
Ormat	Ormat Nevada, Inc.
Project	Truckhaven Geothermal Project
POWER	POWER Engineers, Inc.
SRPR	State Rare Plant Rank
USFWS	U.S. Fish and Wildlife Service

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1.0 INTRODUCTION

This document presents the findings of the focused special-status plant survey for the Ormat Nevada, Inc. (Ormat) Truckhaven Geothermal Project (Project). This survey focused exclusively on portions of the Project that will be physically disturbed to allow for construction of wells, well pads, and access roads.

1.1 Project Description

Ormat is proposing to construct six wells located on pads in the vicinity of the Salton Sea Airport in Imperial County, California (Figure 1), situated at the north end of the U.S. Department of the Interior, Bureau of Land Management (BLM) Truckhaven Geothermal Lease Area. Lands within the Project footprint are federal, state, and private. Future construction of a geothermal power plant that can make use of these wells will occur under separate environmental compliance and permitting documentation.

This report focuses on the proposed well pads, access roads, and sufficient buffer areas to allow for the adjusting of pads and roads should the need arise. The biological survey area (BSA) is depicted in Figure 2.

1.2 Project Location

The proposed Project site is located within and south of Salton City, west of the Salton Sea in the northern portion of Imperial Valley, California. The BSA consists of several discontinuous polygons adjacent to and surrounding the Salton Sea Airport (Figure 2). The elevation of the site ranges from approximately 50 feet below mean sea level to 130 feet below mean sea level. Land use in the BSA consists of low-density residential housing and associated infrastructure and open, natural areas sparsely vegetated with native and non-native plant species.

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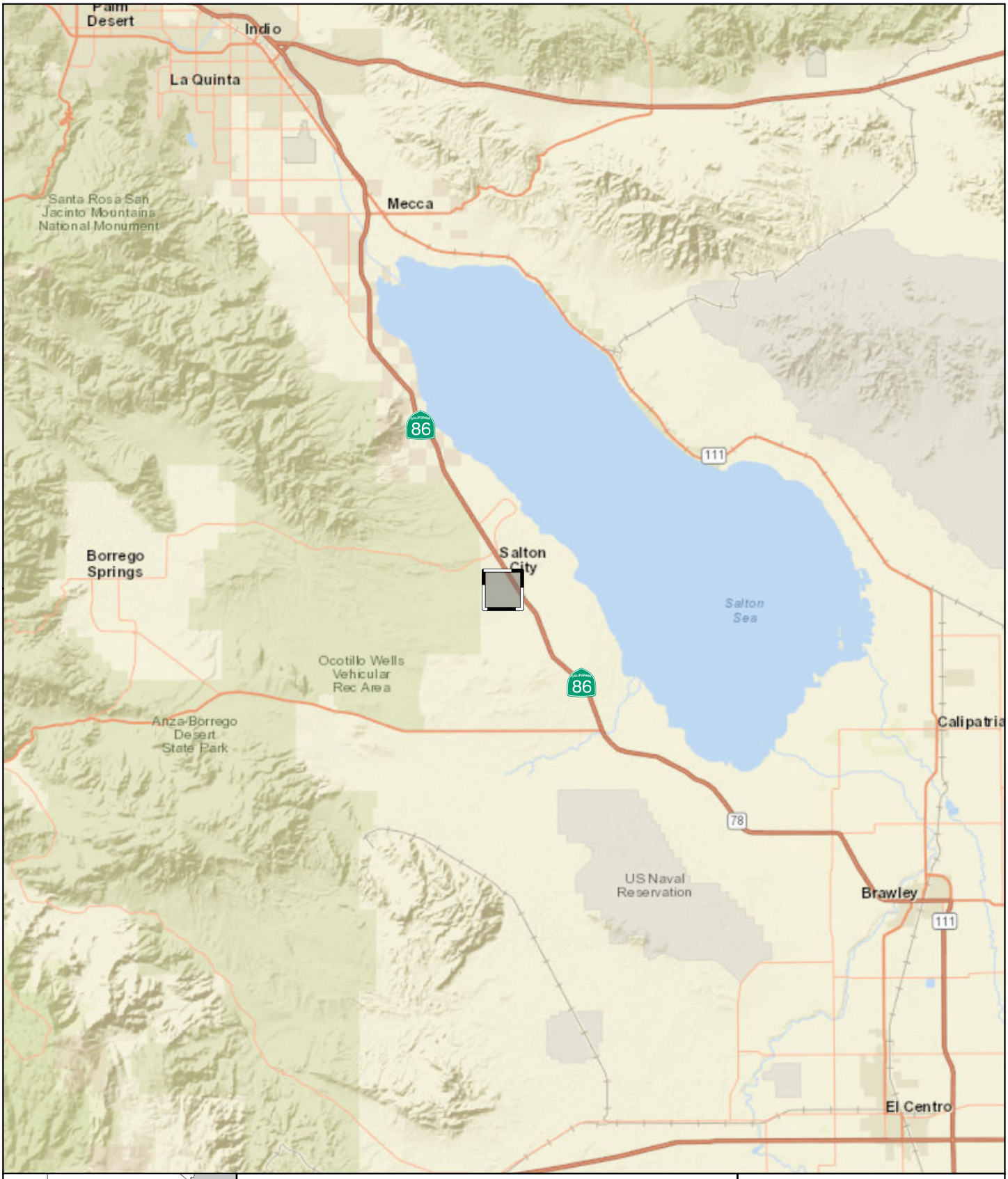

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Project Area

ORMAT-NEVADA, INC. TRUCKHAVEN

Figure 1
Regional Location

0 2 4 6 8 10

Miles

N

POWER ENGINEERS

Date: 7/7/2017

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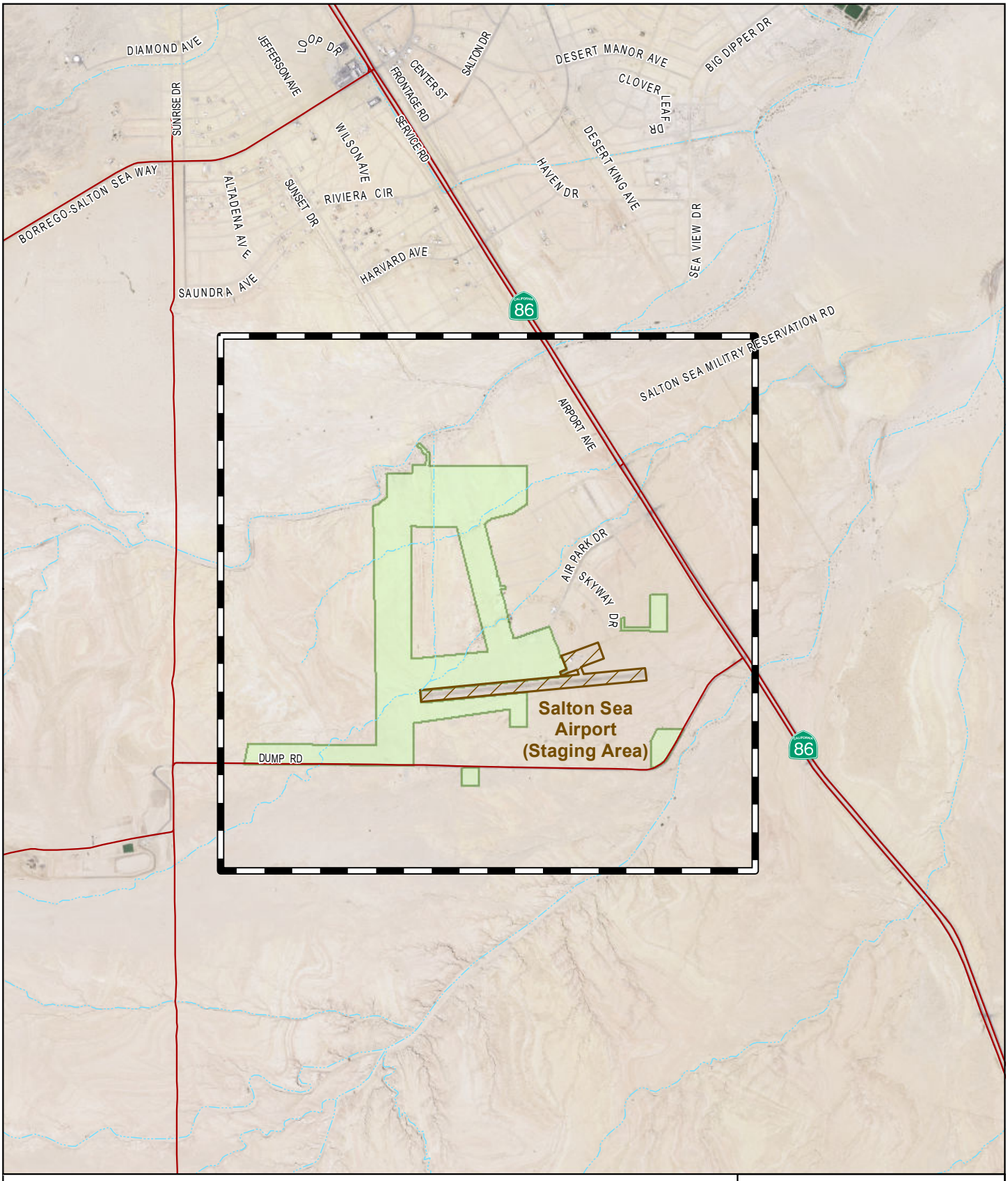

Legend

- Project Area
- Botanical Survey Area
- Salton Sea Airport (Staging Area)
- Highway or Main Road
- Intermittent Stream, Wash, or Ditch

Aerial Photography: 2016 NAIP

ORMAT-NEVADA, INC. TRUCKHAVEN

Figure 2
Biological Survey Area

0 500 1,000 1,500

Meters

N

POWER ENGINEERS

Date: 7/7/2017

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2.0 SURVEY AREA

The BSA consists of four polygons of various sizes encompassing the proposed well pads and associated access roads, with sufficient buffer to refine the final disturbance footprint (Figure 2). The BSA includes federal, state, and private lands on the following U.S. Geological Survey 7.5' quadrangles: Truckhaven, Kane Spring NW, Shell Reef, and Seventeen Palms. The federal lands are administered by BLM and state lands by the State Lands Commission.

2.1 Vegetation Communities

Descriptions of vegetation types that occur within the BSA are provided below. Vegetation was classified using Holland's *Preliminary Descriptions of the Terrestrial Natural Communities of California* as a guide and primary reference (Holland 1986). Communities were classified to the closest described vegetation type. Composition of any community will vary due to various site specific factors, such as elevation, slope, aspect, and disturbance regime, and can appear dissimilar while remaining within the greater classified vegetation community. Vegetation communities within and adjacent to the BSA are presented in Figure 3.

Sonoran Creosote Bush Scrub

Sonoran creosote bush scrub is a widely spaced open community generally dominated by creosote (*Larrea tridentata*) and burro bush (*Ambrosia dumosa*), usually with abundant bare ground between larger shrubs. Growth in this community occurs from winter to early spring, and later with sufficient rainfall, with the shrubs often dormant for long periods. During years of sufficient rainfall, the bare ground is filled with ephemeral herbs. This community typically occurs on well-drained secondary soils of slopes, fans, and valley, rather than upland sites, with winter temperatures seldom below freezing (Holland 1986).

This community was noted to be very sparse in areas constituting a separate mapping layer of "sparse" Sonoran creosote bush scrub. In these areas, the community appeared to be essentially bare of vegetation, but remnant components of the community were present in sufficient number to classify the vegetation type.

Desert Saltbush Scrub

Desert saltbush scrub is a low-growing open community dominated by chenopod bushes (*Atriplex* spp.), usually with a low-growing herbaceous cover. Total cover in this community is often low, with abundant bare ground between widely spaced shrubs. Stands of shrubs are typically dominated by a single Atriplex species. Common species in this community include four-wing saltbush (*Atriplex canescens*), desert holly (*Atriplex hymenolytra*), shadscale (*Atriplex confertifolia*), allscale (*Atriplex polycarpa*), and hop sage (*Grayia spinosa*). This community typically occurs on fine-textured, poorly drained soils with high alkalinity and/or salinity (Holland 1986).

This community was noted to be very sparse in areas constituting a separate mapping layer of "sparse" saltbush scrub. In these areas, the community appeared to be essentially bare of vegetation, but remnant components of the community were present in sufficient number to classify the vegetation type.

Desert Wash

Desert wash is a sparsely vegetated to bare community occurring throughout the BSA. These sandy to hardened silty-mud substrate washes most closely resemble the Holland (1986) vegetation descriptions of tamarisk scrub and arrow weed scrub communities. Where vegetation occurs in the washes, tamarisk (*Tamarix* sp.) was the largest shrub, while arrow weed (*Pluchea sericea*) was the

most common. Occasionally, these washes also harbored Sonoran creosote bush scrub and desert saltbush scrub vegetation. Seeps occurred intermittently within desert washes, and were comprised mainly of salt grass (*Distichlis spicata*).

Bare Ground/Disturbed

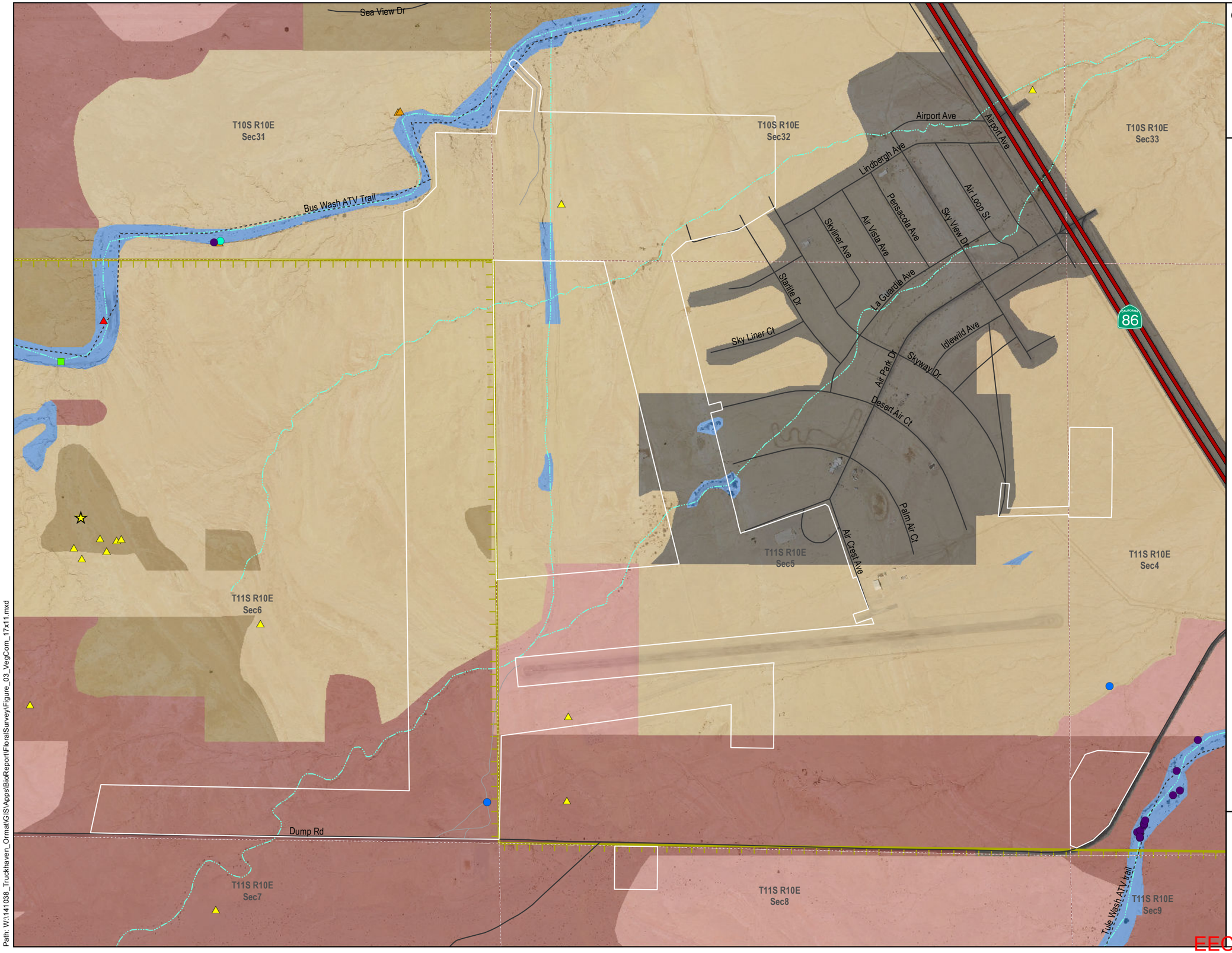
Bare ground and disturbed areas within the BSA occurred mainly adjacent to developed areas and infrastructure, generally in the form of bare, compacted soils from human activities. Vegetation in these areas tended to be sparse and weedy. Occasional individuals of the special-status Salton milk-vetch (*Astragalus crotalariae*), which thrives on disturbance, occur in disturbed areas and the edges of developed areas.

Developed

Developed areas include roads, built structures, and associated infrastructure. Areas generally considered developed include dirt and paved roads, transmission lines, underground gas pipelines, railroads, and any other permanent structures. Examples of this habitat type within the BSA are found throughout the Project area in the form of roads, with the highest concentrations found near the north eastern portion of the site.

ORMAT-NEVADA, INC. TRUCKHAVEN

Figure 3
Biological Resources



Legend

Project Components
- Botanical Survey Area

Sensitive Areas

Flora
- Abronia villosa var. aurita
- Astragalus crotalariae
- Chaenactis carphoclinia ssp. peirsonii

Fauna
- FTHL
- FTHL: potential burrow
- CORA: nest
- BUOW: potential burrow

Other Biological Areas
- Seep

Vegetation
- Sonoran creosote bush scrub
- sparse Sonoran creosote bush scrub
- desert saltbush scrub
- sparse desert saltbush scrub
- desert wash
- seep
- bare ground/disturbed

Base Data
- State Highway
- Local Road
- Dirt Road
- Trail
- Section
- Intermittent Stream, Wash, or Ditch
- Ocotillo Wells SVRA

0 200 400 600
Meters

N

POWER ENGINEERS

Date: 7/7/2017

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3.0 SURVEY METHODOLOGY

Focused special-status plant species surveys were conducted in late-spring and early summer, 2017. The surveys were conducted during the appropriate blooming periods for special-status plant species. The survey methodology followed the U.S. Fish and Wildlife Service's (USFWS) *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (USFWS 1996), the recommended botanical survey guidelines of the California Department of Fish and Wildlife (CDFW; CDFW 2000), the protocols for surveying and evaluating impacts (CDFW 2009), the BLM (BLM 2005), and the California Native Plant Society (CNPS; CNPS 2001).

3.1 Pre-field Preparations

Before conducting the botanical surveys, pre-field research was conducted to determine which special-status plants had potential to occur within the Project area. This list of potentially occurring special-status plant species was compiled using lists and databases from the USFWS (USFWS 2017), CDFW (CDFW 2017a, b, c), the BLM (BLM 2017), and the CNPS (CNPS 2017), and the Habitat Assessment conducted for the Project area (Power 2017). For each potentially occurring species, information was compiled on distribution, habitat preferences, blooming times, elevation, and conservation status from the sources listed above.

A plant was considered to be of special-status if it met one or more of the following criteria:

- Listed, proposed for listing, or candidates for listing as threatened or endangered under the Federal Endangered Species Act (50 Code of Federal Regulations Part 17.12 [listed plants]);
- Listed or proposed for listing by the State of California as threatened or endangered under the California Endangered Species Act (CDFW 2017);
- Identified by the CDFW as species of concern or fully protected species, including fish and wildlife that do not have State or federal threatened or endangered status, but may still be threatened with extinction (CDFW 2017);
- Included in the CNPS Rare Plant Inventory (CNPS 2017);
- Otherwise defined as rare, threatened, or endangered under the California Environmental Quality Act;
- Identified by State Parks Ocotillo Wells Field Office as a sensitive species; or
- Identified by the BLM or the BLM El Centro Field Office as a sensitive species.

Plants meeting one or more of these criteria were considered to have potential to occur within the Project area if suitable habitat occurs within or near the Project area and if their range includes the Project area or its vicinity.

The preliminary list was revised after reviewing information on habitat preferences and range for each species. Species were eliminated from the preliminary list if suitable habitat was absent, or if the species range and elevation requirements did not extend into the Project area or its vicinity.

Species determined to be absent were perennially visible sub-shrubs to trees that are easily observed and identified year-round and were not observed during the botanical surveys, or species with habitat requirements that do not occur in the Project area, including species dependent on mesic conditions or alkaline seeps, granite outcroppings or cliffs, specific elevation ranges, and vernal pool species.

Of the 38 potentially occurring special-status plant species for the desert portion of the survey, seven species were determined to have high potential to occur in the BSA based on known occurrences in the Project vicinity and suitable habitat present on-site, three species had moderate potential to occur, seven had a low potential to occur, and the remaining seven species were determined to be absent from

the Project area based on lack of suitable habitat. Special-status species with potential to occur are summarized in Table 1.

TABLE 1 SPECIAL-STATUS PLANT SPECIES WITH POTENTIAL TO OCCUR AND FINAL DETERMINATION

SPECIES	STATUS	HABITAT	BLOOMING PERIOD	POTENTIAL FOR OCCURRENCE	PRESENCE/ABSENCE
Abronia villosa var. *aurita* chaparral sand-verbena	Fed: None State: None CNPS: 1B.1 BLM: S	Annual herb occurring in chaparral, Coastal scrub, and Desert dunes, on sandy soils. From 245 to 5,250 feet in elevation.	March – September	High. Occurs in the nearby vicinity.	Not observed during the focused surveys. Reference population surveys were negative.
Astragalus crotalariae Salton milk-vetch	Fed: None State: None CNPS: 4.3	Perennial herb occurring in desert wash and Sonoran desert scrub, on sandy or gravelly soils. From 195 to 820 feet in elevation.	January – April	High. Occurs in the nearby vicinity.	Observed during the focused surveys.
Astragalus insularis var. harwoodii Harwood's milk-vetch	Fed: None State: None CNPS: 2B.2	Annual herb occurring on desert dunes, desert wash, and Mojavean desert scrub, on sandy or gravelly soils. From 0 to 2,330 feet in elevation.	January – May	Moderate. Suitable habitat occurs within the BSA.	Not observed during the focused surveys. Reference population surveys were positive.
Astragalus magdalenae var. *peirsonii* Peirson's milk-vetch	Fed: THR State: END CNPS: 1B.2	Perennial herb occurring on desert dunes. From 195 to 740 feet in elevation.	December – April	Absent. No suitable habitat occurs within the BSA.	Not observed during the focused surveys. Reference population was not readily accessible.
Bursera microphylla littleleaf elephant tree	Fed: None State: None CNPS: 2B.3	Perennial deciduous tree occurring in desert wash, Sonoran desert scrub, on rocky soils. From 655 to 2,300 feet in elevation.	June – July	Absent. The BSA is below the known elevation range for the species.	Not observed during the focused surveys. Reference population surveys were positive.
Castela emoryi crucifixion thorn	Fed: None State: None CNPS: 2B.2	Perennial deciduous shrub occurring on alkali playa, desert wash, Mojavean desert scrub and Sonoran desert scrub, on gravelly soils. From 300 to 2,380 feet in elevation.	June – July	Low. Suitable habitat occurs on site, but the BSA is below the known elevation range for the species..	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.
Chaenactis carphoclinia var. *peirsonii* Peirson's pincushion	Fed: None State: None CNPS: 1B.3	Annual herb occurring in Sonoran desert scrub, on sandy soils. From 10 to 1,640 feet in elevation.	March – April	High. Occurs in the nearby vicinity.	Not observed during the focused surveys. Reference population surveys were positive.
Chaenactis glabriuscula var. *orcuttiana* Orcutt's pincushion	Fed: None State: None CNPS: 1B.1 BLM: S	Annual herb occurring in coastal bluff scrub and coastal dunes. From 0 to 330 feet in elevation.	January – August	Absent. No suitable habitat occurs within the BSA.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.
Chorizanthe polygonoides var. *longispina* long-spined spineflower	Fed: None State: None CNPS: 1B.2 BLM: S	Annual herb occurring in chaparral, coastal scrub, meadows and seeps, valley and foothill grassland, ultramafic soils, and vernal pools in clay soils. From 100 to 5,020 feet in elevation.	April – June	Absent. No suitable habitat occurs within the BSA.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.

SPECIES	STATUS	HABITAT	BLOOMING PERIOD	POTENTIAL FOR OCCURRENCE	PRESENCE/ABSENCE
Croton wigginsii Wiggin's croton	Fed: None State: Rare CNPS: 2B.2 BLM:	Perennial shrub occurring on desert dunes and Sonoran desert scrub, on sandy soils. From 165 to 330 feet in elevation.	March – May	Moderate. Suitable habitat occurs within the BSA.	Not observed during the focused surveys. Reference population was not readily accessible.
Cylindropuntia fosbergii Pink teddy-bear cholla	Fed: None State: None CNPS: 1B.3 BLM: S	Perennial stem succulent occurring in Sonoran desert scrub. From 280 to 2,790 feet in elevation.	March – May	Low. Suitable habitat occurs on site, but the BSA is below the known elevation range for the species..	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.
Cylindropuntia munzii Munz's cholla	Fed: None State: None CNPS: 1B.3 BLM: S	Perennial stem succulent occurring Sonoran desert scrub, on sandy or gravelly soils. From 490 to 1,970 feet in elevation.	May	Low. Suitable habitat occurs on site, but the BSA is below the known elevation range for the species.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.
Dieteria asteroids var. *lagunensis* Mount Laguna aster	Fed: None State: Rare CNPS: 2B.1 BLM: S	Perennial herb occurring in cismontane woodland and lower montane coniferous forest. From 2,590 to 7,875 feet in elevation.	July – August	Absent. The BSA is below the known elevation range for the species.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.
Euphorbia abramsiana Abram's spurge	Fed: None State: None CNPS: 2B.2	Annual herb occurring in Mojavean desert scrub and Sonoran desert scrub, on sandy soils. From -15 to 4,300 feet in elevation.	August – November	Moderate. Suitable habitat occurs within the BSA.	Not observed during the focused surveys. Reference population surveys were negative.
Euphorbia platysperma Flat-seeded spurge	Fed: None State: None CNPS: 1B.2 BLM: S	Annual herb occurring in desert dunes and Sonoran desert scrub, on sandy soils. From 215 to 330 feet in elevation.	February – September	Low. Suitable habitat occurs on site, but the BSA is below the known elevation range for the species, and there are no known occurrences within 10 miles.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.
Fremontodendron mexicanum Mexican flannelbush	Fed: END State: Rare CNPS: 1B.1	Perennial evergreen shrub occurring in chaparral, cismontane woodlands, and closed-cone coniferous forest, on gabbroic, metavolcanic, or serpentinite soils. From 30 to 2,350 feet in elevation.	March – June	Absent. No suitable habitat occurs within the BSA.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.
Grindelia hallii San Diego sunflower	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial herb occurring in chaparral, lower montane coniferous forest, meadows and seeps, and valley and foothill grassland. From 605 to 5,725 feet in elevation.	May – October	Absent. No suitable habitat occurs within the BSA, and is below the known elevation range for the species.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.

SPECIES	STATUS	HABITAT	BLOOMING PERIOD	POTENTIAL FOR OCCURRENCE	PRESENCE/ABSENCE
Helianthus niveus ssp. *tephrodes* Algodones Dunes sunflower	Fed: None State: END CNPS: 1B.2 BLM: S	Perennial herb occurring on desert dunes. From 165 to 330 feet in elevation.	September – May	Absent. No suitable habitat occurs within the BSA.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.
Hulsea californica San Diego sunflower	Fed: None State: None CNPS: 1B.3 BLM: S	Perennial herb occurring in chaparral, lower montane coniferous forest, and upper montane coniferous forest in openings and burned areas. From 3,000 to 9,560 feet in elevation.	April – June	Absent. No suitable habitat occurs within the BSA, and is below the known elevation range for the species.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.
Johnstonella costata (=*Cryptantha costata*) ribbed cryptantha	Fed: None State: None CNPS: 4.3 BLM: S	Annual herb occurring in desert dunes, Mojavean desert scrub, and Sonoran desert scrub, on sandy soils. From -195 to 1,640 feet in elevation.	February – May	High. Occurs in the nearby vicinity.	Not observed during the focused surveys. Reference population surveys were positive.
Lepidium flavum var. *felipense* Borrego Valley pepper-grass	Fed: None State: None CNPS: 1B.2 BLM: S	Annual herb occurring in pinon and juniper woodlands and Sonoran desert scrub, on sandy soils. From 1,490 to 2,755 feet in elevation.	March – May	Absent. The BSA is below the known elevation range for the species.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.
Lupinus excubitus var. *medius* Mountain Springs bush lupine	Fed: None State: None CNPS: 1B.3	Perennial shrub occurring in pinyon and juniper woodlands and Sonoran desert scrub. From 1,395 to 4,495 feet in elevation.	March – May	Absent. The BSA is below the known elevation range for the species.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.
Lycium parishii Parish's desert-thorn	Fed: None State: None CNPS: 2B.3	Perennial shrub occurring in coastal scrub and Sonoran desert scrub. From 440 to 3,280 feet in elevation.	March – April	Absent. The BSA is below the known elevation range for the species.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.
Malperia tenuis brown turbans	Fed: None State: None CNPS: 2B.3	Annual herb occurring in Sonoran desert scrub, on sandy or gravelly soils. From 50 to 1,100 feet in elevation.	March – April	Low. Suitable habitat occurs within the BSA, but there are no known occurrences within 10 miles.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.
Monardella nana ssp. *leptosiphon* San Felipe monardella	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial rhizomatous herb occurring in chaparral and lower montane coniferous forest. From 3,940 to 6,085 feet in elevation.	June – July	Absent. No suitable habitat occurs within the BSA, and is below the known elevation range for the species.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.

SPECIES	STATUS	HABITAT	BLOOMING PERIOD	POTENTIAL FOR OCCURRENCE	PRESENCE/ABSENCE
Monardella robisonii Robison's monardella	Fed: None State: None CNPS: 1B.3 BLM: S	Perennial rhizomatous herb occurring in pinon & juniper woodlands. From 2,000 to 4,920 feet in elevation.	April – September	Absent. No suitable habitat occurs within the BSA, and is below the known elevation range for the species.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.
Palafoxia arida var. *gigantea* giant Spanish needle	Fed: None State: None CNPS: 1B.3 BLM: S	Annual to perennial herb occurring on desert dunes. From 50 to 330 feet in elevation.	February – May	Absent. No suitable habitat occurs within the BSA.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.
Pholisma sonorae sand food	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial parasitic herb occurring on desert dunes and Sonoran desert scrub on sandy soils. From 0 to 655 feet in elevation.	April – June	Moderate. Suitable habitat occurs within the BSA.	Not observed during the focused surveys. Reference population was not readily accessible.
Pilostyles thurberi Thurber's pilostyles	Fed: None State: None CNPS: 4.3	Perennial parasitic herb occurring on Psorothamnus in Sonoran desert scrub. From 0 to 1,120 feet in elevation.	December – April	High. Occurs in the nearby vicinity.	Not observed during the focused surveys. Reference population surveys were positive.
Salvia greatae Orocopia sage	Fed: None State: None CNPS: 1B.3 BLM: S	Perennial evergreen shrub occurring in desert wash, Mojavean desert scrub, and Sonoran desert scrub. From -130 to 2,705 feet in elevation.	March – April	Low. Suitable habitat occurs within the BSA, but all known populations occur on northeastern portion of the Salton Sea.	Not observed during the focused surveys. Reference population surveys were negative.
Schoenoplectus americanus Olney's three-square bulrush	Fed: None State: None CNPS: None State Parks: S	Perennial rhizomatous herb occurring in mineral-rich or brackish marshes, shores, fens, seeps, and springs. Up to 7,220 feet in elevation.	May - August	High. Occurs in the nearby vicinity.	Not observed during the focused surveys. Reference population surveys were positive.
Senna covesii Cove's senna	Fed: None State: None CNPS: 2B.2	Perennial herb occurring in sandy desert washes and slopes, and in Sonoran desert scrub. From 740 to 4,250 feet in elevation.	March – June	Absent. The BSA is below the known elevation range for the species.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.
Streptanthus campestris Southern jewel-flower	Fed: None State: None CNPS: 1B.3 BLM: S	Perennial rhizomatous herb occurring in chaparral, lower montane coniferous forest, and pinon and juniper woodlands, on rocky soils. From 2,950 to 7,545 feet in elevation.	May – July	Absent. No suitable habitat occurs within the BSA, and is below the known elevation range for the species.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.

SPECIES	STATUS	HABITAT	BLOOMING PERIOD	POTENTIAL FOR OCCURRENCE	PRESENCE/ABSENCE
Symphyotrichum defoliatum San Bernardino aster	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial rhizomatous herb occurring in cismontane woodland, coastal scrub, lower montane coniferous forest, marsh and swamps, meadows and seeps, and valley and foothill grassland. From 5 to 6,690 feet in elevation.	July – November	Absent. No suitable habitat occurs within the BSA.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.
Thermopsis californica var. *semota* velvety false lupine	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial rhizomatous herb occurring in cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, and wetlands. From 3,280 to 6,150 feet in elevation	March – June	Absent. No suitable habitat occurs within the BSA, and is below the known elevation range for the species.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.
Thysanocarpus rigidus ridge fringepod	Fed: None State: None CNPS: 1B.2 BLM: S	Annual herb occurring in pinon and juniper woodlands, often on dry rocky slopes. From 1,970 to 7,220 feet in elevation.	February – May	Absent. No suitable habitat occurs within the BSA, and is below the known elevation range for the species.	Not observed during the focused surveys. No reference populations occur within 10 miles of the BSA.
Xylorhiza cognata Mecca aster	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial herb occurring in Sonoran desert scrub. From 65 to 1,310 feet in elevation.	January – June	Low. Suitable habitat occurs within the BSA, but all known populations occur on northeastern portion of the Salton Sea.	Not observed during the focused surveys. Reference population surveys were positive.
Xylorhiza orcuttii Orcutt's woody'aster	Fed: None State: None CNPS: 1B.2 BLM: S	Perennial herb occurring in desert wash and Sonoran desert scrub. From 0 to 1,200 feet in elevation.	March – April	High. Occurs in the nearby vicinity.	Not observed during the focused surveys. Reference population surveys were positive.

SPECIES	STATUS	HABITAT	BLOOMING PERIOD	POTENTIAL FOR OCCURRENCE	PRESENCE/ABSENCE

Absent: Species or sign not observed on the site, outside of the known range, and conditions unsuitable for occurrence.
Low: Species or sign not observed on the site, but conditions marginal for occurrence.
Moderate: Species or sign not observed on the site, but conditions suitable for occurrence and/or an historical record exists in the vicinity.
High: Species or sign not observed on the site, but reasonably certain to occur on the site based on conditions, species ranges, and recent records.
Present: Species or sign of their presence recently observed on the site.

Federal status
END = listed as Endangered under the federal Endangered Species Act
Delisted = previously listed under the federal Endangered Species Act but now removed
State status
END = listed as Endangered under the California Endangered Species Act
BLM status
S = designated as a Sensitive species
State Parks status
S = designated as a Sensitive species

SRPR State Rare Plant Rank
1A: Plants presumed extirpated in California and either rare or extinct elsewhere.
1B: Considered rare, threatened, or endangered in California and elsewhere.
2A: Plants presumed extirpated in California, but more common elsewhere
2B: Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere
3: Plants About Which More Information is Needed – A Review List
4: Plants of Limited Distribution - A Watch List
Threat Ranks/ Decimal notations: A California Native Plant Society extension added to the SRPR
.1 Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2 Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)
.3 Not very threatened in California (less than 20% of occurrences threatened / low degree and immediacy of threat or no current threats known)

3.2 Field Survey Methods

The 2017 botanical surveys were conducted by POWER botanists Ken McDonald and Melissa Lippincott. Floral surveys were conducted on May 9 through May 12 and June 14 through June 16. Surveys consisted of walking pedestrian transects within the BSA polygons, with special consideration towards impact areas such as proposed well pads and access road footprints.

Surveys were conducted within all areas containing potential habitat for special-status plants. The intuitive approach uses the botanist's knowledge of the preferred habitat of special-status plants to focus the survey effort on sites most likely to support them. The botanical surveys were floristic in nature, meaning that all taxa were identified to the level necessary to determine if they were of special-status. Botanists identified all plant species detected during field surveys using personal knowledge of the plants and keys in *The Jepson Manual* (Hickman 1993) and Jepson Online Interchange (2017). Scientific nomenclature in this report follows Hickman (1993) and common names are derived from Hickman (1993) and CalFlora (2017).

Botanists recorded observations with Garmin hand-held Global Positioning System (GPS) units. These units were pre-loaded with maps of the BSA boundaries. GPS units were used for navigation, and to collect locational data (points and polygons) for special-status plant species observations. Incidental detections of animal burrows suitable for flat-tailed horned lizard (*Phrynosoma mcallii*) or burrowing owl (*Athene cunicularia*) were also noted, and presented in Figure 3. Current aerial figures of the project site were also used in navigation and noting observations. Additionally, reference population surveys of several special-status target species were conducted to insure that they were in bloom or could otherwise be identified at the time of the botanical surveys.

A list of plant species observed during the surveys within the BSA is presented in Appendix A.

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4.0 RESULTS

More than 65 plant species were detected during the course of the surveys, representing 27 families. A list of plant species observed in the BSA during the surveys is presented in Appendix A.

One special-status plant species was detected within the BSA during the 2017 botanical surveys, and is discussed below. No other special-status plant species were observed during the surveys.

Salton milk-vetch (*Astragalus crotalariae*)

Salton milk-vetch (*Astragalus crotalariae*) is included on List 4.3 of the CNPS online Inventory (CNPS 2017). It is a red-purple to white flowered perennial herb in the Pea Family (Fabaceae). Salton milk-vetch occurs from the south easternmost portion of California and into Arizona; documented in Imperial, Riverside, and San Diego counties. This species occurs in desert wash and Sonoran desert scrub, on sandy or gravelly soils. It ranges from 195 to 820 feet in elevation, and blooms from January to April. Suitable habitat for this species occurs within the BSA. Salton milk-vetch was observed within the BSA during the survey. The locations of Salton milk-vetch detected within the BSA are shown in Figure 3.

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5.0 RECOMMENDATIONS

The following recommendations are provided for avoidance and minimization of effects to botanical resources:

1. A qualified biologist will conduct a general preconstruction survey no more than 14 days prior to the start of construction to verify that no new special-status species are in the project area or its buffers.
2. Impacts to special-status plant species shall first be avoided where feasible, and where not feasible, impacts shall be compensated through approved methods, including reseeding.
3. The footprint of disturbance will be minimized to the maximum extent feasible. Access to sites will be via pre-existing access routes, to the greatest extent possible, and the work area boundaries will be delineated with staking, flagging, or other comparable markings to minimize surface disturbance associated with vehicle straying. Signs and/or fencing will be placed around the project area to restrict access to project-related vehicles.
4. Vehicles and equipment should be maintained and free of leaks. All hazardous material, oil, hydraulic, or other fluid leaks should be contained and cleaned immediately to reduce the risk of negatively impacting water or soil quality.
5. If required, the area of project-related disturbance will be revegetated (reseeded) in consultation with requirements set forth by the County. Mitigation ratios for disturbing habitat are assumed to be 1:1 for temporary disturbance and 2:1 for permanent disturbance.
6. Prior to construction, a plan should be created that will address post-construction clean-up, soil stabilization and erosion control, and any required revegetation for land disturbed by construction related activities, in coordiation with appropriate land owners and regulating agencies. The plan should include a monitoring schedule, responsible parties, minimum standards, and contingecy plans.
7. Project-related equipment will be washed prior to entering the project area for the first time to reduce the chance of transporting noxious weed seeds from outside the area.
8. Straw or hay bales that are used during construction will be certified weed-free.

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6.0 CONCLUSIONS

One special-status plant species was observed within the BSA during the 2017 botanical surveys. Salton milk-vetch would potentially be affected by Project activities. While Salton milk-vetch has no federal or State status, it is considered a plant of limited distribution, and should be avoided, if feasible. Although reference population surveys of several of the other target species were conducted, with most species being observed, no other special-status plant species were detected within the BSA during the focused floral surveys.

The conclusion determined from the survey data indicates that the majority of the BSA does not support any other special-status plant species. The locations of the detected special-status species are shown in Figure 3.

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7.0 REFERENCES

CalFlora: Information on California plants for education, research, conservation. 2017. The CalFlora Database. Berkeley, California. Accessed at: http://www.calflora.org.

California Department of Fish and Wildlife (CDFW). 2000. Guidelines for assessing the effects of proposed projects on rare, threatened and endangered plants and natural communities. May 8, 2000. Available at: http://www.dfg.ca.gov/whdab/pdfs/guideplt.pdf.

_____. 2009. Protocols for Surveying and Evaluating Impacts to Special-status Native Plant Populations and Natural Communities. State of California. California Natural Resources Agency. Department of Fish and Game November 24, 2009 Accessed at: www.nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=18959&inline=1.

_____. 2017a. State and Federally Listed as Endangered, Threatened and Rare Plants of California. Accessed at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEPlants.pdf.

_____. 2017b. Natural Diversity Database. Special Vascular Plants, Bryophytes, and Lichens List.

_____. 2017c. California Natural Diversity Database, Rare Find5, commercial version 5.

California Native Plant Society (CNPS). 2001. Inventory of rare and endangered plants of California. California Native Plant Society. Special Publication #1, Sixth Edition.

_____. 2017. Inventory of Rare and Endangered Plants (online edition, v8-02). California Native Plant Society. Sacramento, CA.

Hickman, J. 1993. *The Jepson Manual*. Univ. of California Press, Berkeley, California. Holland, R. F. 1986. Preliminary descriptions of the terrestrial natural communities of California.

Holland, R.F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California (California Department of Fish and Game The Resources Agency, ed.). Sacramento, CA.

Jepson Online Interchange. 2017. An online database for California floristics. Available at: http://ucjeps.berkeley.edu/interchange.html.

Power Engineers, Inc. 2017. Truckhaven 3D Geophysical Survey Project: Biological Resources Evaluation Report.

U.S. Department of the Interior, Bureau of Land Management (BLM), California Desert District. 2005. Final Environmental Impact Report and Statement for the West Mojave Plan, A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment. Vol. 1. January 2005.

_____. 2017. BLM Special-status Plants under the jurisdiction of the Ridgecrest Field Office. Accessed at: http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/pa/botany.Par.18476.File.dat/Ridgecrest%20concise%20for%20Web%202012.pdf.

U.S. Fish and Wildlife Service (USFWS). 1996. Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed, and Candidate Plants. USFWS, September 23, 1996. Available at: http://www.fws.gov/sacramento/es/documents/listed_plant_survey_guidelines.htm.

_____. 2017. List of federal candidates for listing. Accessed at: http://ecos.fws.gov/tess_public/pub/SpeciesReport.do?lead=8&listingType=C

APPENDIX A VASCULAR PLANT SPECIES OBSERVED

SCIENTIFIC NAME	COMMON NAME
ANGIOSPERMS (DICOTYLEDONS)	
AIZOACEAE	FIG-MARIGOLD FAMILY
*Mesembryanthemum nodiflorum**	slender-leaved iceplant
AMARANTHACEAE	AMARANTH FAMILY
Tidestromia oblongifolia	honeysweet
ASCLEPIADACEAE	MILKWEED FAMILY
Asclepias subulata	rush milkweed
ASTERACEAE	SUNFLOWER FAMILY
Ambrosia dumosa	burro bush
Bebbia juncea	sweetbush
Dicoria canescens	bugseed
Encelia frutescens	rayless encelia
Geraea canescens	desert sunflower
Isocoma acradenia	alkali goldenbush
Palafoxia arida	Spanish needles
Perityle emoryi	emory rock daisy
Pluchea sericea	arrow weed
*Sonchus asper**	prickly sow thistle
Stephanomeria pauciflora	wire lettuce
BORAGINACEAE	BORAGE FAMILY
Cryptantha angustifolia	narrowleaf cryptantha
Cryptantha circumscissa	cushion cryptantha
Cryptantha maritima	Guadalupe forget-me-not
Pectocarya heterocarpa	chuckwalla combseed
BRASSICACEAE	MUSTARD FAMILY
*Brassica tournefortii**	Sahara mustard
Lepidium densifolium	desert peppergrass
Lepidium sp.	peppergrass
CHENOPODIACEAE	GOOSEFOOT FAMILY
Atriplex canescens	four-wing saltbush
Atriplex hymenelytra	desert holly
Atriplex lentiformis	quail brush
Atriplex polycarpa	allscale
*Beta vulgaris**	beet
*Chenopodium murale**	nettle-leaved goosefoot
*Salsola sp.**	Russian thistle
Suaeda nigra	bush seepweed
CLEOMACEAE	SPIDERFLOWER FAMILY
Cleomella obtusifolia	Mojave stinkweed
EUPHORBIACEAE	SPURGE FAMILY
Stillingia spinulosa	Mohave stillingia
FABACEAE	LEGUME FAMILY
Astragalus crotalariae	Salton milkvetch
Cercidium floridum	palo verde

SCIENTIFIC NAME	COMMON NAME
Prosopis glandulosa	honey mesquite
HYDROPHYLLACEAE	WATERLEAF FAMILY
Phacelia crenulata	purple phacelia
KRAMERIACEAE	RHATANY FAMILY
Krameria bicolor	white rhatany
LOASACEAE	LOASA FAMILY
Mentzelia involucrata	bracted blazing star
MALVACEAE	MALLOW FAMILY
Eremalche rotundifolia	desert five-spot
MONTIACEAE	MINER'S LETTUCE FAMILY
Cistanthe ambigua	desert pussypaws
ONAGRACEAE	EVENING PRIMROSE FAMILY
Chylismia cardiophylla	heartleaf suncup
Chylismia claviformis	brown-eyed evening primrose
Eremothera boothii	Booth's evening primrose
PAPAVERACEAE	POPPY FAMILY
Eschscholzia minutiflora	pygmy goldenpoppy
PLANTAGINACEAE	PLANTAIN FAMILY
Plantago ovata	woolly plantain
POLEMONIACEAE	PHLOX FAMILY
Aliciella latifolia	broadleaf gilia
Langloisia setosissima	langlosia
POLYGONACEAE	BUCKWHEAT FAMILY
Chorizanthe brevicornu	brittle spineflower
Chorizanthe corrugata	wrinkled spineflower
Chorizanthe rigida	rigid spineflower
Eriogonum deflexum	flat-topped buckwheat
Eriogonum inflatum	desert trumpet
Eriogonum reniforme	buckwheat
Eriogonum thomasii	Thomas eriogonum
Eriogonum trichopes	little trumpet
PORTULACACEAE	PURSLANE FAMILY
Portulaca halimoides	desert portulaca
RESDACEAE	MIGNONETTE FAMILY
Oligomeris linifolia	narrow-leaved oligomeris
SOLANACEAE	NIGHTSHADE FAMILY
Lycium brevipes	Baja desert-thorn
TAMARICACEAE	TAMARISK FAMILY
*Tamarix aphylla**	athel
*Tamarix ramosissima**	Mediterranean tamarisk
ZYGOPHYLLACEAE	CALTROP FAMILY
Larrea tridentata	creosote bush
ANGIOSPERMS (MONOCOTYLEDONS)	
LILIACEAE	LILY FAMILY
Hesperocallis undulata	desert lily

SCIENTIFIC NAME	COMMON NAME
POACEAE	GRASS FAMILY
Aristida adscensionis	six-week's three-awn
*Phalaris minor**	Mediterranean canary grass
Pleuraphis rigida	galleta grass
*Schismus arabicus**	Arabian schismus

*Non-native species

EEC ORIGINAL PKG

APPENDIX D – CLASS III ARCHAEOLOGICAL SURVEY OF TRUCKHAVEN 3-D SEISMIC PROJECT

August 1, 2019

ORMAT NEVADA, INC.

Class III Archaeological Survey of the Truckhaven 3-D Seismic Project

Imperial County, California

Confidential Version (Final)

BLM Statewide Permit No.: CA-15-48 and CA-18-39
BLM FWA Permit No.: CA-670-16-077-FA03[FA01]

PROJECT NUMBER:
149086

PROJECT CONTACT:
Michael Harrison Dice
EMAIL:
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714.507.2755

CONFIDENTIAL

All information in this report on the locations of cultural resources shall be treated as confidential and shall not be released to the public or other unauthorized entity, consistent with Section 304 of the National Historic Preservation Act (NHPA), Section 9 of the Archaeological Resources Protection Act (ARPA), and California Office of Historic Preservation (OHP) guidelines.

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ACRONYMS AND ABBREVIATIONS

3-D Study	Three-dimensional seismic vibroseis study
ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effects
BLM	Bureau of Land Management
bsl	below sea level
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
County	Imperial County Planning & Development Services Department
CRHR	California Register of Historic Resources
CSLC	California State Lands Commission
CX	Categorical Exemption
DPR 523	State Museum Archaeological Form 523
DRECP	Desert Renewable Energy Conservation Plan
EA	Environmental Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
FTA	Federal Transit Administration
FWA	fieldwork authorization (survey permit)
GPS	global positioning system
Hz	hertz
ICF	ICF International, Inc.
IID	Imperial Irrigation District
m	meters
MLD	Most Likely Descendant
MMP	Mitigation Monitoring Plan
MND	Mitigated Negative Declaration
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
NHPA	National Historic Preservation Act
NPS	National Park Service
NTFHP	National Trust for Historic Preservation
PA	Programmatic Agreement
Parks	California Department of Parks and Recreation
PE	Potential Effect
POWER	POWER Engineers, Inc.
PPV	Peak particle velocity
PRC	Public Resources Code (State of California)
Proponent	Ormat Nevada, Inc.
psi	pound per square inch
RPA	Register of Professional Archaeologists
SCIC	Southern Coastal Information Center
SHPO	State Historic Preservation Officer
SVRA	State Vehicular Recreation Area (Ocotillo Wells)
TGLA	Truckhaven Geothermal Lease Area
U.S.C.	United States Code
USGS	United States Geological Survey
YBP	years before present

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BLM SUPPLEMENTAL STATISTICS REPORT PAGE

1. Project Name.	Truckhaven 3-D Seismic Survey Project	
2. BLM State Permit Number.	CA-15-48 (field) / CA-18-29 (report)	
3. Field Authorization Number.	CA-670-16-077-FA03[FA01]	
4. Dates of Field Survey.	April 24 to May 26, 2016 and January 3 to May 4, 2018	
5. Total acreage of lands surveyed at BLM Class II level.		0
Of item 5 above:		
A) Acreage of BLM lands surveyed.		NA
B) Acreage of other lands surveyed (private, state, other federal) list separately.		NA
6. Total acreage of lands surveyed at BLM Class III level.		2,505.90
Of item 6 above:		
	A) Acreage of BLM lands surveyed.	482.60
	B) Acreage of other lands surveyed (private, state, other federal) list separately.	Private: 1052.60 State Parks: 716 CSLC: 249.5 County of Imperial: 5.2
7. Total number of cultural properties in project Area (of Potential Effect).		Salton Sea Airport 175
Of item 7 above:		
	A) Total number of cultural properties for which site records were completed (newly recorded cultural properties).	175
	B) Number of new cultural properties on BLM lands.	47 (BLM: 32) (BLM & Private: 3) (BLM & Parks: 11) (BLM & Private & Parks: 1)
	C) Number of new cultural properties on other lands (private, state, other federal).	128 (Private: 49) (Cal State Parks: 57) (CSLC: 10) (Private & CLSC: 9) (Parks & CLSC: 2) (Private & Parks & CSLC: 1)
8. Of the cultural properties located within the Area (of Potential Effect): [If properties are not located on BLM, place this number in parentheses ( ) after the number of BLM properties.]		
	A) Number of cultural properties that you are recommending as eligible for the National Register of Historic Places (NRHP).	47 (128)
	B) Number of cultural properties you are a recommending as not eligible for the NRHP.	0 (0)
Of item 8A above:		

	a) Number of cultural properties that can/will be avoided.	174
	b) Number of cultural properties that will be affected.	1
	c) Number of cultural properties that you are recommending data recovery/mitigation.	1 (mitigate)
	d) Number of cultural properties that were data recovered/mitigated.	0
Of item 8B above:		
	a) Number of cultural properties that can/will be avoided.	0
	b) Number of cultural properties that will be affected.	0

EXECUTIVE SUMMARY

In accordance with the National Environmental Policy Act (NEPA) and 36 Code of Federal Regulations Part 800 regulations that implement Section 106 of the National Historic Preservation Act (NHPA), POWER Engineers, Inc. (POWER) undertook a Class III cultural resource inventory and impact analysis associated with cultural resources located on Bureau of Land Management (BLM), State lands and private land within a proposed geothermal project area in the Salton City region of Imperial County, California. Ormat Nevada, Inc. (Proponent) is planning to undertake a three-dimensional seismic vibroseis project (the 3-D Study) in support of the construction of a set of geothermal exploration wells near the Salton Sea Airport. The BLM is the lead federal agency and the BLM's El Centro Field Office is the local representative of the agency. The California Department of Parks and Recreation (Parks) is a concurring party, and the County of Imperial serves as the Lead Agency for California Environmental Quality Act (CEQA).

The archaeological Class III inventory is located within a 5.4-mile (east/west) by 4.5-mile (north/south) block of land surrounding the Salton Sea Airport; the inventory fully envelopes the Proponents' proposed 3-D Study. Part of the Class III inventory area is located within the Ocotillo Wells State Vehicular Recreation Area (SVRA). Parks manages surface lands inside the SVRA in conjunction with the BLM on those portions owned by the federal government, and Parks owns some of the SVRA land outright. Other landholders include the California State Lands Commission, the County, and private landowners. Prior to survey, the Proponent obtained permission for POWER staff to inventory resources on all parcels within the 3-D Study.

The purpose of the Class III inventory is to support a federal permit application by the Proponent through the BLM that requires, in part, impacts to historic properties be fully delineated and considered during project planning. The BLM has agreed to allow State-level compliance considerations in this report (C. Sagahun. BLM. Personal communication. 2016).

Between April 24 and to May 26, 2016, POWER archaeological staff, with a no-collection inventory permit obtained from BLM (#CA-670-16-077-FA01) and a DPR 412a permit from Parks, performed an inventory of proposed seismic drive pathways and geothermal well pads for a joint wells/3-D Study proposed by the Proponent. Numerous archaeological resources were discovered. After the 2016 fieldwork was halted by the Proponent, a draft Class III inventory report and a set of preliminary draft State Museum (DPR 523) form sets were issued by POWER and submitted to BLM and Parks (POWER 2016). In mid-2017, the Proponent revised the 3-D Study parameters and created a new project description separating the draw and injection wells portion of their original project from the 3-D Study itself, then contacted BLM to initiate the change in project scope. As a result, a 2017 archaeological field season for revised well placement and proposed access roads was needed in support of a wells-only project description and concomitant Area of Potential Effect (APE). A new BLM fieldwork authorization permit (#CA-670-16-077-FA02) was required to undertake the wells-only inventory. The cultural resources identified within the wells APE were delineated and discussed in the resultant Class III report (POWER 2018).

In late 2017, the Proponent requested a restart of the 3-D Study by creating an additional set of proposed seismic drive pathways for field research. The Proponent reduced the size of the original 3-D Study area by moving the southernmost edge of the proposed project area approximately 0.75 mile to the north. A new BLM fieldwork authorization permit (#CA-670-16-077-FA03) and Parks DPR 412a permit was required to undertake the Class III fieldwork, which ultimately incorporated the 2016 seismic pathway survey data with new 2018 survey data. Fieldwork began on January 3, 2018 and concluded on May 4, 2018. Upon completion, a set of proposed seismic drive pathway centerlines, delineated during the 2016 and 2018 field seasons, was delivered to BLM and Parks for preliminary review in July 2018. The centerlines cover 110,610 linear meters (68.73 miles).

The seismic drive pathways will be driven upon during the 3-D Study by two pairs of seismic wave producing vehicles (also known as vibroseis buggies) that will follow an archaeologist monitor. Along the centerline of the pathways, at "source points," the buggy tandems shall halt for a few minutes and generate a 15- to 20-second pulse of seismic energy at identical times. Once complete, the tandems will move to the next source point and repeat the process. The seismic waves will reflect off deep geological structures and the echoes will be picked up by receiving equipment (geophones) placed across the 3-D Study area. Known in this report as "receiver points," BLM and Parks agreed in 2015 that the hand-placement of geophones at the receiving points, is not considered a potential effect that needed to be analyzed through a Class III archaeological inventory, however, an archaeologist monitor will accompany the geophone technicians as they place the equipment. Geophone equipment will be helicoptered to appropriate locations from the Salton Sea Airport staging area and dropped at approved cleared areas. The geophones will be unpacked from the drop bags and placed by hand by seismic technicians prior to beginning the vibroseis work, then the geophones will be removed once the vibroseis work is complete.

Because the fieldwork was dynamic in that certain seismic drive pathways were inventoried and then, in some cases, rejected by the fieldwork teams, the proposed APE (which includes the seismic drive pathway centerlines), buffer zones on either side of the centerlines, and all acreage covered by encountered cultural resource sites, is larger than and encompasses all ground to be driven upon by the vibroseis buggies. To develop the complete proposed set of seismic drive pathways required that certain potential pathways, identified while the Class III inventories were in progress, be rejected or truncated in the field due to the potential for adverse impacts to historic properties or because of topographic constraints. Thus, to achieve the current total of 110,610 linear meters of proposed seismic drive pathways, POWER archaeological teams inventoried 2,505.9 total acres in the APE.

Based on the records search provided to POWER by the staff of the Southern Coastal Information Center (SCIC) at San Diego State University in December 2015, 31 cultural resource studies have been conducted within one-half mile of the proposed APE. One report, not filed with the SCIC as of the 2016 field season (McGinnis and Murphy 2010), was added to the background list that makes a total of 32 previous studies. The records search identified 219 archaeological sites and 183 historic-era isolates within one-half mile of the APE.

In sum, the intensive pedestrian cultural resource surveys in 2016 and 2018 covered 482.6 acres on BLM-managed land, 716 acres on Parks-managed land, 249.5 acres on California State Lands Commission-managed land, 5.2 acres on County of Imperial land (within the Salton Landfill), and 1,052.6 acres on privately owned land. Resources recorded during the surveys include 158 previously unrecorded sites, and 10 previously recorded sites. Seven sites recorded during the Truckhaven Wells analysis (POWER 2018) are located in the Class III APE, and several of these were updated. A total of 175 sites were encountered in the 3-D survey area. Ninety-one new isolates were recorded during the inventory. The sites and isolates encountered during the inventory are summarized in Table ES-1 below. All archaeological and historic-era sites encountered during the inventory are considered eligible for the National Register of Historic Places (NRHP) and the California Register of Historic Resources (CRHR) until a formal evaluation is undertaken. The isolates are not considered historic properties per the Work Plans POWER staff submitted to BLM and State Parks in order to obtain permits to survey.

Direct impacts to a historic property could occur if the historic property is driven over by a vibroseis buggy; if a buggy leaves tracks from a paved or graveled road that could lead the public to the resource; if seismic wave generation damages nearby sensitive features; or if a historic property is directly impacted as the seismic survey teams set up or demobilize in the field. Any land scarring the agencies deem undesirable can be mitigated for during the mitigation planned effort that will take place before the 3-D Study begins.

All but one of the 175 cultural resource sites recorded in the proposed APE (P13-14306) will be avoided completely. The Proponent proposes to have vibroseis buggies drive over one possible historic-era dirt road (site P13-14306) in three places (two west of the Imperial County dump and another 200 meters northwest of site P13-17685, but this potential event can be accounted for during development of a CEQA-level mitigation/monitoring plan so that no physical damage will take place to this resource. All recorded prehistoric sites will be avoided during the 3-D Study and distances between drive path centerlines and site boundaries have been provided (see Table ES-1 below).

POWER's analysis of the potential for vibrational impact has shown that stacked rock or cairn features, habitation foundations, cobblestone and/or sandstone slab fish traps, and upright/partially collapsed slab features are believed to have a greater potential sensitivity to vibrational impacts than other archaeological elements because such features could fall or collapse. Sites composed of artifact scatters and/or decomposed hearths with no uprights or coursing are considered less sensitive and therefore less likely to be adversely impacted by source point wave generation. POWER recommends that source points (ie, the location where the vibroseis machines stop and vibrate) be located at least 15.27 meters (50 feet) from the more sensitive types of features. Source points should be located at least 33 meters (100 feet) from any previously identified cremation features or human remains. POWER also recommends that geophone placement avoid all recorded archaeological site activity areas and features, and that geophone placement be monitored. To come to these conclusions required that POWER carefully examine previous technical studies developed by land managers in the Western United States related to the vibroseis process and their potential effect on archaeological and historic resources as part of the project background research effort.

Table ES-1 summarizes the descriptions of the 175 archaeological sites and 91 isolates encountered during the 2016 and 2018 field seasons; all resources except the isolates are considered eligible to the NRHP and CRHR. POWER has offered eligibility consideration statements within the body of the DPR 523 form set provided for each of the sites (see Appendix I).

TABLE ES-1 SUMMARY OF RESOURCES ENCOUNTERED WITHIN THE AREA SURVEYED

Note: the minimum distance calculation was done by POWER GIS and represents the distance between a vibroseis pathway and a portion of a nearby site boundary. The site boundaryis expressed as a polygon in the GIS database.

Sites

#	ID	TRINOMIAL (CA-IMP-)	OWNER	ERA	TYPE AND FEATURES	MIN. DIST. FROM VIBROSEIS PATH IN METERS	NRHP/CRHR ELIGIBILITY STATEMENT
1	P13-17573 (CN-1)	-12892	BLM	Prehistoric	Artifact scatter. Three loci, no features.	61.8	Considered potentially eligible.
2	P13-17574 (CN-2)	-12893	Private	Prehistoric	Artifact scatter. One cremation feature.	53	Considered potentially eligible.
3	P13-17575 (CN-3)	-12894	BLM	Prehistoric site and Historic isolate	Artifact scatter. No features.	6.4	Considered potentially eligible.
4	P13-17576 (CN-4)	-12895	BLM	Prehistoric site and Historic isolates	Artifact scatter. Two loci, one feature.	4.4	Considered potentially eligible.
5	P13-17577 (CN-5)	-12896	BLM	Historic	Two metal debris features.	15.6	Considered potentially ineligible but regarded as a historic property until a formal NRHP/CRHR evaluation can be completed.
6	P13-17578 (CN-7)	-12897	BLM	Prehistoric	Lithic scatter. No features.	9.9	Considered potentially eligible.
7	P13-17597 (CN-11)	-12898	BLM	Prehistoric	Lithic scatter. No features.	50	Considered potentially eligible.
8	P13-17580 (CN-12)	-12899	California State Parks	Prehistoric	Lithic scatter. No features.	31.5	Considered potentially eligible.
9	P13-17581 (CN-13)	-12900	BLM	Prehistoric	Lithic scatter. No features.	58.1	Considered potentially eligible.
10	P13-17582 (CN-14)	-12901	BLM	Prehistoric	Lithic scatter. No features.	13.8	Considered potentially eligible.
11	P13-6250 (CN-15)	-6250	BLM	Prehistoric	Lithic scatter. One loci, two features. Includes vast expansion of site P13-6250.	20.6	Considered potentially eligible.
12	P13-17583 (CN-16)	-12902	California State Parks	Prehistoric/ unknown	Lithic scatter. No features. Rock piles of uncertain	24.4	Considered potentially eligible.

#	ID	TRINOMIAL (CA-IMP-)	OWNER	ERA	TYPE AND FEATURES	MIN. DIST. FROM VIBROSEIS PATH IN METERS	NRHP/CRHR ELIGIBILITY STATEMENT
					heritage.		
13	P13-17584 (CN-17)	-12903	California State Parks	Prehistoric	Artifact scatter. Eight fish trap features.	46.9	Considered potentially eligible.
14	P13-17585 (CN-18)	-12904	California State Parks	Prehistoric/ unknown	Artifact scatter. Three fish trap features. Rock piles of uncertain heritage.	26	Considered potentially eligible.
15	P13-17586 (CN-19)	-12905	California State Parks	Prehistoric	Artifact scatter. Seventy-seven fish trap features.	65.6	Considered potentially eligible.
16	P13-17587 (CN-21)	-12906	California State Parks	Prehistoric	Artifact scatter. One feature.	3.9	Considered potentially eligible.
17	P13-17588 (CN-22)	-12907	California State Parks	Prehistoric	Lithic scatter.	62.3	Considered potentially eligible.
18	P13-17589 (CN-23)	-12908	BLM	Prehistoric	Lithic scatter.	7.4	Considered potentially eligible.
19	P13-17637 (CN-24)	-12961	Private	Prehistoric	Artifact scatter. Two loci, two features.	10.7	Considered potentially eligible.
20	P13-17638 (CN-29)	-12962	Private	Prehistoric	Artifact scatter. One feature.	17.5	Considered potentially eligible.
21	P13-17639 (CN-30)	-12963	Private	Prehistoric	Artifact scatter. One locus, one feature.	20.7	Considered potentially eligible.
22	P13-17640 (CN-31)	-12964	Private	Prehistoric	Artifact scatter. Two loci, six features. One possible cremation locus.	22.8	Considered potentially eligible.
23	P13-17641 (CN-32)	-12965	California State Lands Commission and Private	Prehistoric	Artifact scatter. Five features.	59.6	Considered potentially eligible.
24	P13-17642 (CN-33H)	-12966	California State Lands Commission	Probable historic	Historic-era road and can dump.	8.1	Considered potentially ineligible but regarded as a historic property until a formal NRHP/CRHR evaluation can be completed.

#	ID	TRINOMIAL (CA-IMP-)	OWNER	ERA	TYPE AND FEATURES	MIN. DIST. FROM VIBROSEIS PATH IN METERS	NRHP/CRHR ELIGIBILITY STATEMENT
25	P13-17643 (CN-34)	-12967	Private	Prehistoric	Lithic scatter. Five features.	53.2	Considered potentially eligible.
26	P13-17644 (CN-35)	-12968	Private	Prehistoric	Lithic scatter.	11.9	Considered potentially eligible.
27	P13-17645 (CN-36)	-12969	Private	Prehistoric	Lithic scatter.	105.2	Considered potentially eligible.
28	P13-17646 (CN-37)	-12970	Private	Prehistoric	Lithic scatter.	4.9	Considered potentially eligible.
29	P13-17647 (CN-38E)	-12971	Private	Prehistoric	Artifact scatter.	43.4	Considered potentially eligible.
30	P13-17648 (CN-38W)	-12972	Private	Prehistoric	Artifact scatter. Two features.	33.8	Considered potentially eligible.
31	P13-17649 (CN-39E)	-12973	Private and California State Lands Commission	Prehistoric	Artifact scatter. Eight loci, 28 features, human remains and cremations.	5.3	Considered potentially eligible.
32	P13-8671 (CN-39W)	-12974	Private	Prehistoric	Artifact scatter. Four loci and four features. Possible unexposed cremations per tribal monitors.	18.7	Considered potentially eligible.
33	P13-17650 (CN-41)	-12975	Private	Prehistoric	Artifact scatter. Eight loci and 50 features. Human remains and cremations.	9.2	Considered potentially eligible.
34	P13-17651 (CN-46)	-12976	Private	Prehistoric	Artifact scatter. Three features.	8.9	Considered potentially eligible.
35	P13-17652 (CN-47)	-12977	Private	Prehistoric	Lithic scatter. No features.	9.3	Considered potentially eligible.
36	P13-17653 (CN-48)	-12978	Private and BLM	Prehistoric	Lithic scatter. No features.	146.9	Considered potentially eligible.
37	P13-17654 (CN-49)	-12979	Private	Prehistoric	Lithic scatter. No features.	6.9	Considered potentially eligible.
38	P13-17655 (CN-50)	-12980	Private	Prehistoric	Artifact scatter. Two loci, ten features.	245.9	Considered potentially eligible.

#	ID	TRINOMIAL (CA-IMP-)	OWNER	ERA	TYPE AND FEATURES	MIN. DIST. FROM VIBROSEIS PATH IN METERS	NRHP/CRHR ELIGIBILITY STATEMENT
39	P13-17656 (CN-51)	-12981	Private, California State Lands Commission, and California State Parks	Prehistoric	Artifact scatter. Two features.	7.2	Considered potentially eligible.
40	P13-17657 (CN-53)	-12982	Private	Prehistoric	Artifact scatter. No features.	15.1	Considered potentially eligible.
41	P13-17658 (CN-54W)	-12983	Private	Prehistoric	Artifact scatter. No features.	7.2	Considered potentially eligible.
42	P13-17659 (CN-55)	-12984	Private	Prehistoric	Artifact scatter. Two features, one juvenile human long bone.	38.3	Considered potentially eligible.
43	P13-17660 (CN-56)	-12985	Private	Prehistoric	Lithic scatter. No features.	11.9	Considered potentially eligible.
44	P13-17661 (CN-58)	-12986	Private	Prehistoric	Lithic scatter. One feature.	5.5	Considered potentially eligible.
45	P13-17662 (CN-59)	-12987	Private	Prehistoric	Artifact scatter. One loci, four features.	21.8	Considered potentially eligible.
46	P13-17663 (DM-3)	-12988	BLM and Private	Prehistoric	Artifact scatter. No features.	22.7	Considered potentially eligible.
47	P13-17664 (DM-4)	-12989	Private	Prehistoric	Artifact scatter. Two loci, four features.	31.2	Considered potentially eligible.
48	P13-17590 (DM-6)	-12909	Private	Prehistoric	Lithic scatter. No features.	43.4	Considered potentially eligible.
49	P13-17591 (DM-8)	-12910	Private	Prehistoric	Lithic scatter. Ten features.	16.3	Considered potentially eligible.
50	P13-17592 (DM-9)	-12911	California State Lands Commission	Prehistoric	Lithic scatter. No features.	2.9	Considered potentially eligible.
51	P13-17593 (DM-22)	-12912	Private	Prehistoric	Lithic scatter. No features.	3.3	Considered potentially eligible.
52	P13-17594 (KRM-14)	-12913	Private	Prehistoric	Artifact scatter. Three loci, nine features.	3.7	Considered potentially eligible.

#	ID	TRINOMIAL (CA-IMP-)	OWNER	ERA	TYPE AND FEATURES	MIN. DIST. FROM VIBROSEIS PATH IN METERS	NRHP/CRHR ELIGIBILITY STATEMENT
53	P13-17595 (KRM-15)	-12914	Private	Prehistoric	Lithic scatter. No features.	22.2	Considered potentially eligible.
54	P13-17596 (KRM-16)	-12915	Private	Prehistoric	Artifact scatter. No features.	8.6	Considered potentially eligible.
55	P13-17597 (KRM-17)	-12916	Private	Prehistoric	Artifact scatter. Two loci, eight features.	12.4	Considered potentially eligible.
56	P13-17598 (KRM-18)	-12917	Private	Prehistoric	Artifact scatter. Two loci, one feature.	13	Considered potentially eligible.
57	P13-17599 (KRM-19)	-12918	Private	Prehistoric	Artifact scatter. No features.	77	Considered potentially eligible.
58	P13-17600 (KRM-20)	-12919	Private	Prehistoric	Artifact scatter. No features.	35.5	Considered potentially eligible.
59	P13-6248	-6248	BLM	Prehistoric	Lithic scatter. Sixteen features. Site update adds to original record.	40.3	Considered potentially eligible.
60	P13-6249	-6249	BLM and Private	Prehistoric	Artifact scatter. No features. Site update adds to original record. Recorded during Wells Study (POWER 2018).	15.4	Considered potentially eligible.
61	P13-8148	-7748	California State Lands Commission	Prehistoric	Artifact scatter. Three features. Site update revises original record.	4.3	Considered potentially eligible.
62	P13-8379	-7860	Private	Prehistoric	Artifact scatter. Eleven loci and one feature. Site update revises original record.	22.8	Considered potentially eligible.
63	P13-11154	-10160	California State Parks	Prehistoric	Lithic scatter, site extension portion only. Site update adds to original record.	31	Considered potentially eligible.

#	ID	TRINOMIAL (CA-IMP-)	OWNER	ERA	TYPE AND FEATURES	MIN. DIST. FROM VIBROSEIS PATH IN METERS	NRHP/CRHR ELIGIBILITY STATEMENT
64	P13-11166	-10172	California State Parks BLM in northwest segment	Prehistoric	Artifact scatter and one feature, site extension portion only. Site update adds to original record.	34	Considered potentially eligible.
65	P13-12479	-11030	California State Parks	Prehistoric	Artifact scatter and one feature. Site update revises original record slightly.	41.6	Considered potentially eligible.
66	P13-12508	-11034	California State Parks	Prehistoric	Artifact scatter. No new features. Site update adds to original record.	197	Considered potentially eligible.
67	P13-12654	-11130	California State Parks	Prehistoric and Historic	Artifact scatter and historic-era metal debris One locus and four features.	42.5	Considered potentially eligible.
68	P13-13435	-11552	California State Parks	Prehistoric	Artifact scatter. Eight features. Relocated in 2016 and original museum form is accurate.	143.4	Considered potentially eligible.
69	P13-13675	-11730	BLM and California State Parks	Historic	Historic metal debris: Winona I historic-era practice bombing range. Extension to site added in 2018.	29.6	Considered potentially eligible.
70	P13-14306	none	BLM, Private, And California State Parks	Possible historic-era road	Historically bulldozed roads. SCIC coded resource as isolate; this was corrected during recordation.	Seismic pathway crosses defined site boundary in three places	Considered potentially ineligible but regarded as a historic property until a formal NRHP/CRHR evaluation can be completed.
71	P13-17173	-12788	BLM	Prehistoric	Lithic scatter. No features.	10	Considered potentially eligible.

#	ID	TRINOMIAL (CA-IMP-)	OWNER	ERA	TYPE AND FEATURES	MIN. DIST. FROM VIBROSEIS PATH IN METERS	NRHP/CRHR ELIGIBILITY STATEMENT
					Recorded during Wells Study (POWER 2018).		
72	P13-17174	-12789	BLM	Prehistoric	Lithic scatter. Three features (fish traps). Recorded during Wells Study (POWER 2018).	3.2	Considered potentially eligible.
73	P13-17175	-12790	California State Lands Commission and Private	Prehistoric	Lithic scatter. No features. Recorded during Wells Study (POWER 2018).	31.8	Considered potentially eligible.
74	P13-17176	-12791	California State Lands Commission and Private	Prehistoric	Lithic scatter. No features. Recorded during Wells Study (POWER 2018).	11.3	Considered potentially eligible.
75	P13-17177	-12792	California State Lands Commission	Prehistoric	Lithic scatter. No features. Recorded during Wells Study (POWER 2018).	6.8	Considered potentially eligible.
76	P13-17182	-12795	Private	Prehistoric	Lithic scatter. No features. Recorded during Wells Study (POWER 2018) then re-recorded in 2018.	12.7	Considered potentially eligible.
77	P13-17665 (RK-1)	-12991	Private	Prehistoric and one historic isolate	Artifact scatter. No features.	6.4	Considered potentially eligible.
78	P13-17666 (RK-2)	-12992	Private	Prehistoric	Lithic scatter. No features.	9.4	Considered potentially eligible.
79	P13-17667 (RK-3)	-12993	Private	Prehistoric	Artifact scatter. Two loci, one feature.	6.2	Considered potentially eligible.
80	P13-17668 (RK-4)	-12994	Private	Prehistoric	Artifact scatter. One locus, four features.	31.8	Considered potentially eligible.
81	P13-17669 (RK-5N)	-12995	California State Lands	Prehistoric	Artifact scatter. Three loci, two features.	24.9	Considered potentially eligible.

#	ID	TRINOMIAL (CA-IMP-)	OWNER	ERA	TYPE AND FEATURES	MIN. DIST. FROM VIBROSEIS PATH IN METERS	NRHP/CRHR ELIGIBILITY STATEMENT
			Commission and Private				
82	P13-17670 (RK-5S)	-12996	California State Lands Commission and Private	Prehistoric	Artifact scatter. One loci, five features.	11.1	Considered potentially eligible.
83	P13-17671 (RK-5H)	-12997	Private and California State Lands Commission	Historic	Three separate possibly historic-era trash dumps.	9.6	Considered potentially ineligible but regarded as a historic property until a formal NRHP/CRHR evaluation can be completed.
84	P13-17672 (RK-6)	-12998	Private	Prehistoric	Lithic scatter. No features.	22.7	Considered potentially eligible.
85	P13-17673 (RK-7)	-12999	Private	Prehistoric	Lithic scatter. Two features.	10.1	Considered potentially eligible.
86	P13-17674 (RK-9H)	-13000	California State Parks	Historic	Trash scatter. No features.	24.2	Considered potentially ineligible but regarded as a historic property until a formal NRHP/CRHR evaluation can be completed.
87	P13-17675 (RK-10)	-13001	California State Parks	Prehistoric	Lithic scatter. One loci, two features.	21.9	Considered potentially eligible.
88	P13-17676 (RK-11)	-13002	California State Parks	Prehistoric and one historic isolate	Artifact scatter. No features.	26.9	Considered potentially eligible.
89	P13-17677 (RK-12)	-13003	California State Parks and California State Lands Commission	Prehistoric and historic	Artifact scatter. No features.	7.1	Considered potentially eligible.
90	P13-17678 (RK-13)	-13004	California State Lands Commission	Historic	Trash scatter. One Caltrans concrete marker.	8.4	Considered potentially ineligible but regarded as a historic property until a formal NRHP/CRHR evaluation can be completed.
91	P13-17679 (RK-14)	-13005	California State Parks	Uncertain	No artifacts. One sandstone slab	111.5	Considered potentially eligible.

#	ID	TRINOMIAL (CA-IMP-)	OWNER	ERA	TYPE AND FEATURES	MIN. DIST. FROM VIBROSEIS PATH IN METERS	NRHP/CRHR ELIGIBILITY STATEMENT
					alignment of unknown function.		
92	P13-17680 (RK-15)	-13006	BLM	Prehistoric and some historic isolates	Artifact scatter. No features	21.2	Considered potentially eligible.
93	P13-17681 (RK-17)	-13007	Private	Prehistoric	Artifact scatter. One locus, four features.	28.2	Considered potentially eligible.
94	P13-17682 (RK-18)	-13008	BLM	Prehistoric	Lithic scatter. No features.	28.7	Considered potentially eligible.
95	P13-17683 (RK-19)	-13009	BLM	Prehistoric	Ceramic scatter. One fish-trap feature.	29.9	Considered potentially eligible.
96	P13-17684 (RK-20)	-13010	BLM and California State Parks	Prehistoric	Lithic scatter. No features.	13.6	Considered potentially eligible.
97	P13-17685 (RK-21)	-13011	California State Parks	Prehistoric	Lithic scatter. No features.	21.4	Considered potentially eligible.
98	P13-17686 (RK-22)	-13012	California State Parks	Prehistoric	Lithic scatter. No features.	67.5	Considered potentially eligible.
99	P13-17687 (RK-23)	-13013	California State Parks	Prehistoric	Lithic scatter. Three fish-trap features.	5.6	Considered potentially eligible.
100	P13-17688 (RK-24)	-13014	California State Parks	Prehistoric	Artifact scatter. One possible fish-trap feature.	26.9	Considered potentially eligible.
101	P13-17689 (RK-25)	-13015	California State Parks	Prehistoric	Artifact scatter. No features.	9.9	Considered potentially eligible.
102	P13-17690 (RK-26)	-13016	California State Parks	Prehistoric	Artifact scatter. One possible fish-trap feature.	13.6	Considered potentially eligible.
103	P13-17691 (RK-27)	-13017	BLM and California State Parks	Prehistoric	Lithic scatter. Two features.	14.6	Considered potentially eligible.
104	P13-17692 (RK-28)	-13018	BLM	Prehistoric	Lithic scatter. One locus.	45.1	Considered potentially eligible.
105	P13-17693 (RK-29)	-13019	BLM and California State	Prehistoric	Artifact scatter. One locus, five features.	25.4	Considered potentially eligible.

#	ID	TRINOMIAL (CA-IMP-)	OWNER	ERA	TYPE AND FEATURES	MIN. DIST. FROM VIBROSEIS PATH IN METERS	NRHP/CRHR ELIGIBILITY STATEMENT
			Parks				
106	P13-17694 (RK-30)	-13020	BLM	Prehistoric	Lithic scatter. No features.	71.1	Considered potentially eligible.
107	P13-17695 (RK-31)	-13021	California State Parks and BLM	Prehistoric	Lithic scatter. No features.	46.9	Considered potentially eligible.
108	P13-17696 (RK-32)	-13022	BLM	Prehistoric	Lithic scatter. No features.	40.2	Considered potentially eligible.
109	P13-17697 (RK-33)	-13023	BLM	Prehistoric	Lithic scatter. No features.	33.1	Considered potentially eligible.
110	P13-17698 (RK-34)	-13024	California State Lands Commission and California State Parks	Prehistoric	Artifact scatter. Two loci, four features.	11.6	Considered potentially eligible.
111	P13-17699 (RK-35)	-13025	BLM and California State Parks	Prehistoric	Artifact scatter. Six features, some may be fish-traps.	71.6	Considered potentially eligible.
112	P13-17700 (RK-36)	-13026	BLM	Prehistoric	Artifact scatter. No features.	14.3	Considered potentially eligible.
113	P13-17701 (RK-37)	-13027	BLM and California State Parks	Prehistoric	Artifact scatter. One locus, four features.	13.6	Considered potentially eligible.
114	P13-17702 (RK-38/55)	-13028	BLM and California State Parks	Prehistoric and historic metal debris	Artifact scatter. Fourteen features.	7	Considered potentially eligible.
115	P13-17703 (RK-39)	-13029	California State Parks	Prehistoric	Lithic scatter. One feature.	9.5	Considered potentially eligible.
116	P13-17704 (RK-40)	-13030	California State Parks	Prehistoric	Artifact scatter. No features.	24.6	Considered potentially eligible.
117	P13-17705 (RK-41)	-13031	California State Parks	Prehistoric	Lithic scatter. No features.	41.2	Considered potentially eligible.
118	P13-17706 (RK-42)	-13032	California State Parks	Prehistoric	Artifact scatter. One possible feature.	53.1	Considered potentially eligible.
119	P13-17707 (RK-44)	-13033	California State Parks	Prehistoric	Artifact scatter. Five features.	11.6	Considered potentially eligible.

#	ID	TRINOMIAL (CA-IMP-)	OWNER	ERA	TYPE AND FEATURES	MIN. DIST. FROM VIBROSEIS PATH IN METERS	NRHP/CRHR ELIGIBILITY STATEMENT
120	P13-17708 (RK-45)	-13034	California State Parks	Prehistoric	Lithic scatter. Two features (one roomblock).	30.6	Considered potentially eligible.
121	P13-17709 (RK-47)	-13035	California State Parks	Prehistoric	Lithic scatter. No features.	13.5	Considered potentially eligible.
122	P13-17710 (RK-48)	-13036	California State Parks	Prehistoric	Lithic scatter. No features.	21.9	Considered potentially eligible.
123	P13-17711 (RK-49)	-13037	California State Parks	Prehistoric	Lithic scatter. No features.	12.8	Considered potentially eligible.
124	P13-17712 (RK-50)	-13038	California State Parks	Prehistoric	Lithic scatter. Four features.	12.7	Considered potentially eligible.
125	P13-17713 (RK-51)	-13039	BLM	Prehistoric	Lithic scatter. No features.	5.9	Considered potentially eligible.
126	P13-17714 (RK-52)	-13040	BLM	Prehistoric	Lithic scatter. No features.	48.6	Considered potentially eligible.
127	P13-17715 (RK-54)	-13041	BLM	Prehistoric	Lithic scatter. No features.	9.8	Considered potentially eligible.
128	P13-12495 (RK-55)	-11033	California State Parks	Prehistoric and historic metal debris	Artifact scatter. No features.	29.4	Considered potentially eligible.
129	P13-17716 (RK-57)	-13042	California State Parks	Prehistoric	No artifacts. Two possible fish trap features.	61.4	Considered potentially eligible.
130	P13-17717 (RK-58)	-13043	California State Parks	Prehistoric	Artifact scatter. No features.	25.1	Considered potentially eligible.
131	P13-17718 (RK-59)	-13044	California State Lands Commission and California State Parks	Prehistoric	Lithic scatter. No features.	9.3	Considered potentially eligible.
132	P13-12634 (RK-60)	-12990	California State Parks	Prehistoric	Lithic scatter. No features. Note: includes isolate P13-12634.	3.4	Considered potentially eligible.
133	P13-17601 (S-04-001)	-12920	Private	Prehistoric	Lithic scatter. One feature.	18.2	Considered potentially eligible.

#	ID	TRINOMIAL (CA-IMP-)	OWNER	ERA	TYPE AND FEATURES	MIN. DIST. FROM VIBROSEIS PATH IN METERS	NRHP/CRHR ELIGIBILITY STATEMENT
134	P13-17602 (S-04-002)	-12921	California State Lands Commission	Prehistoric	Lithic scatter. No features.	21.1	Considered potentially eligible.
135	P13-17603 (S-04-003)	-12922	California State Lands Commission	Prehistoric	Lithic scatter. No features.	14.6	Considered potentially eligible.
136	P13-17604 (S-04-004)	-12923	California State Lands Commission	Prehistoric	Lithic scatter. No features.	14.2	Considered potentially eligible.
137	P13-17605 (S-04-005)	-12924	California State Lands Commission	Prehistoric	Lithic scatter. No features.	9.9	Considered potentially eligible.
138	P13-17606 (S-04-006)	-12925	Private and California State Lands Commission	Prehistoric	Artifact scatter. No features.	21.1	Considered potentially eligible.
139	P13-17607 (S-04-007)	-12926	Private	Prehistoric	Artifact scatter. One feature.	30.5	Considered potentially eligible.
140	P13-17608 (S-04-010)	-12927	California State Lands Commission	Prehistoric	Artifact scatter. No features.	9.6	Considered potentially eligible.
141	P13-17609 (S-04-012)	-12928	Private	Prehistoric	Ceramic scatter. No features.	5	Considered potentially eligible.
142	P13-17610 (S-04-013)	-12929	Private	Prehistoric	Artifact scatter. One feature.	12.2	Considered potentially eligible.
143	P13-11134 (TW-1)	-10140	California State Parks	Prehistoric and historic	Artifact scatter. One well feature, one trash feature. Note: includes site P13-11134.	89.9	Considered potentially eligible.
144	P13-17611 (TW-2)	-12930	California State Parks	Prehistoric	Artifact scatter. No features.	42.5	Considered potentially eligible.
145	P13-17612 (TW-3)	-12931	Private	Prehistoric	Artifact scatter. No features.	15.8	Considered potentially eligible.
146	P13-17613 (TW-4)	-12932	Private	Prehistoric and historic	Artifact scatter. Two well features.	11.9	Considered potentially eligible.

#	ID	TRINOMIAL (CA-IMP-)	OWNER	ERA	TYPE AND FEATURES	MIN. DIST. FROM VIBROSEIS PATH IN METERS	NRHP/CRHR ELIGIBILITY STATEMENT
147	P13-17614 (TW-5)	-12933	California State Parks	Prehistoric	Artifact scatter. No features.	35.8	Considered potentially eligible.
148	P13-17615 (TW-8)	-12934	California State Parks	Prehistoric	Artifact scatter. No features.	40.3	Considered potentially eligible.
149	P13-17616 (TW-9)	-12935	BLM and California State Parks	Prehistoric	Lithic scatter. No features.	4.2	Considered potentially eligible.
150	P13-17617 (TW-10)	-12936	BLM	Prehistoric	Artifact scatter. No features.	5.9	Considered potentially eligible.
151	P13-17617 (TW-11)	-12937	BLM	Prehistoric	Artifact scatter. No features.	4	Considered potentially eligible.
152	P13-17617 (TW-12)	-12938	California State Parks	Prehistoric	Artifact scatter. No features.	20	Considered potentially eligible.
153	P13-17620 (TW-13)	-12939	BLM	Prehistoric	Lithic scatter. No features.	37.1	Considered potentially eligible.
154	P13-17621 (TW-14)	-12940	BLM	Prehistoric and historic	Artifact scatter. No features.	31.9	Considered potentially eligible.
155	P13-17622 (TW-15)	-12941	BLM	Prehistoric	Lithic scatter. No features.	11.4	Considered potentially eligible.
156	P13-17623 (TW-16)	-12942	BLM	Prehistoric and historic	Artifact scatter. No features.	36.9	Considered potentially eligible.
157	P13-17624 (TW-17)	-12943	BLM	Prehistoric	Lithic scatter. No features.	50.4	Considered potentially eligible.
158	P13-17625 (TW-18)	-12944	California State Parks	Prehistoric and historic	Artifact scatter. No features.	51.4	Considered potentially eligible.
159	P13-17626 (TW-20)	-12945	California State Parks	Prehistoric	Artifact scatter. No features.	24.9	Considered potentially eligible.
160	P13-17627 (TW-21)	-12946	California State Parks	Prehistoric	Lithic scatter. No features.	21.4	Considered potentially eligible.
161	P13-17628 (TW-22)	-12947	BLM and California State Parks	Prehistoric	Artifact scatter. No features.	21.2	Considered potentially eligible.
162	P13-17629 (TW-23)	-12948	BLM	Prehistoric	Lithic scatter. No features.	56.8	Considered potentially eligible.
163	P13-12505 (TW-25)	-12949	California State Parks	Prehistoric and historic metal debris	Artifact scatter. No features.	57.7	Considered potentially eligible.

#	ID	TRINOMIAL (CA-IMP-)	OWNER	ERA	TYPE AND FEATURES	MIN. DIST. FROM VIBROSEIS PATH IN METERS	NRHP/CRHR ELIGIBILITY STATEMENT
164	P13-12491 (TW-26)	-12950	California State Parks	Prehistoric	Lithic scatter. No features.	9	Considered potentially eligible.
165	P13-12492 (TW-27)	-12951	California State Parks	Prehistoric	Lithic scatter. No features.	10.6	Considered potentially eligible.
166	P13-17630 (TW-28)	-12952	California State Parks	Prehistoric and historic trash	Artifact scatter. No features.	53	Considered potentially eligible.
167	P13-12477 (TW-30)	-12953	California State Parks	Prehistoric	Lithic scatter. No features.	42.7	Considered potentially eligible.
168	P13-17631 (TW-31)	-12954	California State Parks	Prehistoric	Lithic scatter. No features.	35.1	Considered potentially eligible.
169	P13-17632 TW-32	-12955	California State Parks	Prehistoric	Artifact scatter. One locus, one potdrop feature.	7.1	Considered potentially eligible.
170	P13-17633 (TW-33)	-12956	California State Parks	Prehistoric	Artifact scatter. No features.	158.4	Considered potentially eligible.
171	P13-12464 (TW-34)	-12953	California State Parks	Prehistoric	Artifact scatter. One locus, five features.	49.1	Considered potentially eligible.
172	P13-17634 (TW-36)	-12954	California State Parks	Prehistoric	Artifact scatter. Six loci, 29 probable fish trap and/or habitation features.	12.4	Considered potentially eligible.
173	P13-17635 (TW-37)	-12955	California State Parks	Prehistoric	Lithic scatter. No features.	8.8	Considered potentially eligible.
174	P13-17636 (TW-38)	-12956	California State Parks	Prehistoric	Lithic scatter. No features.	10.2	Considered potentially eligible.
175	P13-17719 (TW-39)	-13045	California State Parks	Prehistoric	Lithic scatter. No features. Overlain by the Winona I practice bombing site.	31.6	Considered potentially eligible.

Isolates

#	FIELD NUMBER	PRIMARY (P13-)	OWNER	ERA	TYPE AND FEATURES	NRHP/CRHR ELIGIBILITY STATEMENT
176	CN-ISO-3	-17483	BLM	Prehistoric	One biface fragment.	Ineligible
177	CN-ISO-4	-17484	BLM	Prehistoric	One stone tool.	Ineligible
178	CN-ISO-5	-17485	BLM	Historic	One bomb tail fin.	Ineligible
179	CN-ISO-6	-17486	BLM	Prehistoric	One flake.	Ineligible
180	CN-ISO-7	-17487	BLM	Prehistoric	One flake.	Ineligible
181	CN-ISO-8	-17488	BLM	Prehistoric	One stone tool.	Ineligible
182	CN-ISO-9	-17489	BLM	Prehistoric	One flake.	Ineligible
183	CN-ISO-10a	-17490	BLM	Prehistoric	One stone tool, one flake.	Ineligible
184	CN-ISO-13	-17491	Private	Prehistoric	One mano fragment.	Ineligible
185	CN-ISO-14	-17492	BLM	Historic/modern	One likely historic or modern cairn.	Ineligible
186	CN-iso-18	-17544	Private	Prehistoric	One metate.	Ineligible
187	CN-iso-19	-17545	Private	Prehistoric	One metate.	Ineligible
188	CN-iso-20	-17546	Private	Uncertain	Isolated human humerus.	Ineligible
189	DM-ISO-1	-17493	California State Lands Commission	Prehistoric	One stone tool, one flake.	Ineligible
190	DM-ISO-3	-17494	Private	Prehistoric	One flake.	Ineligible
191	DM-ISO-5	-17495	Private	Prehistoric	Two flakes.	Ineligible
192	DM-ISO-6	-17496	Private	Prehistoric	Two tested cobbles.	Ineligible
193	DM-ISO-8	-17497	California State Lands Commission	Prehistoric	One stone tool.	Ineligible

#	FIELD NUMBER	PRIMARY (P13-)	OWNER	ERA	TYPE AND FEATURES	NRHP/CRHR ELIGIBILITY STATEMENT
194	DM-ISO-9H	-17498	Private	Historic	One meat can in pieces.	Ineligible
195	DM-ISO-10	-17499	Private	Prehistoric	One core, one flake.	Ineligible
196	DM-ISO-11	-17500	Private	Prehistoric	One core.	Ineligible
197	DM-ISO-12	-17501	Private	Prehistoric	One stone tool.	Ineligible
198	DM-ISO-13	-17502	Private	Prehistoric	Three refitted ceramics.	Ineligible
199	DM-ISO-14	-17503	Private	Prehistoric	One flake.	Ineligible
200	DM-ISO-15	-17504	Private	Prehistoric	One stone tool.	Ineligible
201	DM-ISO-16	-17505	Private	Prehistoric	One stone tool, one flake.	Ineligible
202	DM-ISO-17	-17506	Private	Prehistoric	One broken metate and one mano fragment.	Ineligible
203	DM-ISO-18	-17507	Private	Prehistoric	One core.	Ineligible
204	DM-ISO-19	-17508	Private	Prehistoric	One stone tool.	Ineligible
205	DM-ISO-20	-17509	Private	Prehistoric	One tested cobble.	Ineligible
206	DM-ISO-21	-17510	Private	Prehistoric	One stone tool.	Ineligible
207	DM-ISO-24	-17511	Private	Prehistoric	One projectile point.	Ineligible
208	DM-ISO-25	-17512	Private	Prehistoric	One stone tool	Ineligible
209	DM-ISO-26	-17513	Private	Prehistoric	One shatter fragment and one potsherd.	Ineligible
210	DM-ISO-27	-17514	Private	Prehistoric	Two flakes.	Ineligible
211	I-04-002	-17515	Private	Prehistoric	One core.	Ineligible
212	I-04-003	-17516	Private	Prehistoric	One flake.	Ineligible

#	FIELD NUMBER	PRIMARY (P13-)	OWNER	ERA	TYPE AND FEATURES	NRHP/CRHR ELIGIBILITY STATEMENT
213	i-04-005	-17517	Private	Prehistoric	One flake.	Ineligible
214	i-04-006	-17518	California State Lands Commission	Uncertain	One possible historic or modern cairn.	Ineligible
215	i-04-012	-17519	Private	Prehistoric	One projectile point.	Ineligible
216	i-04-030	-17520	Private	Prehistoric	One projectile point fragment.	Ineligible
217	i-04-031	-17521	California State Lands Commission	Prehistoric	One potsherd.	Ineligible
218	i-04-032	-17522	California State Lands Commission	Prehistoric	One potsherd.	Ineligible
219	i-04-033	-17523	California State Lands Commission	Prehistoric	One potsherd.	Ineligible
220	i-04-034	-17524	California State Lands Commission	Prehistoric	One pipe fragment.	Ineligible
221	KRM-ISO-37	-17525	Private	Prehistoric	One flake.	Ineligible
222	KRM-ISO-38	-17526	Private	Prehistoric	One flake.	Ineligible
223	KRM-ISO-40	-17527	Private	Prehistoric	One flake.	Ineligible
224	RK-iso-1	-17547	Private	Prehistoric	One flake.	Ineligible
225	RK-iso-3	-17548	California State Parks	Historic	One WW2 bullet.	Ineligible
226	RK-iso-4	-17549	BLM	Historic	One ammo clip.	Ineligible

#	FIELD NUMBER	PRIMARY (P13-)	OWNER	ERA	TYPE AND FEATURES	NRHP/CRHR ELIGIBILITY STATEMENT
227	RK-iso-7a	-17550	Private	Prehistoric	One flake.	Ineligible
228	RK-iso-7b	-17551	Private	Historic	One historic bimetal can.	Ineligible
229	RK-iso-8	-17552	Private	Prehistoric	One mano.	Ineligible
230	RK-iso-9	-17553	Private	Prehistoric	One flake.	Ineligible
231	RK-iso-10	-17554	California State Parks	Prehistoric	One stone tool.	Ineligible
232	RK-iso-11	-17555	California State Parks	Historic	One WWII rocket ignitor.	Ineligible
233	RK-iso-12	-17556	California State Parks	Prehistoric	One flake.	Ineligible
234	RK-iso-13	-17557	California State Parks	Prehistoric	One stone tool.	Ineligible
235	RK-iso-14	-17558	BLM	Historic	One WWII rocket motor venture.	Ineligible
236	RK-iso-15	-17559	California State Parks	Prehistoric	One mano fragment.	Ineligible
237	RK-iso-17	-17560	BLM	Prehistoric	Two stone tools.	Ineligible
238	RK-iso-18	-17561	California State Parks	Prehistoric and historic	One metate and historic metal debris.	Ineligible
239	RK-iso-19	-17562	BLM	Prehistoric	Two flakes.	Ineligible
240	RK-iso-20	-17563	BLM	Prehistoric	One metate.	Ineligible
241	RK-iso-21	-17564	California State Parks	Prehistoric	One flake.	Ineligible
242	RK-iso-22	-17565	Private	Historic	One whole bottle.	Ineligible

#	FIELD NUMBER	PRIMARY (P13-)	OWNER	ERA	TYPE AND FEATURES	NRHP/CRHR ELIGIBILITY STATEMENT
243	RK-iso-23	-17566	California State Parks	Prehistoric	One flake.	Ineligible
244	RK-iso-24	-17567	California State Parks	Prehistoric	One tested cobble.	Ineligible
245	RK-iso-25	-17568	California State Parks	Prehistoric	One stone tool.	Ineligible
245a	RK-iso-26	-17720	California State Parks	Prehistoric	One flake tool	Ineligible
246	RK-iso-28	-17569	California State Parks	Prehistoric	One flake.	Ineligible
247	RK-iso-29a	-17570	California State Parks	Prehistoric	One potsherd.	Ineligible
248	RK-iso-29b	-17571	California State Parks	Prehistoric	Two stone tools.	Ineligible
249	RK-iso-30	-17572	California State Parks	Historic	One sardine can.	Ineligible
250	TW-ISO-1	-17528	California State Parks	Prehistoric	One stone tool.	Ineligible
251	TW-ISO-2	-17529	California State Parks	Prehistoric	One mano.	Ineligible
252	TW-ISO-3	-17530	California State Parks	Prehistoric	One stone tool.	Ineligible
253	TW-ISO-4	-17531	California State Parks	Prehistoric	One flake.	Ineligible
254	TW-ISO-5	-17532	California State Parks	Prehistoric	One projectile point/chert tool.	Ineligible
255	TW-ISO-6a	-17533	California State Parks	Prehistoric	One potsherd.	Ineligible
256	TW-ISO-6b	-17534	BLM	Prehistoric	One stone tool.	Ineligible

#	FIELD NUMBER	PRIMARY (P13-)	OWNER	ERA	TYPE AND FEATURES	NRHP/CRHR ELIGIBILITY STATEMENT
257	TW-ISO-7	-17535	BLM	Prehistoric	One stone tool.	Ineligible
258	TW-ISO-8	-17536	BLM	Prehistoric	One stone tool and one flake.	Ineligible
259	TW-ISO-9	-17537	California State Parks	Prehistoric	One stone tool.	Ineligible
260	TW-ISO-13	-17538	California State Parks	Prehistoric	One flake.	Ineligible
261	TW-ISO-14	-17539	California State Parks	Prehistoric	Two flakes.	Ineligible
262	TW-ISO-15	-17540	California State Parks	Prehistoric	One core.	Ineligible
263	TW-ISO-18	-17541	California State Parks	Prehistoric	Two flakes.	Ineligible
264	TW-ISO-21	-17542	California State Parks	Prehistoric	One projectile point and one flake.	Ineligible
265	TW-ISO-22	-17543	California State Parks	Prehistoric	One flake.	Ineligible

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1.0 INTRODUCTION

The Proponent is proposing to conduct a 3-D Study within a large block of land in and southwest of Salton City in the County of Imperial, California. The study will be conducted by a specialized contractor retained by the Proponent after all authorizations to conduct the 3-D Study are received. The purpose of the 3-D Study is to evaluate potential subsurface geothermal resources located at the north end of the United States Department of the Interior, BLM Truckhaven Geothermal Lease Area (TGLA), which would allow the Proponent to locate and drill geothermal test wells at the most ideal location of hot water draw and cooled water injection. Because the lead federal agency is the BLM and the proposed 3-D Study is considered an undertaking following 36 Code of Federal Regulations (CFR) Part 800.3(a), a Class III cultural resource inventory is necessary prior to Project approval.

The general location of the Class III inventory covers a block west of the Salton Sea measuring approximately 5.4 miles west to east by 4.5 miles north to south (Figure 1). Stages of project planning were generated before and after the POWER archaeological fieldwork took place and these stages have relevance to this discussion. For example, Appendix A shows the 2016 and 2018 initial 3-D Study test grids prepared by POWER and the Proponent. These tests grids were later modified by teams in the field and these exhibits were used to obtain fieldwork authorization permits for those field seasons. Appendix B shows a proposed Area of Potential Effects (APE) mapbook, which was developed once the field surveys and site recordation was complete. The Class III inventory undertaken by POWER covers an APE that is larger than the proposed seismic drive pathways, which are pictured in Appendix C, because some of the seismic drive pathways POWER staff surveyed ultimately crossed over recorded site boundaries or crossed topography too severe for the 3-D Study equipment. Seismic drive pathways that were surveyed by the archaeological crews, but were discovered to bear these limitations, were discarded from consideration.

Figure 2 shows all areas inventoried by POWER archaeological staff as part of a proposed Class III APE in 2016 and 2018. The Class III inventory area covers 2,505.9 acres as a set of disconnected polygons. Fieldwork occurred in parts of T10S/R9E, T10S/R10E, T11S/R9E and T11S/R10E as shown on the *Kane Spring NW, CA*, *Truckhaven, CA*., *Shell Reef, CA.* and *Seventeen Palms, CA*. 1:24,000 topographic maps. The survey area is located within a multi-jurisdictional regulatory environment. Appendix D shows ownership data for each parcel in the 3-D Study area. Prior to beginning fieldwork, the Proponent advised POWER that avoidance of all cultural resource sites was their preferred action.

Fieldwork began in April 2016 when the project consisted of a combined well pad and vibroseis pathways study (POWER 2018). POWER archaeological staff obtained a BLM permit associated with the 2016 archaeological survey (#CA-670-16-077-FA01) and wrote a Work Plan in support of the survey permit. A California Department of Parks and Recreation's (Parks) 412A archaeological survey permit was also obtained utilizing the same Work Plan. For the 2018 field season, a new permit request was filed by POWER with the BLM (#CA-670-16-077-FA03), and Parks (412A), and a revised Work Plan for the 2018 surveys tiered off the original with BLM and Parks' permission. The 2016 and the 2018 Work Plans are provided in Appendix E and F, respectively.

The Work Plans allowed the environmental teams assigned to undertake the fieldwork the necessary latitude to develop revisions to the seismic drive pathways associated with the 3-D Study through the identification of various types of environmental constraints in the field, including archaeological resources. The field lead for the 2016 surveys was BLM-approved field director Trish Webb, and the field director of the 2018 surveys was Rebekka Knierim, M.A., RPA. Both were listed as field directors on POWER's statewide BLM permit during the respective field seasons. Michael Dice M.A., RPA was the Principal Investigator for both field seasons. POWER staff archaeologists that undertook the 2016 and 2018 surveys were pre-approved during the 2016 and 2018 Class III

inventory permitting process and numerous tribal monitors were also involved during the survey and site recordation fieldwork periods.

Numerous federal laws and regulations have been developed to protect cultural resources, including the NHPA, which established both the Advisory Council on Historic Preservation (ACHP) and the NRHP. Regulations associated with Section 106 of the NHPA (36 CFR Part 800 et seq.) require that any permitted activity (or undertaking) located on federal land that involves the expenditure of federal funds or that requires federal permits must consider the effect of the undertaking on all potentially historic properties. The BLM must afford the ACHP a reasonable opportunity to comment on such undertakings if there are potential effects to any historic properties. During the BLM-mandated Class III analysis, an inventory must be made of all potentially historic properties within the undertaking's proposed APE, a concept that is defined by 36 CFR Part 800.16(d). Properties judged significant within the context of the criteria in the NRHP must be avoided or be subject to programs that mitigate for adverse effects. BLM would then initiate consultation with the State Historic Preservation Officer (SHPO) if the undertaking was to adversely affect a historic property.

BLM agreed during development of the 2016 Work Plan that regulatory elements associated with State archaeological compliance guidelines could be incorporated into the Class III inventory report. Development-related projects that occur on State-managed lands and private lands in California are subject to cultural resource regulations that have been made a part of the CEQA process. The Imperial County Planning & Development Services Department (County) is the lead CEQA agency for this project and Appendix G of the CEQA Guidelines requires that the County account for potential adverse effects for any listed, unevaluated, or eligible historical resources as part of preparing County environmental compliance documents.

1.1 Description of the Federal Undertaking

Federal agencies must comply with Section 106 regulations when they directly undertake federal activities and when they are involved indirectly through funding, approving, permitting or licensing. Federal agencies must also comply with Section 106 when they are indirectly involved by delegating a federal program under which State or local agencies issue permits. The 1992 amendments to the NHPA specifically defined the term 'undertaking' as:

> "…a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including A) those carried out by or on behalf of the agency; B) those carried out with Federal financial assistance; C) those requiring a Federal permit, license, or approval; and D) those subject to State or local regulation administered pursuant to a delegation or approval by a Federal agency. (16 U.S.C. [United States Code] § 470w, Section 301[7])."

ACHP current regulations in 36 CFR Part 800.2(o) defines the 'undertaking' as:

> "…any project, activity, or program that can result in changes in the character or use of historic properties, if any such historic properties are located in the area of potential effects [APE]. The project, activity, or program must be under the direct or indirect jurisdiction of a Federal agency, or licensed or assisted by a Federal agency. Undertakings include new and continuing projects, activities, or programs and any of their elements not previously considered under Section 106."

ACHP takes the position that its current regulatory definition of undertaking is broad enough to encompass the 1992 definition. For the purposes of BLM, the action that is the undertaking is the issuance of a permit to the Proponent to drill wells on BLM-managed lands. Approval of the

undertaking is contingent on identifying if historic resources are present in the project area and if the undertaking has the potential to affect them.

The key to fulfilling these requirements is developing an appropriate APE.[1] BLM must consider potential direct, indirect, and cumulative effects to historic properties and all aspects of integrity, including their associated settings as applicable. Thus, the proposed APE for the project includes those portions of the study area that could have a potentially harmful impact on known and unknown cultural resources and, specifically for this project, any portion of the 3-D Study area where ground-disturbing activities are proposed. All cultural resources observed during the Class III inventory must be included in the APE and all are assumed to be eligible for listing to the NRHP/CRHR for the purposes of this inventory and analysis. Confirmation of the proposed APE involves consultation with key stakeholders such as Native American Tribes, Parks, the County, and SHPO. POWER has produced a preliminary APE in this document that can serve as a starting point for BLM to consider.

1.1.1 Project Description

The Proponent provided POWER with an August 2018 Plan of Operations from which this 3-D Study and Class III inventory project description has been derived. The purpose of the 3-D Study is to provide a high-resolution image of the subsurface geological features that will allow the Proponent to effectively evaluate the complex geology of the TGLA. The nature of geology below the TGLA is composed of complex folding and faulting that makes understanding the geothermal system difficult to model and very sensitive to drilling success and completion techniques.

Geophysical exploration utilizing 3-D seismic recording techniques includes an extensive field data acquisition operation combined with complex computer-assisted seismic data processing and interpretation to characterize and depict subsurface geologic structure and stratigraphy in three dimensions. Data obtained from the proposed 3-D Study, when combined with preexisting subsurface data, will enable geothermal wells to be drilled with a much higher probability of locating developable geothermal reserves than is attainable from alternative methods (for example, using relatively sparse two-dimensional seismic data and/or limited well control to infer drillable locations). Seismic waves will be created using the vibroseis technique along pre-determined source lines at "source points" and recorded at "receiving stations" using devices specially designed to undertake these tasks.

The Proponent's geotechnical team considered, before any archaeological fieldwork began, various designs for placement of source locations and receiver locations in the 3-D Study area to maximize seismic data quality, while minimizing potential environmental impact. In 2016, the Proponent initially proposed that receiver stations and source points be placed in a strict grid-like pattern generally 200 feet apart along parallel lines spaced approximately 1,200 feet apart. The 2016 version of the 3-D Study area originally included approximately 3,168 receiver points distributed over approximately 119.09 linear miles of receiver lines amongst 24 receiver transects. The 3,243 source points were to be distributed over approximately 121.97 linear miles of source lines amongst 23 source transects. Changes to the project scope in late 2017 and during the 2018 field season

[1] As defined by 36 CFR Part 800.16(d), an APE is "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of the undertaking and may be different for different kinds of effects caused by the undertaking". Typically, an archaeological survey should attempt to cover as much ground as is reasonably possible before an APE is confirmed by the lead agency. If BLM consults with project stakeholders, and BLM finds than an inadequate amount of land has been surveyed, the Proponent must have those additional areas surveyed. The additional lands would then be made part of the APE, as required.

necessitated a reduction in source points and receiver points to complete the 3-D Study. The Proponent now proposes to utilize seismic energy source points at rough intervals of 165 feet along seismic drive pathways spaced roughly 990 feet apart. The survey will also require the deployment of motion sensing devices (geophones or receivers) at receiving stations that will be placed at regular intervals of 165 feet along parallel receiver lines spaced 825 feet apart. These needs are subject to alteration once the proposed seismic drive pathways are reviewed by the agencies and source point locations would need to be similarly reviewed.

The source of the seismic energy will be created by vibration-creating equipment mounted on the undersides of heavy equipment known as 'vibroseis buggies' working in tandem pairs. These vehicles are approximately 13 feet high, 36 feet long, 12 feet wide, and weigh approximately 62,000 pounds. A vibrator pad measuring 4.5 by 7.5 feet is centered under each vehicle. A vibroseis buggy is equipped with wide, low-pressure flotation tires, resulting in an effective 4.5 pounds per square inch (psi) ground pressure, as compared to tires of a ¾-ton four-wheel-drive pickup, which exerts 27 psi. Ground pressure under the vibrator pads is approximately 12.75 psi.

Two vibrators would be used at each seismic energy "source point." Two independent teams of two vibrators working in tandem on adjacent blocks of source points are proposed for this 3-D Study. A vibrator team would not travel on the same routes used by the other vibrator team to avoid dual travel on the same route to the extent practical. During vibroseis operations, the vibrator buggies traveling in tandem will move along the global positioning system (GPS)-established seismic drive pathways, stop at given point, and then each vibrator buggy will then drop the vibrator pad to the ground. Source generation would be triggered from a central control truck stationed at the Salton Sea Airport and all buggies in the field will vibrate in unison to create the energy source which sends selected vibration signals propagating though the ground. The resulting energy wave will be recorded by the receivers and transmitted wirelessly to the main data point station located at the airport. Source generation from vibrators would occur between three- and five-minute intervals, depending on access, detours, and terrain. Approximately 2,160 receiver channels may be active, collecting data at any given time during a work day.

Each tandem of buggies shall be guided by a monitoring archaeologist equipped with a high-resolution tracking device (a Trimble or similar device) that will allow the tandem to follow the BLM- and Parks-approved centerlines of the seismic drive pathways that have been described in this report. Controlled source generation and recording would begin shortly after placement of the initial grouping of receiver stations. Approximately 50 to 60 crew members and monitors, organized into field groups, would conduct daily operations during receiver placement and data acquisition operations.

Placement of receiving/recording stations, consisting of six geophones each, would occur during the data acquisition operations. A helicopter would be used to move cache bags containing four to six receiving stations along receiver lines. The cache bags would be suspended from a helicopter with a long line and deposited one at a time to predetermined GPS locations provided by the civil surveyors. Approved archaeological monitor will work with each geophone placement team to ensure that the geophones are not inserted into archaeological features.

Field survey crew members would walk to the first dropped cache bag, move the equipment to the first receiver location, then prepare and connect the transmitter station and geophones. Cables and attached geophones would be laid out by hand around each station in a predetermined pattern. Each geophone would be mounted on a four-inch spike and placed into the soil using foot pressure. In areas of rock outcrops, battery-operated hand drills may be used to provide a pilot hole for the geophone spike if they cannot be coupled to the ground sufficiently. The crewmembers would proceed on foot to the second bag and repeat the set-up of the first receiver station and its network of cables and

geophones. Staggered deployment and pick up of receiving stations would occur as the source sequence proceeds during data acquisition. Depending on the rate of progress after data recording starts, the first few lines of cable and equipment would be picked up and moved "leap-frog" fashion ahead of the last line laid. This pattern of picking up and moving receiver stations a few lines ahead would continue through the entire recording process. All receiver placement would be performed by personnel on foot.

In some instances, the movement of vibrating equipment to and along source lines can result in minor rutting. Additionally, vibrator buggies may leave a pad imprint at the source locations, which is about eight square feet in size (two feet by four feet). Displacement of ground vegetation can occur in areas immediately surrounding the source vibration locations. However, soils in the area are the mostly finer-textured silt and sandy soils which are less likely to compact. Field demonstrations undertaken in 2017 confirmed this with a loosening of the surface soil after vibroseis. The recovery time needed for these impacts is minimal, and affected areas are anticipated to revegetate to pre-project conditions in a normal-rainfall growing season.

The vibroseis buggies will be required to utilize designated routes along the seismic drive pathways to stay on approved routes and minimize impacts to substrate and vegetation. To minimize impacts to soil and vegetation in areas where vibrators would need to backtrack, they will offset their travel routes to the extent practical within the approved travel corridors. Vibroseis buggies would typically proceed from one source location to the next with one pass per source line, unless the terrain or obstacle required vibroseis buggies to enter and exit the area using the same route.

Repairing faulty equipment may be necessary during geophone deployment and/or data acquisition. As the geophones are being deployed, they would be checked for functionality. If there is a need to further check or replace equipment, a troubleshooter on foot would be sent to the problem area. Access for maintenance would be performed by persons using archaeologically-cleared routes or seismic drive pathways only. Troubleshooting operations would utilize 6 to 10 crewmembers.

1.2 Proposed Area of Potential Effects

Because the proposed seismic drive pathways necessary to undertake the 3-D Study by the vibroseis buggies must be approved by various project stakeholders with reference to the locations of archaeological sites encountered during the survey, the proposed APE associated with this Class III inventory (see Appendix B) includes the following elements:

1. Centerlines of proposed seismic drive pathways.
2. Centerlines of proposed seismic drive pathways surveyed but rejected by the fieldwork teams because they either crossed cultural resources or were restricted by other topographic obstacles.
3. Surveyed buffer zones surrounding the surveyed seismic pathway centerlines. In the SVRA, the surveyed buffer zone extended 25 meters (82 feet) on either side of the centerline for the 2016 field season and 15 meters (49 feet) for the 2018 field season. Outside the SVRA, the buffer zone was 7.62 meters (25 feet) during both field seasons.
4. One 40-acre odd-shaped polygon within the Salton Sea Airport grounds.
5. Archaeological sites and isolates encountered and recorded during all Class III inventories.

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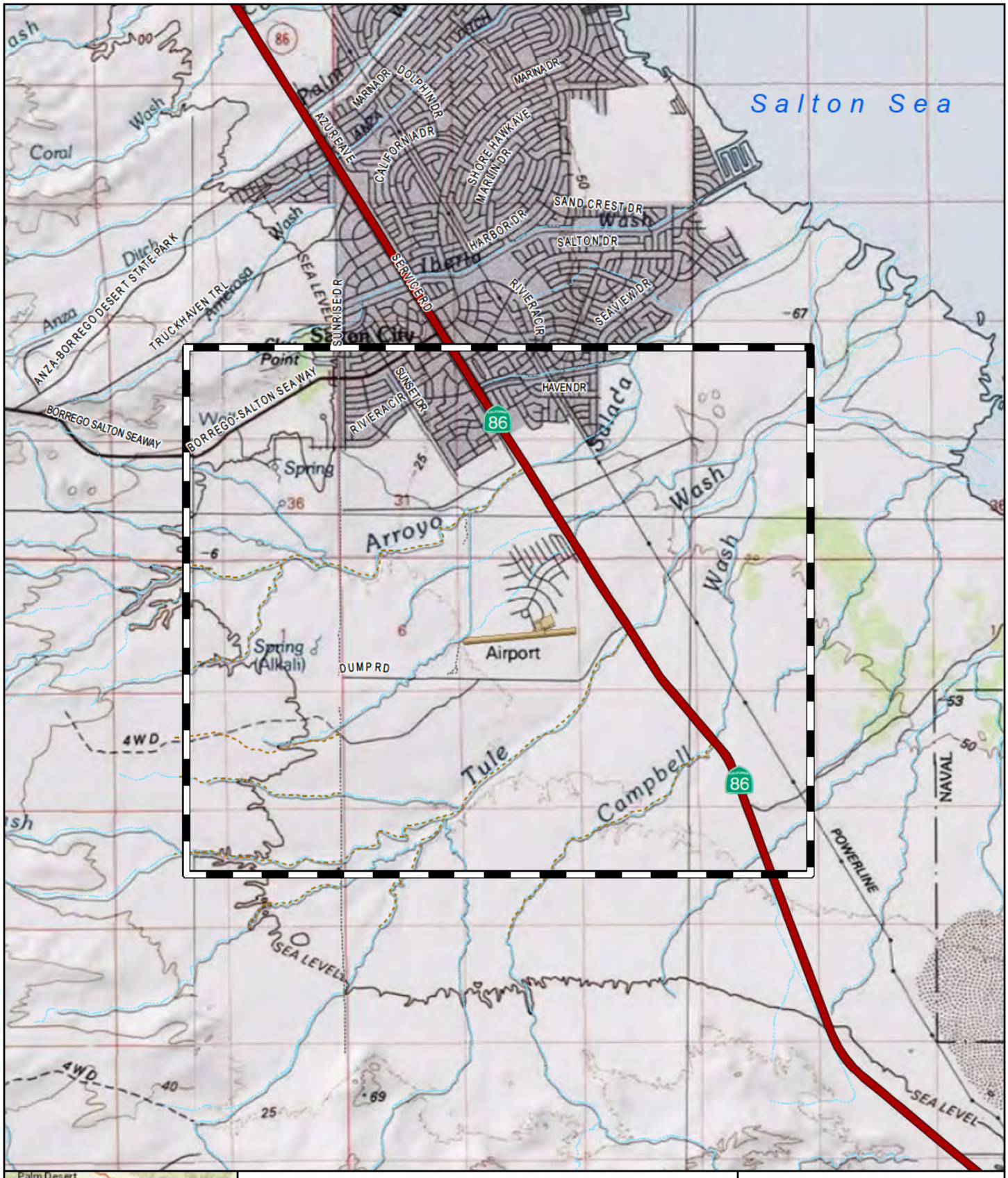
FIGURE 1 PROJECT LOCATION



Legend

- General Survey Area
- Salton Sea Airport (Staging Area)
- State Highway
- Dirt Road
- Trail
- Intermittent Stream, Wash, or Ditch

ORMAT NEVADA, INC. TRUCKHAVEN

Figure 1
Project Location

0 0.5 1 1.5
Miles

N

POWER ENGINEERS

Date: 9/24/2018

EEC ORIGINAL PKG

Path: W:\141038_Truckhaven_Ormat\GIS\Apps\Report_3D Study\Figure_1_Project_Location.mxd

FIGURE 2 AREA OF POTENTIAL EFFECTS, GENERAL VIEW

EEC ORIGINAL PKG

1.3 Regulatory Framework

The archaeological survey for this project is being performed to allow BLM to comply with elements of NEPA, Section 106 of the NHPA, and for the County elements of CEQA. According to BLM Handbook 8110 (BLM 2004), field office managers are responsible for ensuring that all cultural properties on public lands in their jurisdiction are appropriately managed. Sections 106 and 110 of the NHPA, and implementing regulations at 36 CFR Part 800, place specific procedural requirements on managers. Managers are required to consider the effects that a proposed BLM undertaking (action or authorization) would have on significant cultural properties prior to deciding to approve or authorize the undertaking (BLM 2004: pp 23).

1.3.1 National Environmental Policy Act

Federal or federally-assisted projects must consider effects on historic and cultural resources. NEPA (42 U.S.C. §4321-4346) establishes national policy for the protection and enhancement of the environment. Part of the function of the federal government in protecting the environment is to "preserve important historic, cultural, and natural aspects of our national heritage." NEPA is implemented by the Council on Environmental Quality regulations at 40 CFR Parts 1500 to 1508. Integration of the NEPA process and the Section 106 process early in the environmental analysis is encouraged.

This project is a federal undertaking regulated by BLM; therefore, BLM is the lead federal agency for NEPA compliance. A definition of "effects" to cultural resources requires that NEPA compliance documents must address historic and cultural resources (40 CFR Part 1508.8). Per 40 CFR Part 1508.8, any adverse and beneficial effects must also be addressed in NEPA documents.

The "affected environment" section of a NEPA document should provide background information on the prehistory and history of the area and describe known historic and cultural resources that may be affected by the project (40 CFR Part 1502.15). Lastly, the "environmental consequences" section of a NEPA document must address effects to historic or cultural resources that could result from the proposed action and each alternative (40 CFR Part 1502.16(f)). POWER understands that a Categorical Exclusion (CX) shall be prepared as the NEPA document for this project.

1.3.2 National Historic Preservation Act

The NHPA, as amended (16 U.S.C. §470f), is the principal federal law in the United States protecting cultural resources. Section 106 of the NHPA directs all federal agencies to consider the effects of their undertakings (i.e., actions, financial support, and authorizations) on cultural resources that have been included in or eligible for the NRHP. Such resources are known as historic properties by federal agencies and may include any prehistoric or historic district, site, or building structure. Section 106 of the NHPA is the key portion of the Act, and it directs all federal agencies to take into consideration the effects of their actions on historic properties.

The ACHP regulations at 36 CFR Part 800 implement Section 106. These regulations establish the NRHP as a planning tool to help federal agencies evaluate cultural resources in consultation with the SHPO and the ACHP. The criteria for determining whether cultural resources are eligible for listing in the NRHP are provided in 36 CFR Part 60.4. Eligible sites are those that:

a) are associated with events that have made a significant contribution to the broad patterns of history;

b) are associated with the lives of persons significant in the past;

c) embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction; or

d) have yielded, or may be likely to yield, information important in prehistory or history.

A cultural resource that has been **listed** or is **determined** eligible for listing on the NRHP is deemed a *historic property* regardless of the period to which it dates. To be listed in or determined eligible for the NRHP the cultural resource must meet one or more of the above criteria and possess integrity. Integrity is defined as the authenticity of a resource's historic identity as evidenced by the survival of physical characteristics that existed during the prehistoric or historic period of use. The NRHP recognizes seven aspects of integrity: location, design, setting, materials, workmanship, feeling, and association. Integrity of location means that the resource has not been moved from its historic location. Integrity of design, materials, and workmanship mean that the resource's original building materials, plan, shape, and design elements remain intact. Integrity of setting means that the surrounding landscape has changed very little since the period of importance for the resource. Integrity of feeling and association means the resource retains a link to an earlier time and place and can evoke that era.

Historic properties must generally be at least 50 years old; however, certain cultural resources associated with more recent, exceptionally important events (e.g., the development of nuclear energy; space exploration) may also be considered eligible for listing in the NRHP.

Compliance with Section 106 is required whenever a project has a federal nexus, meaning that the project is on federal land, uses federal funds, or is permitted by a federal agency. The project constitutes an undertaking as defined in 36 CFR Part 800.16(y) and requires implementing the Section 106 process as part of environmental compliance performance.

1.3.3 Desert Renewable Energy Conservation Plan

The Desert Renewable Energy Conservation Plan (DRECP), a major component of California's renewable energy planning efforts, will help provide effective protection and conservation of desert ecosystems while allowing for the appropriate development of renewable energy projects.

The DRECP is focused on 22.5 million acres in the desert regions and adjacent lands of seven California counties – Imperial, Inyo, Kern, Los Angeles, Riverside, San Bernardino, and San Diego. The DRECP is a landscape-level plan that streamlines renewable energy development while conserving unique and valuable desert ecosystems and providing outdoor recreation opportunities. The DRECP is a collaborative effort between the California Energy Commission, California Department of Fish and Wildlife, the BLM, and the United States Fish and Wildlife Service.

The BLM signed the Record of Decision approving its Land Use Plan Amendment on September 14, 2016, completing Phase I of DRECP requirements. The BLM Plan Amendment covers the 10 million acres of BLM-managed lands in the DRECP plan area and supports the overall renewable energy and conservation goals of the DRECP. Because archaeological fieldwork in specific DRECP land use planning areas may involve numerous tribal stakeholders and federal/state agencies, the BLM issued a Programmatic Agreement (PA) that provides technical guidance for archaeologists in potential renewable energy lease areas including the Truckhaven Geothermal Lease Area. POWER archaeological teams followed prescribed processes during the 2016 and 2018 3-D Study field seasons and during the 2017 wells analysis (POWER 2018b).

1.3.4 California Environmental Quality Act

The County will comply with the cultural resource requirements of CEQA (Sections 21000-21177 California Public Resources Code [PRC]) and CEQA Guidelines (14 California Code of Regulations Section 15000 et seq.). POWER understands that a Mitigated Negative Declaration (MND) shall be prepared as the overall CEQA document in support of this project.

Under CEQA, the County not only has an obligation to determine whether a project would have significant impacts on historical resources, archaeological resources, or human remains, but also to "identify potentially feasible measures to mitigate significant adverse changes in the significance" of these resources, and to "ensure that any adopted measures to mitigate or avoid significant adverse changes are fully enforceable through permit conditions, agreements, or other measures (California Code of Regulations Section 15064.5)." Specifically, CEQA asks would the project:

- Cause a substantial adverse change in the significance of a historical resource as defined in California Code of Regulations Section 15064.5[2]?
- Cause a substantial adverse change in the significance of an archaeological resource as defined in California Code of Regulations Section 15064.5?
- Disturb any human remains, including those interred outside of formal cemeteries?

California Public Resources Code 5024 and 5024.5

Under State environmental law, these are the primary regulations dictating the process of cultural resources management for State-owned historical resources which include archaeological and built-environment resources owned and managed by California State Parks:

- PRC 5024(f). Each state agency shall submit to the State Historic Preservation Officer for comment documentation for any project having the potential to affect historical resources listed in or potentially eligible for inclusion in the National Register of Historic Places or registered as or eligible for registration as a state historical landmark.

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[2] 14 CCR § 15064.5: the term "historical resources" shall include the following:

(1) A resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the California Register of Historical Resources (Pub. Res. Code §5024.1, Title 14 CCR, Section 4850 et seq.).

(2) A resource included in a local register of historical resources, as defined in section 5020.1(k) of the Public Resources Code or identified as significant in an historical resource survey meeting the requirements section 5024.1(g) of the Public Resources Code, shall be presumed to be historically or culturally significant. Public agencies must treat any such resource as significant unless the preponderance of evidence demonstrates that it is not historically or culturally significant.

(3) Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be an historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record. Generally, a resource shall be considered by the lead agency to be "historically significant" if the resource meets the criteria for listing on the California Register of Historical Resources (Pub. Res. Code, § 5024.1, Title 14 CCR, Section 4852) including the following:

(A) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

(B) Is associated with the lives of persons important in our past;

(C) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or

(D) Has yielded, or may be likely to yield, information important in prehistory or history.

(4) The fact that a resource is not listed in, or determined to be eligible for listing in the California Register of Historical Resources, not included in a local register of historical resources (pursuant to section 5020.1(k) of the Public Resources Code), or identified in an historical resources survey (meeting the criteria in section 5024.1(g) of the Public Resources Code) does not preclude a lead agency from determining that the resource may be an historical resource as defined in Public Resources Code sections 5020.1(j) or 5024.1.

- PRC 5024.5(a). No state agency shall alter the original or significant historical features or fabric, or transfer, relocate, or demolish historical resources on the master list maintained pursuant to subdivision (d) of Section 5024 without, early in the planning processes, first giving notice and a summary of the proposed action to the officer who shall have 30 days after receipt of the notice and summary for review and comment.
- PRC 5024.5(f). Until such time as a structure is evaluated for possible inclusion in the inventory pursuant to subdivisions (b) and (c) of Section 5024, state agencies shall assure that any structure which might qualify for listing is not inadvertently transferred or unnecessarily altered.

California Department of Parks and Recreation General Plan

In April 1982, Parks published a General Plan specific to the Ocotillo Wells SVRA (Parks 1981) and an Environmental Impact Report (EIR) written in support of the acquisition of the SVRA. The General Plan closed portions of the SVRA to off-road use, including lands located south of Dump Road and east of Power Line Road. Mitigation Measure #4 in the General Plan states the following:

> 4. Areas of high natural and cultural resource value will be preserved as noted in the plan and will be patrolled by staff (Some less noticeable resource values may be better protected by not having special attention drawn to them, especially in lightly used areas.)

Imperial County General Plan

The Open Space Element of the County General Plan presents numerous pieces of evidence related to that part of the County west of the Salton Sea. Goals of the Plan included the following:

Goal 3. Preserve the spiritual and cultural heritage of the diverse communities of Imperial County.

> Objective 3.1: Protect and preserve sites of archaeological ecological, historical and scientific value, and/or cultural significance.
>
> Objective 3.2: Develop management strategies to preserve the memory of important historic periods, including Spanish, Mexican, and early American elements of Imperial County.
>
> Objective 3.3: Engage all local Native American Tribes in the protection of tribal cultural resources, including prehistoric trails and burial sites.

The Open Space Element was updated by the County in March 2016 and approved by County Commissioners. The new Element contains the following policy and programs associated with Cultural Resource Conservation:

> Policy: Identify and document significant historic and prehistoric resources, and provide for the preservation of representative and worthy examples; and recognize the value of historic and prehistoric resources, and assess current and proposed land uses for impacts upon these resources.
>
> Programs:

- The County will use the CEQA process to conserve cultural resources and conform to Senate Bill 18 “Consultation with Tribal Governments” and Assembly Bill 52 “Consultation with Tribal Governments.” Public awareness of cultural heritage will be stressed. All information and artifacts recovered in this process will be stored in an appropriate institution and made available for public exhibit and scientific review.

- Encourage the use of open space easements in the conservation of high value cultural resources.
- Consider measures which would provide incentives to report archeological discoveries immediately to the Imperial Valley Desert Museum.
- Coordinate with appropriate federal, State, local and Tribal agencies to provide regular updates to the County "Sensitivity Map for Cultural Resources."
- Discourage vandalism of cultural resources and excavation by persons other than qualified archaeologists. The County shall study the feasibility of implementing policies and enacting ordinances toward the protection of cultural resources such as can be found in California Penal Code, Title 14, Point 1, Section 622-1/2. The County should maintain confidentiality of specific resource locations to prevent vandalism and desecration of sensitive cultural resources.

Lastly, Appendix F of the General Plan EIR provides the County's Mitigation Monitoring Program. For complying with CEQA, the County has issued the following requirements that apply to this project:

MM 6. Require the preparation of a cultural resource study by a qualified archaeologist for any for any project proposed in an area identified as very, moderately, or lightly sensitive.

- The planning department must monitor the reporting process.
- The report must be generated and approved prior to approval of the development project.
- The report must be submitted to the Planning Department.

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2.0 A BACKGROUND REVIEW OF POTENTIAL IMPACTS TO CULTURAL RESOURCES BY VIBRATION-PRODUCING HEAVY EQUIPMENT

Vibration induced impacts to cultural resources can be examined from qualitative or quantitative perspectives. POWER's initial draft Class III report for the 2016 field season (POWER 2016) demonstrated that the study area bore a varied topographic and archaeological environment, and POWER argued that some of the cultural resources encountered during the 2016 field season exhibited features that could be unintentionally harmed by vibration-creating heavy equipment and that the environment was one of many factors that could cause vibration harm to greater or lesser degree. Within the body of POWER's Truckhaven Wells Class III inventory analysis (POWER 2018) POWER provided a similar argument in support of POWER's recommended avoidance measures. Thus, there is a need to examine how cultural resources could be harmed by seismic effects caused by vibroseis field studies effects, and how to mitigate for this type of potential impact.

Although some in the oil and gas industry suggest that the effects of a vibroseis study on the environment is benign (Finley 2016), the environmental compliance process requires that federal and California state agencies demonstrate *why* no adverse impact to a historic property/historical resource is likely to occur during the 3-D Study utilizing empirical evidence. If such evidence demonstrates that the vibroseis process does not harm sensitive cultural resources, then it must be presented to the public for review before the 3-D Study can be permitted by any public agency. If uncertainty exists, then the uncertainty must be presented, and a reasonable effort must made by experts to develop measures that can reduce any potential risks associated with the proposed 3-D Study.

2.1 Qualitative Impact Analyses

Because of the uncertainty as to the effects a vibroseis-prepared 3-D Study could have on surficial and/or buried cultural resources, many federal land managers have allowed vibroseis and vibration-inducing construction activities to occur near cultural resources as long as the permit is bolstered by a professionally adequate study of the nearby cultural resources, with the anticipated potential effects defined on the basis of stakeholder opinion rather than quantitative analyses. As a result, enforceable buffer zones and/or archaeological monitoring are the result of a qualitative analysis only.

2.1.1 Chaco Canyon

The effects of mechanically-created vibration on standing prehistoric structures or stacked rocked features near a vibration source have been carefully examined in Chaco Canyon National Historical Park (King et al. 1985; King and Algermissen 1987), because vehicle traffic and the effects of heavy machinery use were known to damage the exposed surfaces of prehistoric structures at this park since at least the 1960s. Chaco Canyon archaeologists found that a standing prehistoric building would tend to be less damaged or not at all from a temporary or permanent vibration source using a buffer zone distance prescribed on the basis of the nearby cultural resource type, and whether or not that resource was located directly on bedrock or topsoil.

2.1.2 Stone Cabin

Vibroseis studies on public lands have been controversial. In 2004, BLM was criticized by the federal ACHP for developing a No Adverse Effect ruling for cultural resources within its Environmental Assessment (EA)/ Findings of No Significant Impact prepared for the Stone Cabin 3-D Seismic Survey Project in Duchesne County, Utah (Bauman 2003). ACHP argued that BLM allowed certain archaeological survey corridors during the planning stages of the Project without empirical justification of the survey corridor size. BLM and ACHP later developed procedures that would allow

the project to proceed. The BLM was also sued in federal court on the basis of an inadequate consideration of project effects on cultural resources during the planning phase of the Stone Cabin Project EA. Plaintiffs argued that the proposed cultural resource mitigation measures would not support a No Adverse Effect finding (Leggett and Sumner 2004) and the rock art and standing stone structures in the Nine Mile Canyon portion of the Stone Cabin project were the primary concerns of the plaintiffs. During the suit, BLM successfully defended its actions to ACHP and the Court by making sure that all stakeholders, even those that did not want the Stone Cabin Project in the first place, were given a legally adequate opportunity to voice their concerns and work with BLM to ensure that NRHP-eligible cultural resources would not be harmed during the project. Extensive inclusion of all stakeholders' opinions during the pre-fieldwork phase of the environmental analysis, and the subsequent development of appropriate mitigation measures, allowed the Stone Cabin Project to move forward.

2.1.3 West Tavaputs

After the litigation and controversy at Stone Cabin, BLM prepared an Environmental Impact Statement (EIS) for the West Tavaputs Plateau Natural Gas Development Area in eastern Utah (BLM 2011a). BLM made certain that lessons learned at Stone Cabin were applied to the West Tavaputs project since an EIS requires longer lead time and assumes greater project controversy and public scrutiny. The project was not without controversy however, as the Afvisory Council for Historic Preservation (ACHP) provided critical comments (NTFHP 2008) prior to finalization of the EIS. As a result, a cultural resource Programatic Agreement (PA) was developed for the project (BLM 2010), which brought the federal government, cultural resource stakeholders such as ACHP, Native American tribes, and cultural resource specialists together to devise ways to avoid harming sensitive cultural resources. Although the potential for vibration-induced effects in certain areas of West Tavaputs was considered high, the PA and pre-planning research allowed oil and gas exploration to move forward with appropriate analytical and mitigation measures in place.

Of key concern to BLM on the West Tavaputs Plateau were the potential effects of project-related dust and vibration-inducing project events on standing prehistoric structures and rock art, both of which are considered fragile and highly significant to local Native American tribes. The PA concluded that sensitive resources must be avoided during any vibroseis work whenever possible and that archaeologists would need to monitor certain types of construction events in areas bearing resources classified as highly sensitive. Measures defining how archaeological surveys and monitoring in the West Tavaputs Project area were to be undertaken were presented in the PA (BLM 2010: pp 52-64) and were developed after extensive consultations occurred between project stakeholders.

2.1.4 Culver 3D

To obtain permits to undertake the Culver 3D Seismic Survey, a basic Class I inventory report via the Categorical Exclusion (CE) process was submitted to the Colorado State Historic Preservation Officer (SHPO) by BLM archaeological staff. SHPO accepted a no adverse effect finding (BLM 2012). Native American stakeholders were contacted by BLM following the Section 106 consultation process during Culver Project planning, but no Tribes responded.

After the consultation period ended, the following measures were applied to the Culver 3D Seismic Project at BLM and SHPO's request. Edits for clarity are in parenthesis:

1. Vibroseis actions would only take place on BLM-administered and state lands as long as there is (a) minimum of 6" (inches) of snow on frozen ground. If the terrain does not meet the conditions of 6" of snow cover over frozen ground, then all vibroseis actions would be restricted to maintained and graded county roads. If conditions are not met there would be no

vehicular cross-country travel on BLM-administered land or state land to lay out receiver lines or to extract those lines.

2. A predictive model has been created to identify areas of high potential for cultural resource sites. The model would be used on federal and private lands. The predictive model would extend beyond federal and state land onto private lands 1/8 mile. Only (sic No) Vibroseis would be allowed within areas of high site potential. Known sites within areas of high potential would be avoided by the stated avoidance measures.
3. The consulting archaeologist would identify all vibroseis points that have a potential to impact known cultural resources that are unevaluated (need data) or eligible for avoidance. Vibroseis actions would be relocated 500 feet away from sites with standing historic structures or aboriginal stone features, and 200 feet from a site if there are no standing historic structures or aboriginal stone features. The cultural resource consultant would also monitor all avoided sites where standing structures or stone features are present during vibroseis actions.
4. The consulting archaeologist would provide a monitoring report after the work of the proposed action is completed.

In sum, BLM was able to categorically exclude the Culver Project from further environmental compliance, in part, if known cultural resource sites were avoided and a monitor was placed in the field to assist the Proponents staff in their effort to avoid cultural resources bearing high cultural resource sensitivity. Sensitive cultural resources near the Culver APE included historic buildings and aboriginal stone features such as cairns. Because a CE was used to permit this project, no quantitative work was undertaken to support the applied buffer zones, and snow at least six inches thick was necessary to reduce the effect or tire tracks on the existing topsoil; given proposed Project conditions, no cross-country traffic was allowed. Finally, the BLM H-3150-1 document (BLM 2007) used in the body of the Culver analysis, bears standard terms and conditions for these types of projects when a CE is used as the federal compliance document. This shows that if tire tracks are created that lead away at minimum 100 feet from an established dirt or two track road on public lands because of vibroseis travel, the tracks must be hand raked so that the track blends into the surrounding soil surface.

Other projects such as the Anadarko/Veritas Salt Creek Project (BLM 2006) and the West Oregon Basin 3D Seismic project (BLM 2011b) were similarly examined under a qualitative basis and reasonable mitigation measures produced after extensive stakeholder input. In sum, background research on this subject showed that federal and state archaeologists typically recommended the application of specific horizontal (and in a few cases vertical) buffer zones between vibroseis equipment and fragile structures. The buffer zones were applied as mitigation measures, but no hard data was presented by the federal and state archaeologists that justified the buffer zone distances. In one case, vibroseis was permitted on public lands only when the ground surface was covered in at least six inches of snow, with the snow serving as a vertical buffer (Culver 3D Seismic Survey: BLM 2012).

POWER's 2016 research (POWER 2016) showed that the effects of vibration generated by heavy equipment while in operation may or may not be substantial, but the potential physical impact on nearby archaeological sites and archaeological features during a vibration event is little studied. Hearsay evidence (i.e., various *YouTube* videos) tends to infer that the vibroseis process does cause clear vibrational impacts to nearby people and buildings. As seen below, POWER's research shows that potential impacts on cultural resources depend on the type of ground upon which the vibroseis plate rests while vibrating, the vibration period, the power output of the vibroseis device, and the sensitivity of nearby receptors' (people, structures, etc.).

2.2 Quantitative Impact Analyses

Traffic engineers have studied the effects of vibrations on sensitive receptors, including fragile historic buildings, for many decades (Caltrans 2013). The cause and effect relationships in traffic analyses are well-studied and can lead to an understanding of the potential for impacts to cultural resources when heavy equipment is used during the 3-D Study. It should be noted that BLM Handbook H-3150-1 associated with onshore oil and gas geophysical exploration surface management requirements (BLM 2007) does not provide minimum offsets (buffers) from vibroseis-generated events to sensitive cultural resources. This essentially leaves the decision-making associated with appropriate buffer distances to BLM land managers.

In the 1970s, traffic and public rail engineers recognized that a concept known as peak-particle velocities (PPV[3]) that are inherent during certain isolated construction events (blasting, drilling, heavy truck movements, etc.) could damage nearby structures in the short term, the long term, and cause extreme annoyance to persons located nearby. Vibrations created by constant traffic movement were also examined to determine if the short- and long-term effects to older historic buildings could be gauged. Whiffin and Leonard (1971) were among the first to test the dynamic effects of construction-related vibration on roadways, bridges, and buildings. Their research helped to define new analytical standards and led to the development of vibration-mitigating building practices. They recognized the following fundamental issues:

> "It is often assumed that vibrations are automatically detrimental to a structure such as a building or a bridge, regardless of whether they are caused by machinery, traffic or normal use of the structure by people. It is not always appreciated that all structures are being continually subjected to vibrations of some kind although they may be at levels which are imperceptible to people or do not present structure problems. It is only when the vibrations reach levels which cause annoyance or damage that attention is paid to them, and hence people tend to associate vibrations of any type with damage, failure or insecurity. This reaction to vibrations is exaggerated by the extreme sensitivity of the human body to even low levels of vibration."
>
> and
>
> "Interpretation of the dynamic movements (i.e., the vibrations) is in terms of the effect on the structure or its contents, or in terms of the personal reaction of the user. For the structure and its contents, the questions of damage and acceptability arise whereas for the user, the problems are normally those of tolerance and intrusion…" (Whiffin and Leonard 1971: p 2)

Whiffin and Leonard explored vibration impacts on asphalt and concrete roadways, bridges; and the response of buildings to ground vibrations. In each instance, direct relationships could be established between the component velocities produced by the vibration-inducing equipment, the media within which the velocities travelled, and the distance from the originator to the receptor. Cumulative effects were also considered.

Oriard (1994) studied vibroseis operations in highly urbanized sections of Los Angeles. Because of his work, criteria were developed for the prevention of vibration related damage to sensitive receptors, and a public relations program was put into effect to minimize any allegations of damage

[3] Peak particle velocity (PPV) is defined by the International Electrotechnical Commission (801-21-30) as the "greatest instantaneous particle velocity during a given time interval. If measurements are made in 3-axis then the resultant PPV is the vector sum [i.e. the square root of the summed squares of the maximum velocities', regardless of when in the time history those occur."

(Oriard 1994: pp 343). Since the vibroseis signal could be chosen by the vibroseis crew, different frequencies and durations were used under certain conditions:

> "A common signal consisted of a uniform sweep from 4 [hertz] hz to 64 hz lasting for 16 seconds. In cases where the work was taking place very close to poorly constructed buildings or deteriorating buildings, the frequency sweep was typically limited to a range from 16 hz to 64 hz and the input energy reduced." (Oriard 1994: pp 344)

Oriard developed a series of attenuation tables showing the relationship between construction equipment PPV generated under certain conditions and distance. When the distance between the origination source increases, the potential damage brought on by lessened PPV decreases (i.e., "attenuation"). These types of analyses can be used to develop distance models under differing Project conditions.

Burgus (2014) produced a pro-industry analysis of the potential effects certain types of blasting and vibroseis work would have on nearby sensitive receptors. A simple ground motion attenuation study was undertaken using standard variables. The calculation used was:

$$PPV = H(SD)^{-B}$$

Where,
H = the velocity (y axis intercept) at a scaled distance of one.
B = the slope of the curve.
PPV = the peak particle velocity in inches per second.
SD (Scaled Distance) = Distance from shot to recorder divided by the square. root of the charge weight = Distance for Vibroseis studies.

Scaled changes to these variables, such as difference in vibration intensity, hertz, subsoil strata, etc., can change the results, but average site conditions were used in the Burgus study. Applying a "conservative" peak vibration limit of 0.5-inch per second or higher as the adverse effects threshold, Burgus argued that a receptor defined as a "cultural standing structure" and/or "pictographs and petroglyphs" required a 69-foot buffer (21 meters) between the receptor and the source at 95 percent confidence of no observable harm and a 167-foot buffer (51 meters) between the receptor and source at 99 percent confidence of no observable harm. Similar distances were recommended for other receptors such as "high risk earthen dams" and frame and brick residential buildings.

Kalinski and Taluskie (2013) produced a method for deducing the effect of PPV at a distance. These authors, like Caltrans (2013), argued that probabilistic analyses may be useful in quantifying and mitigating the risk associated with vibration exposure caused by vibroseis exploration to nearby structures. They argue that measuring real-world PPV in the field during future construction may not be needed to define avoidance probabilities during the planning phase of construction. Kalinski and Taluskie reported that distance, power output (i.e., "drive level"), and wave hertz can reliably produce a linear relationship between vibrational power output and distance. A "probability of exceedance" at five percent could be generated if the vibration producing inputs were changed and the distance to the sensitive receptor known. Their Figure 10 shows that if a vibroseis array (four trucks in a row operating at once) bearing a power level of 20 percent of maximum at 44,000 foot-pounds is used under average topographic conditions, the probability of exceeding a PPV of 0.5 will be only 1.0 percent at a reading point 30 meters from the vibroseis source points.

Caltrans' Transportation and Construction Vibration Guidance manual (Caltrans 2013) summarized a problem that Caltrans' engineers face where high amplitude vibrations could easily cause cosmetic damage to the surfaces of delicate buildings - unless buffer zones are defined and supported by testable data. Caltrans noted that the various surface and subsurface matrices within which the waves

penetrate have dampening effects, and that simple attenuation models prescribed for their projects can reduce the potential adverse effect. Reviewing the literature, Caltrans examined models of various frequency ranges (hertz) compared against classes of structural sensitivity (Caltrans 2013: Tables 10, 11 and 12). This showed that sensitive buildings and objects of historic interest could be damaged if continuous PPV reaches 0.12 to 0.2 inch per second at the receptor. Table 19 in the Caltrans 2013 manual provides threshold criteria for maximum PPV estimated for various types of continuous/ frequent sources and notes that "extremely fragile historic buildings ancient monuments" could be damaged if PPV reaches 0.08 inch per second at these sensitive receptors. Given these facts, it may be necessary to mitigate for these potential impacts by arming monitoring staff with a PPV meter and asking the operator(s) to reduce PPV outputs if the vibration occurs too close to the sensitive resource.

The Federal Transit Administration (FTA) produced a manual (FTA 2006) that provided a list of heavy equipment types that would create expected PPV at certain distances. FTA notes that:

> "…soil and subsurface conditions are known to have a strong influence on the levels of ground-borne vibration. Among the most important factors are the stiffness and internal damping of the soil and the depth to bedrock. Experience with ground-borne vibration is that vibration propagation is more efficient in stiff clay soils, and shallow rock seems to concentrate the vibration energy close to the surface and can result in ground-borne vibration problems at large distances from the track. Factors such as layering of the soil and depth to water table can have significant effects on the propagation of ground-borne vibration. (FTA 2006: pp 7-10)

POWER notes that in much of the 3-D Study area, sedimentary bedrock can be observed, but much of the project is located on the silts and sands of the exposed floor of ancestral Lake Cahuilla. Harder strata are a reasonably good transmitter of surface PPVs. The FTA undertook a construction vibration assessment (FTA 2006: Section 12.1) and provided Table 12-2 which listed typical PPVs at 25 feet, which is a distance covered by archaeologists in the off-Park portions of the project. Many of the listed types of construction equipment are unlikely to produce more than 0.09 PPV at 25 feet. The greatest vibrations are produced by pile drivers and vibratory rollers. "Cassion drilling," which may be the equivalent of well drilling, is unlikely to produce more than 0.089 PPV under standard conditions. Finally, FTA (2006: Table 12-3) states that sensitive buildings should not endure more than 0.12 PPV; this threshold number could be applied to sensitive archaeological features. Standard baseline mitigation methods that could be applied to construction projects were discussed in the FTA analysis.

Given the factors noted above, avoidance measures in the form of construction equipment that can be adjusted to lessen nearby PPV, the establishment of buffer distances between the vibration source and a sensitive cultural receptor, and other avoidance recommendations, could be used to reduce the possibility that nearby sensitive structures would be shaken during vibration-inducing construction events. By inputting predicted PPV at the highest potential level (that produced when vibroseis occurs on a hard surface such as bedrock or a paved roadway) and reducing the output of the vibroseis machine such that low PPV is achieved, Caltrans' 0.08 PPV threshold at distance can be observed during the 3-D Study.

The Proponent sponsored a demonstration of vibroseis vehicle travel and use for BLM, Parks and Tribal representatives in the winter of 2017. Seismic energy generation was monitored by a professional vibration analysis firm, who wrote a report on the results (van de Vrugt 2018: Appendix G). Based on their report, PPVs at 25 feet and 50 feet from the seismic source point were estimated for a single vehicle. This research, along with the quantitative review above, support POWER's recommended buffer distances between a source point and the sensitive features within a historic

property as described in Section 6.4 below. Tracks created by travel to and from both vibration sites was monitored by POWER archaeological staff and the width of vibroseis buggy turning radius (48 feet) was measured. Video taken during the demonstration can be supplied to BLM and Parks for their review.

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3.0 ENVIRONMENTAL SETTING

The Salton Sea is located several miles west of the archaeological survey area and was created in 1905-06 after irrigation canals were breached during spring floods on the Colorado River. Salinity rapidly increased after the freshwater inflows were cut off. Today, die-offs of fish due to high salinity levels are common (Marti-Cardona et al. 2008) and often occur when high winds stir deep oxygen-deprived lake waters to the surface. The depression in which the Salton Sea is located lies some 230+ feet below sea level (bsl).

Landscapes surrounding the Salton Sea are extremely hot, dry and are subject to incessant wind. Vegetation in areas not affected by agriculture consists of low woody plants adapted to extreme temperatures and lack of rainfall (Barbour et al. 2007). There are numerous examples of mesquite bushes in the project area with extensive root systems that have captured sand and created hummocks up to two meters high. In those years after abundant winter rains, annual and perennial spring flowers are plentiful.

The survey area is cut by a series of washes, some of which are extremely narrow and deep, such that crossing them is very difficult. Much of the area is used by off-road enthusiasts but portions of the survey area have been closed off to vehicles. Bedrock outcrops and slabs are common; some of this material has been procured by prehistoric peoples to make cairns and rock-slab hearths. Numerous cobble foundations of weirs (fish-traps) can be observed; their placements likely define the approximate shoreline of Lake Cahuilla in the prehistoric past.

3.1 Geo-Cultural Background of the Salton Sink

The Coachella Valley and the Salton Basin, from North Palms Springs to the Mexican border, was pristine when the first American surveyors rode through the region. The 1853 journal by the geologist W.P. Blake (Blake 1853 and 1854; Williamson et al. 1856), who served with Lieutenant John Parke and John Pope during work on the southernmost Pacific Railroad Survey (1854-1855), provides an accurate historical view of the region with a careful examination (for the period) of Cahuilla peoples. Parke and Pope reached Cahuilla territory in the Coachella Valley, turned south toward Mexico, then headed west to San Diego with few water stops noted between. Blake understood from local informants and visible geology that a large lake once existed in the Salton Sink, but had no idea how it formed or when it was last filled.

The Salton Sink was formed by the continued effects of the San Andreas Fault, which represents the region's primary complex rift zone between the Pacific and North American tectonic plates. Prior to approximately 12 million years ago, most of southern California was covered with a shallow sea, and the mountains lining both sides of the rift zone had not yet begun to rise. As the Pacific Plate moved northwestward causing parts of the Farallon Plate to disintegrate, the East Pacific Rise was created, and the tip of Baja California began to split off from Mexico (Alles 2011). Crust on the Pacific and North American plates were forced against one another forming numerous small volcanoes, mountains, and valleys as the rising blocks of land buckled under immense pressure. The Salton Sink, technically a "graben" (Frisch et al. 2010), represents an area currently under severe tectonic strain. Because the center of the sink lays approximately 277 feet bsl and the Colorado River sediments that have filled it to that point reach at least 13,000 feet bsl, this is a place where water can accumulate and sink to bedrock. The extreme depth of tectonically-heated ground water and has created a potent geothermal source that has been tapped by many other geothermal plants in the Imperial Valley.

The floor of the sink is currently hidden by the Salton Sea. Annual sediment load in the Lower Colorado, prior to construction of dams upstream in the 1950s, delivered up to 83 million metric tons of sediment into the Gulf of California per year, as calculated at Yuma (Topping et al. 2000). If such

rates were to continue backward into the prehistoric millennia as southern California moved along the rift zone, Colorado River sediments might be expected to have rested at Palm Springs and Thousand Palms prior to the beginning of the Pliocene or approximately 5.5 million years ago (Barker 1995) with the Gulf of California likely located just to the south, and a much longer Baja California Peninsula. Over the next few million years, the Colorado River mouth grew more distant from the upper Coachella Valley due to northwestward tectonic movement of the Pacific Plate and yearly deltaic sedimentation, but not distant enough to prevent the occasional infill of water into the Salton Sink during the Colorado River's flood season.

At least by the middle Pleistocene, when the Colorado River's flow was directed for a long enough time southwest and then to the north near the region known as the Myoma Dunes, the entire trough would fill with water, forming what is now known as Lake Cahuilla or possibly a seawater extension as the Colorado's flow was blocked off by deltaic dams. If the flow of the river continued unabated into the sink, the water would spill out to the southwest and into the Gulf of California near Cerro Prieto, Mexico via a path now called the Rio Hardy. This would occur during the late Pleistocene only after reaching a potential high stand of +/-12 meters (approximately 42 feet) above sea level (Wilke 1978). At the high-water mark, lagoons would have connected Lake Cahuilla with the Gulf of California (Norris and Norris 1961).

Waters (1993) has calculated that if the Colorado River delivered all of its runoff into the sink, roughly 18 years of infill would be needed to fill it to 42 feet above sea level, and Norris and Norris (1961) indicate that at least half the Colorado's yearly flows would be necessary to keep the lake at the 42-foot-high stand continuously to replenish that lost to evaporation. At the 42-foot-high water stage, the Lake would have had lowered mineral levels. Fresh water fish, bivalve and crustacean species would survive, but when the lower Colorado River changed its position in its delta and flow was cut off from delivery to Lake Cahuilla, the lake would slowly revert to saline brine in a few decades and as it evaporated all the native species would become extinct.

An area known as Bermuda Dunes, located east of the city of La Quinta represents the most northern reach of Lake Cahuilla that can be well demonstrated today (Norris and Norris 1961). The "bathtub" ring of travertine first recorded by Blake in 1853 a few miles north of Salton City may signify the last long high stand of Lake Cahuilla. Wilke's 1978 review indicates that the Colorado delta likely formed a natural dam across the lower reaches of Lake Cahuilla, but that dam was not noticed by the earliest Spanish explorers (in the 1500s), nor was Lake Cahuilla itself. The dam was composed entirely of sand and silt and may have been swampy ground occasionally replenished by Colorado River flooding before agriculture began to drain the water table in the late 1800s. The sand and silt dam probably reached a maximum height above sea level to match the "bathtub ring" of travertine, which is approximately 12 meters above sea level (+/- 42 feet).

Another much smaller dry basin, known as Laguna Macuata, is located southwest of Lake Cahuilla, lying approximately 10 feet bsl, and was flooded both during extreme high tides, heavy rainstorms, and possibly during extreme Colorado River flooding (Laylander et al. 2016). Laylander reports that this lake was first observed by members of the Juan de Oñate exploration of 1604-1605. Other explorers viewed the Laguna Macuata and noted fish bones of salt water species by the score on its banks. The existence of several large low-lying basins suggest that the lower Colorado was an extremely complex place geographically and would have been the site of numerous lakes, tidal pools, estuaries, and swamps within a scorching desert for many millennia.

During POWER 2016 fieldwork associated with the vibroseis pathways, the ancient lake bottom sediments were observed in all the cut banks found in the larger washes. These slices of sediment are like a layer cake, each representing infilling and desertification during the last several hundred thousand years. Once the Colorado River infills were cut off, a minimum of roughly 56 years would

be needed before Lake Cahuilla evaporated completely (Laylander 2006; Schaefer and Laylander 2007), and fluvial deposits would begin to cover lake bottom sediments. Various types of geological, vegetative and cultural clues would be needed to determine when and at what altitude the various high stands and low stands could be expressed in the geological and archaeological records. Variations in high tide through time surrounding Lake Cahuilla can be expressed by travertine deposits and the locations of archaeological sites bearing lake edge features. The project (see Figure 3) is located between -38 meters bsl (-125 feet) and approximately -15 meters bsl (-50 feet). A prehistoric site (CN-20) located near Dump Road west of Highway 86 exhibits three hook-shaped cobble alignments suggestive of prehistoric weirs or "fish-traps." The existence of the features at CN-20 and other sites bearing fish traps suggest that part of the 3-D Study area is located on the shorelines of Lake Cahuilla.

The last diversion of Colorado River water into the Salton Basin was man-made. In 1905, spring flooding breached temporary irrigation canal control gates that directed water for irrigation into the lower Coachella Valley, and sent the entire flow of the Lower Colorado into the sink forming the Salton Sea. Engineers were not able to stop the flow until early 1907 and, according to MacDougal et al. (1914), caused the maximum depth of the new lake to reach roughly 80 feet. At that point the shores of the Salton Sea would rest at approximately 60 meters (197 feet) bsl. This height lies many meters below the lowest point of this project.

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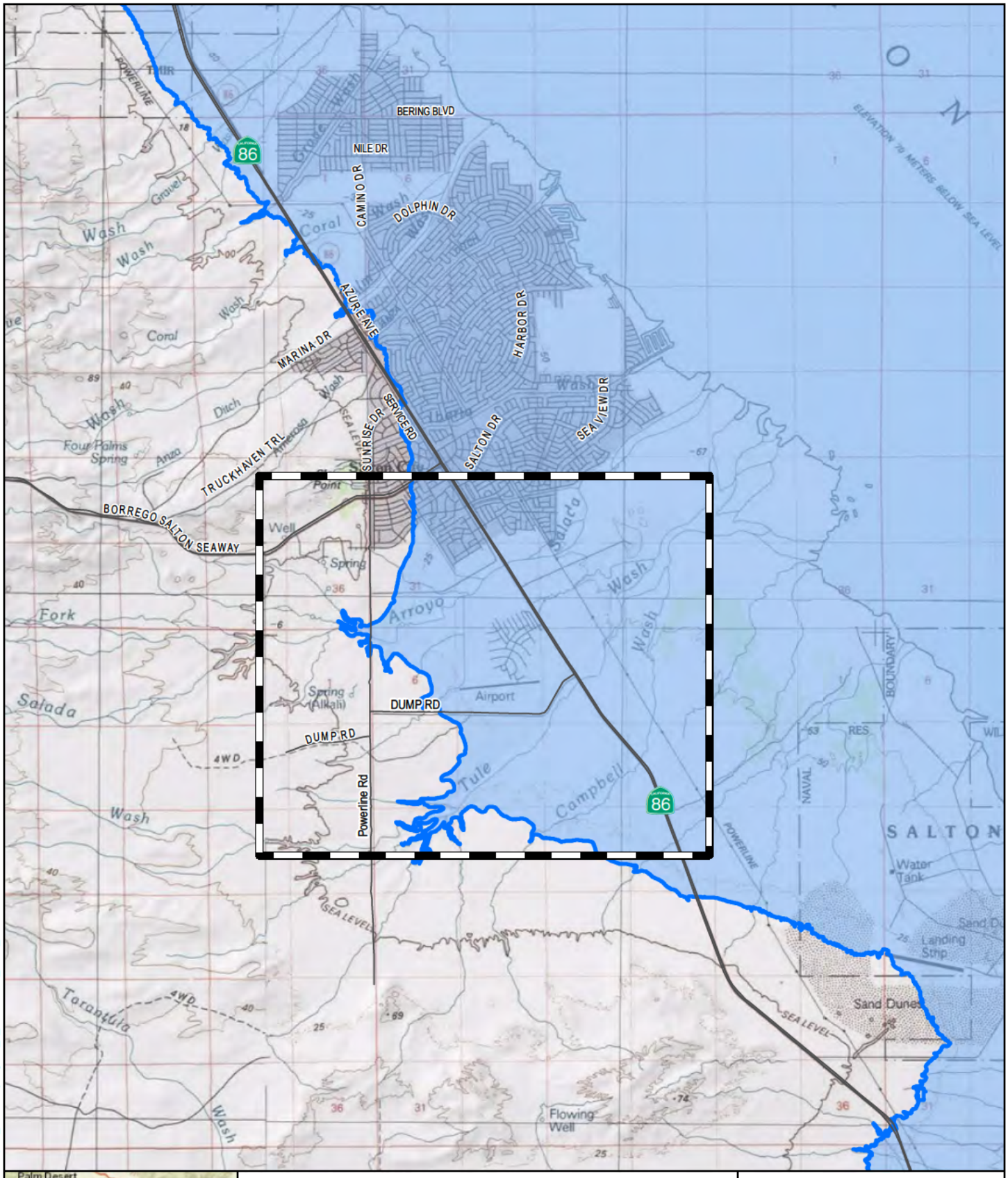
FIGURE 3 PREHISTORIC LAKE CAHUILLA



Legend

- General Survey Area
- Highway or Main
- 60 feet below Sea Level
- Prehistoric Lake

Salton Sea and Borrego Valley, CA
USGS 100K Topographic Maps

Credits: ESRI Street Map

ORMAT NEVADA, INC. TRUCKHAVEN

Figure 3
Prehistoric Lake Cahuilla

0 0.5 1 1.5 2 2.5
Miles
N

POWER ENGINEERS

Date: 9/24/2018

EEC ORIGINAL PKG

Path: W:\141038_Truckhaven_Ormat\GIS\Apps\Report_3D Study\Figure_3_Prehistoric_Lake_Cahuilla.mxd

4.0 CULTURAL SETTING

Historic contexts are defined as "those patterns or trends in history by which a specific occurrence, property, or site is understood and its meaning and significance is made clear" (NPS 1990). A context may be organized by a theme, geographic area, or chronology. Typically, a historic context is associated with a defined area and an identified period of significance, and the context should be linked to the evaluated resource through the concept of property types. In this way, the contextual statement provides a framework for the evaluation of the significance of any cultural resource in a project and ultimately the potential for effects to historic properties that could take place because of an undertaking.

4.1 Ethnographic Background

Cahuilla historical traditions, first discussed by Blake in the 1850s, told of an ancient lake that filled the valley but then disappeared little by little. Given the geology Blake witnessed while travelling through the central and southern portions of the Coachella Valley, it was hard for him to disagree with this tradition. The region is home to two distinct tribal groups: the Cahuilla, who once lived in the areas north of the project, and Ipai-Tipai (Kumeyaay) groups to the south. The nearest Desert Cahuilla are represented by the Torres Martinez Desert Cahuilla Indians, while Ipai-Tipai groups are represented by 12 Kumeyaay tribes in San Diego County: Barona, Campo, Ewiaapaayp, Inaja, Jamul, Los Posta, Manzanita, Mesa Grande, San Pasqual, Iipay Nation of Santa Ysabel, Sycuan and Viejas. Although the La Posta Band reservation lies closest to the project area, none of the San Diego tribes holds land in Imperial County. The Native American Heritage Commission named a member of the Kwaaymii (an Ipai village), Carmen Lucas, as the Most Likely Descendant during the fieldwork. It is likely that the Lake Cahuilla shoreline was utilized by all tribal members in this area during the prehistoric period, only to be slowly abandoned when Colorado River flows into Lake Cahuilla stopped and the Lake desiccated completely.

Although the coast of Alta California was first explored by the Spanish in the mid-1500s and lightly exploited for the next 250 years (Cutter and Engstrand 1998), the Lower Colorado and Gulf of California was visited in 1539 by Francisco de Ulloa (Forbes 1965). Realizing the potential for conquest, in 1540 Hernando de Alarcón sent two boats several miles up the Colorado and saw local natives for the first time (Forbes 1965). Land-based explorations north from Sonora were also undertaken in the 1540s, first to Zuni and then to Yuma. These forays stopped once the Spanish realized that the natives bore no gold and were often hostile, and the Spanish concentrated on developing mining interests in northern Mexico. In the early 1600s, Juan de Oñate explored the Gila and Colorado rivers via overland routes, encountering large populations and agricultural development. More than 160 years passed before the coastal regions of California were colonized under the Mission system (Heizer 1978) mainly because the Spanish saw California as a very poor and distant outpost while the rest of the empire was troubled. As the coastal regions of Alta and Baja California began to be developed by Franciscan and Jesuit Missionaries in the 1760-1820 period, overland routes to the Colorado were developed for trade purposes; many of the trails utilized were created by prehistoric traders. Finally, upon declaration by Mexico as a sovereign state in 1831, the Mexican government could only claim control over a narrow strip of coastal territory (Heizer 1978) for a few decades before Americans and the development of more reliable overland trade routes could effectively colonize the region. Although treated with disdain by the Spanish (Forbes 1965), the 1800's Mexican and American governments treated most California native groups harshly, killing many in battles, subjecting them to disease, and conscripting many into servitude on cattle ranches (ranchos).

4.1.1 Cahuilla

The project area is in the far southeastern range of an area that may have been used by the Cahuilla during prehistoric times (Bean 1978). Their spoken language is of the Takic-Cupan branch (Shoshonean) of the Uto-Aztecan language family. Prior to the incursion of Europeans, the tribe lived in three topographically and linguistically distinct sections of their ancestral homeland (Kroeber 1925). The Santa Rosa-San Jacinto Mountains and the Coachella Valley formed the eastern part of the homeland, and as a result the tribe lived in the drier and relatively remote sections of inland southern California many miles from missions or outposts (Bean 1972) until the early 1800s. This fact allowed many aboriginal Cahuilla to survive well into the mid-nineteenth century with little effective white exploitation. By approximately 1850, pressure from American settlers and the development of important transportation routes had forced many from their ancestral lands and onto marginal areas still bearing little European presence (Doody and Meltzer 2012). At about that time, 17 rancherias were known in the Coachella Valley, and the eastern branch of the tribe (aka Desert Cahuilla) had adapted a successful desert lifestyle. Due to the occasional explorer and cattle ranching in the mountains, visits by Europeans were not unknown to them.

The diverse habitats where the three geographic divisions of the Cahuilla lived provided a tremendous variety of plant and animal foodstuffs. Various basket and pottery forms were used to process and cook plant foods. Stone-lined pit ovens were used to cook root crops, granaries were built for acorn or mesquite bean storage, and seeds were stored in ollas. The Rancheria system allowed permanent structures to develop and be managed year after year and prevented the loss of a pre-existing clan-based social system.

Lake Cahuilla allowed tribal members to exploit fish, shellfish, and birds until lacustrine changes in the Colorado Delta cut off the supply of fresh water to the Salton Basin. After a desiccation period, the lake would become too salty to support fresh-water species and the tribes would be forced to return to a more desert-oriented lifestyle or migrate. Schaefer and Laylander (2007: pp 247-257) cite archaeological evidence dating to the Late Prehistoric Period for domesticated agriculture (e.g., corn, beans, squash, melons) that matched the “Patayan” lifestyle origination source. This proximity to diverse habitats and the agriculture gave the Cahuilla a unique world view and adaptability unmatched in the Late Prehistoric Period (Schaefer and Laylander 2007).

4.1.2 Kumeyaay

The Kumeyaay, also known as Tipai-Ipai (formerly Kamia or Diegueño), have been defined by three separate languages: Ipai (Northern Kumeyaay), Kumeyaay (including the Kamia/Kwaaymii), and Tipai (Southern Kumeyaay) of northern Baja California. All three languages belong to the Delta–California branch of the Yuman language family, to which several other linguistically distinct but related groups may also belong, including the Cocopah (Kwapa, or Xawiłł kwñchawaay) and Quechan (Kwatsáan). There is some controversy regarding these divisions as most of the original speakers have been lost.

Gifford (1931) examined the Desert Tipai (Kamia), who according to Schaefer (2006), are the only Tipai group with a substantial oral tradition regarding Lake Cahuilla. Kroeber (1925) places the Kamia in the far southeastern corner of the state, with Mexico to the south and neighboring Yuman-speaking groups to the east along the Colorado River. Formerly known as the Western Diegueño or Kumeyaay, Tipai groups were centered at the south end of Lake Cahuilla and lived within the extreme desert between that point and the main artery of the Colorado.

Kumeyaay lifeways closely resembled Yuman groups with their wetlands adaptations, devotion to agriculture and structure design. At least 11 rancherias were known in the 1850s (Schaefer 2006) but permanent villages were not constructed known, due to the distinct possibility that lower Colorado

flooding could destroy all they had built. While annual flooding replenished the Alamo and New River sloughs, drought could easily wipe it all away. Unlike the Desert Cahuilla with their ability to remain isolated in rough mountainous regions, the Kumeyaay were frequently exposed to European contact. Many had succumbed to European diseases, died in violence with Mexican settlers, or had been displaced or starved by drought before ethnographers could fully document their existence. A lifestyle at this location was precarious.

The Kumeyaay built small communities, subsisted on wild plants and crops, and supplemented their diet with fish caught in the sloughs (Kroeber 1925). Origin myths state that they emerged near Needles, California, along the Colorado River. Along with the rest of the lower Colorado tribes, they were forced to the south by the expansion of the Mojave. Recognition that the Colorado delta would be an agricultural bonanza hastened assimilation of local natives by California and Mexican governments in the mid-1800s into a single rancheria possibly located on the Alamo River near the Mexican border (Gifford 1931).

Peoples of the Southwest and California used traditional methods to capture fish in fresh water lake environments. The concept of the prehistoric "fish trap" or weir has been discussed for decades (Treganza 1945), and the subject was recently explored by White and Roth (2011). These authors believe that the V- and J-shaped structures found in many places along the western side of the Salton Basin (as described by von Werlhof 1996; Wilke 1978 and 1980; Wilke and Lawton 1975) may have been constructed to capture certain species of fish. Here, a weir underpinned by single or multiple courses of stones could be quickly constructed to support nets or fences with a shallow basin dug behind the rocks to hold water. These would be placed on the lakefront to capture fish swimming in the extreme shallows. The opening of the weir would face the deeper parts of the Lake and allow fish to enter. Fish could have been driven into the weir (razorback suckers are docile when handled), or the structure may have been designed and built to take advantage of the fact that certain species (specifically the razorback sucker and the bony tail chub) used gravel covered lakefronts to spawn. The trap behind the opening could have held bait for the entering fish to consume. These fish otherwise reside in the deeper waters of the lake where they would have to be captured in a boat with hook and line, which are tools difficult to observe in the archaeological record. A weir constructed from cobbles along the edge of Lake Cahuilla would be a high gain tool designed to capture food with little continuous effort or maintenance. If preservation was good, such features could leave evidence behind for archaeologists to find even if the high-water mark of the Lake changed through time. Similar structures were documented during archaeological work at the Salton Sea Test Base (Rose and Bowden-Renna 1998). Crucial to weir use would be the reliability of the lake shore, periodic maintenance and extraction of food, and low salinity.

4.2 Models of Local Prehistory

Models designed to compare and contrast the prehistory of the region have focused upon data derived from excavated sites located in the Coachella Valley and the Salton Basin, with inferences about the prehistoric past derived from field surveys with no chronological controls. Of those excavated sites bearing hard dates, sites located near the Lake Cahuilla shoreline have dated to the Late Prehistoric only. Scant attention has been given to earlier periods in this part of California due to the lack of hard radiocarbon dates taken from excavated sites beyond Lake Cahuilla itself. As discussed by Schaefer (2006), the following prehistoric phases or Periods stretching back to approximately 12,000 years ago are reviewed here: 1) Early Man or the Malpais; 2) Paleoindian or the San Dieguito Period; 3) Archaic or the Pinto and Amargosa period; 4) Late Prehistoric or Patayan Period; and 5) Ethnohistoric Tipai and Cahuilla Period (for the Ethnohistoric era see Section 3.1 above).

4.2.1 Early Man – Malpais Period (+/- 12,000 + Years Before Present [YBP])

Originally conceived by Rogers (1939 and 1966) and applied to cleared circles and rock alignments found in the Colorado Desert using their original phase term San Dieguito I, the term was assigned to choppers and scrapers found in the desert with a heavy patina of desert varnish assumed to predate the Paleoindian Period. Rogers believed that the Malpais dates from 12,000 years before present and perhaps earlier. Resources bearing such dates have not been found in the region.

4.2.2 Paleoindian – San Dieguito Period (+/- 7,000 to 12,000 YBP)

Archaeological materials found bearing an early but more "advanced" appearance was assigned to all three San Dieguito phases of this Period, but the early model devised by Rogers (1939) remains untested. The period, which is believed to have existed before the specialized use of milling stones by California tribes, is characterized by a toolkit exclusively designed to capture and process small and large game. Later, seed grinding technologies appear to have developed during the early Archaic Period. A "Late" San Dieguito Phase III adaptation is suggested at coastal sites dating to 8,000+ YBP, and several of these coastal sites bear hard dates. The early San Dieguito culture (Phases I and II) has been assigned to heavily varnished choppers and scrapers found on the desert floor. Sites lacking projectile points and milling stones have been assigned to these early phases.

Recently, evidence of a Paleoindian occupation in the Colorado Desert area has been obtained from archaeological investigations at site CA-SDI-7074, located southwest of the SVRA in the Jacumba area of eastern San Diego County (Williams 2014). The site was found to contain more than 100 thermal subsurface features, most of which were indicated to likely be earth ovens associated with agave roasting activity. Radiocarbon dating of 22 of the features indicated most of the features dated to the Late Prehistoric Period (<1700 B.P.), five of the more deeply buried features were discovered to date to between 8590 and 9600 B.P. These results suggest vegetal food processing activities occured in the Colorado Desert area during a time period when most of the existing archaeological evidence is associated with hunting and gathering.

4.2.3 Archaic – Pinto, Amargosa Period (+/-1,500 to 7,000 YBP)

Assigned to sites in the Great Basin, the Mojave Desert and Arizona's Sonoran Desert that bear Pinto style projectile points and Elko style dart points, the Archaic Period appears to be a reliable phase for testing archaeological timelines because many such points have been excavated from datable archaeological contexts. Schaefer (2006) suggests that a limited picture of Archaic prehistoric lifestyle is slowly emerging after decades of archaeological work in this area. Since it is likely that sedimentation associated with Lake Cahuilla infilling serves to bury the deposits of early sites in the 3-D Study area, nearby excavations in watered canyons paint a view that the Archaic period was characterized by mobile bands of hunters and seed gatherers with a lifestyle that had probably been mitigated by the sporadic appearance of Lake Cahuilla. Spear and dart points were used, along with atlatls. A few burials are known for this period.

4.2.4 Late Prehistoric – Patayan Period (European contact to 1,500 YBP)

Common in the local archaeological record, Late Prehistoric sites have been divided into several phases, with ceramics and horticulture introduced approximately 975 YBP. At least five infillings of Lake Cahuilla are known during this Period, with the next to last during the Patayan II phase (525 to 975 YBP) and a final infilling between approximately 400 and 300 YBP. Many of the ethnographic and lifestyle characteristics perceived in the archaeological record appear to have been derived from the influence of Yuman-speaking groups located to the east in the Sonora Desert of Arizona and Mexico. Known as Patayan, the concept involves assuming a technological flow of ideas from the east including pottery making, even though the Cahuilla speak an entirely different language, such

that survival traits of the Sonoran peoples could be successfully adapted by the Cahuilla, whose language is derived from Shoshonean (Uto-Aztecan) stock. Many Cahuilla survival traits and their own ethnohistoric history suggest a direct link between themselves and the prehistoric peoples observed in sites dated to the latter parts of this Period.

4.3 Historic-era Background

As noted in Section 3.1, there appears to be very limited, if any, use of lands in and near the project area during the Spanish and Mexican historic periods. It is likely that many of the local native groups knew of and were met by Europeans between 1540 and 1770, but upon establishment of southern California coastal Missions, visits and raiding became more common. An unusual story regarding Lake Cahuilla suggests that in 1615, Spanish explorer Juan de Iturbe sailed a shallow-drafted caravel up the Gulf of California in search of pearls. A high tide carried the ship across a strait into Lake Cahuilla. After exploring the lake for several days, Iturbe found himself unable to sail out again, whereupon he beached the craft and made his way back to the nearest Spanish settlement on foot, leaving behind a fortune in pearls (Chalfant 1947).

In January 1774, Juan Bautista de Anza led a small a group of 20 soldiers, three padres, and animals on a reconnaissance trip between the Tubac Presidio south of Tuscon to Mission San Gabriel near what is now Los Angeles. Between October 1775 and 1776, de Anza, along with 30 families and cattle, traveled this same route on their way to San Francisco Bay (Rice et al. 1996). In December 1775, de Anza entered the Ocotillo Wells SVRA, following San Felipe Creek from a campsite at San Sebastian (Harpers Well), traversed the southwest corner of the SVRA and entered into the area of the Anza Borrego Desert State Park where he camped again near Borrego Spring (Pourade 1962:164). Approximately eight miles of this trail runs through the southwestern area of Ocotillo Wells SVRA (NPS 1994).

Prior to the accidental creation of the Salton Sea (1905-1906), the Salton Basin and region underwent a relatively detailed exploration by American transcontinental railroad surveyors (Williamson 1856). The extreme heat and dryness prevented most cattle grazing operations, but salt was mined by local tribes and miners on the bed of the Salton Basin prior to inundation. After the Salton Sea was formed, entrepreneurs developed marinas on the edge of the lake. These became successful after the Salton Sea, which began to slowly dry up after 1907, stabilized due to development of irrigation and large agribusinesses at the north and south ends of the Salton Basin.

The road following the route of what is now State Route 86 was first built in 1912 and improvements were made in 1916 (Mealey et al. 2012). During World War II, the area was used for practice sorties with the Salton Sea Test Base as the headquarters, and many sorties were flown over the Salton City area. One of the debris fields recorded in the Truckhaven region area is known as the “Winona I” site (P13-13675).

Roads built to access the interior of the 3-D Study area from State Route 86 were constructed during the historic period. One leads to a long-abandoned homestead south of Dump Road and east of Pole Line Road, while others may have been developed when the area was used to access Salton Sea Test Base targets. A few geothermal wells have been drilled in the area, and Schaefer (2006) notes that petroleum exploratory wells have been drilled in several places in the TGLA. None were successful at tapping oil or gas reserves.

Between 1958 and the late 1960s, a major attempt was made to turn the Salton Sea marina area on State Route 86 into the primary vacation housing development in north Imperial County (Time 1959). Per the Los Angeles Times (Streitfeld 2007), the infamous California developer M. Penn Phillips, with the Holly Sugar Corporation, conceived and developed Salton City in 1957-1958. With County

approval, Phillips plotted out and then graded lots and streets (paving some of the streets). By the mid-1970s, it was clear that the development was a failure (among many in California, the victim of an economic downturn and inflation in the early 1970s) and the existing landowners attempted to sue Phillips for damages in 1977. Little improvement, save for the occasional sale of a lot, has occurred since that time.

After World War II, the United States military began selling off its jeeps to the public for very low prices, prompting a surge in off-road recreation in Ocotillo Wells and Truckhaven. Due to its ever-increasing popularity statewide, California State Parks created an Off-Highway Vehicle Division in 1971, and the Ocotillo Wells SVRA was established in 1979 (Parks 2011-2012). The Ocotillo Wells SVRA covers 40,000 acres of land with the most northern sections of the SVRA extending to points northwest of Salton City. Operated by Parks, Off-Highway Motor Vehicle Recreation Division, for the enjoyment of off-road motoring enthusiasts, sections of land near the project (Sections 6, 7, 8, 9 T11S R10E) are jointly managed by Parks and the BLM.

5.0 METHODS

5.1 Records Search

Archaeological staff at the SCIC at San Diego State University performed the cultural resource records search for the originally proposed Truckhaven Project and delivered the results of their search to POWER in December of 2015. POWER requested additional information from the SCIC in January of 2016 and again in May of 2016. SCIC staff reviewed historic maps, historic aerial photographs and copied all official forms and records associated with cultural resources within and located up to one-half mile from the original 3-D Study block (POWER 2016). In 2017, the Proponent revised the block such that the 3-D Study area's southern border is 0.75 mile north of the original. The SCIC data summarized in Section 6, Table 1 reflects this change.

The SCIC record search crosses four 1:24,000 scale (7.5-minute) topographic maps, including (clockwise) *Truckhaven, California* (1998), *Kane Spring NW, California* (1995), *Shell Reef, California* (1991), and *Seventeen Palms, California* (1991). Many of the earliest recorded cultural resource sites in the SCIC database were originally plotted on 15' topographic maps, then transferred to 7.5' maps when those became available through the United States Geological Survey (USGS).

An important set of survey data was not reported to the SCIC and therefore was not included in the 2015 results. Tierra Environmental Services undertook an archaeological survey (McGinnis and Murphy 2008) on land within the proposed Salton City Landfill Expansion, which required the preparation of an EIR to fulfill CEQA guidelines (ICF 2011). An additional draft report was written on Phase II (CEQA) testing that had taken place at those sites that would have been destroyed by the proposed landfill enlargement (McGinnis and Murphy 2009), but this was not submitted to the SCIC. When POWER discovered that the Tierra reports had not been submitted to the SCIC, Parks, or the BLM, Mr. Dice requested and received copies of the Tierra reports from the original contractor. POWER notes that since this property is now an active construction zone associated with landfill operations, the Proponent asked that POWER not engage in survey of this area during the 2018 Class III fieldwork session.

In addition, the BLM's records associated with cultural resources were examined by Mr. Dice at the El Centro Field Office in April 2016. The data stored therein matched the SCIC records search with all BLM records accounted for by the SCIC.

5.2 Fieldwork

POWER archaeological staff surveyed the APE following fieldwork procedures detailed in the 2016 (see Appendix E) and 2018 (see Appendix F) BLM/Parks fieldwork authorizations. A summary of the methods used is provided here and has been summarized from the Work Plans written in support of the fieldwork permit applications. Seismic drive pathway centerlines were surrounded by a survey buffer zone of various widths. The survey buffer zone in the SVRA was 50 meters wide in 2016 and reduced to a 25-meter-wide buffer zone, with Parks approval, in 2018. The survey buffer zone was 15.27 meters (50 feet) outside the SVRA during both field seasons. Spacing between archaeologists in all cases was 10 meters and the buffer was linear, centered on the seismic pathway centerline.

For the 2018 field season, the survey crews were divided into two teams with one three-person archaeological crew working in the SVRA (Crew 1) and a two-person archaeological crew working outside the SVRA (Crew 2). For the 2016 field season, four crews were used, two working in the SVRA (Crews 1 and 2) and two working outside the SVRA (Crews 3 and 4). The 2016 SVRA crews were five-person crews and the 2016 Non-SVRA survey was undertaken using a two-person crew. The crews in 2016 were also accompanied by other technicians including a biologist, botanist,

paleontologist, geophysical technicians and tribal monitors. The 2018 crews excluded the former except for a geophysical technician and tribal monitor.

Fieldwork consisted of surveying a grid-like potential seismic drive pathway shcema and, if necessary, rejecting surveyed areas if the paths could not be driven upon either because of topographical concerns or because archaeological sites were encountered in the pathway. The buggy drivers who accompanied the survey team made decisions for the group as to the ability of their vibroseis buggies to cross rough terrain. If sites were encountered, a new pathway that avoided these types of obstacles was surveyed. Any sites and isolates encountered were recorded such that State Museum form sets (DPR 523) could be generated and attached to this Class III inventory as an Appendix (Appendix I). A Trimble submeter global positioning system (GPS) device was used to record locations of site boundaries and point locations of particular artifacts. Tribal monitors accompanied crews during both field seasons. Representatives from four tribal groups accompanied 2016 crews; representation was increased to 12 tribal groups during the 2018 field season.

BLM and Parks allowed staff to bypass sites encountered if recordation of any one archaeological site was anticipated to take more than four hours. Known as "bypassed" sites, the location was plotted, notes taken, then the crews returned at a later date to proceed with the full recordation process. Except for tribal monitors, the extra technicians necessary for support during the recordation process were not required.

5.2.1 Sites Versus Isolates During Recording

The DRECP PA (2016 [Appendix B, page 40]) provides a definition of a "cultural resource":

> Cultural Resource: A cultural resource is an object or definite location of human activity, occupation, use, or significance identifiable through field inventory, historical documentation, or oral evidence. Cultural resources are prehistoric, historic, archaeological, or architectural sites, structures, buildings, places, or objects and locations of traditional cultural or religious importance to specified social and/or culture groups. Cultural resources include the entire spectrum of objects and places, from artifacts to cultural landscapes, without regard to eligibility for inclusion on the National Register of Historic Places (NRHP).

POWER found, after all fieldwork had concluded and report preparation begun, that previous archaeological research at certain sites in the survey area appeared possibly inaccurate and our review resulted in modifications to previously recorded prehistoric site boundaries in a few instances[4]. In many places, previously recorded isolates had been plotted in SCIC files less than 50m from a previously recorded site boundary. POWER similarly recorded several boundaries less than 50m away from other sites and isolates because erosion (such as deep washes) had clearly cut the space between and eliminated the prehistoric ground surface between the sites and isolates such that the depositional context was very uncertain. The plotted locations many of the artifacts do not wholly reflect prehistoric human activity alone. The definition of a site in the Work Plans of our BLM and State Parks permits was on the minds of every archaeological field worker. In many instances, it was found to be impractical for POWER archaeologists to record resources in the manner prescribed in the Work Plans each and every time.

[4] This is not uncommon. As an example, compare the DPR523 forms and Museum-derived shapefiles of P13-11160 (CA-IMP-10166), P13-11166 (CA-IMP-10172), and P13-11145 (CA-IMP-10151) by State Parks Archaeologist Marla Mealey (Mealey 2012) with their legacy site forms. Similarly, site P13-8379 (CA-IMP-7860) was reviewed by POWER staff and enlarged in site and shiften slightly north.

The possibility exists that most of the central project area located between Arroyo Salado to the north, Campbell Wash to the south and Tule Wash in the center is in reality one gigantic prehistoric site that has been cut into parts by water and wind leaving resource-free areas. These areas can, in our view, be utilized by Vibroseis buggies.

Future archaeologists may discover that the site boundaries defined by POWER archaeological teams reflect confined places of human activity surrounded by a halo of artifacts that may have been moved into the positions our teams recorded through the natural effects of erosion. The chararacteristics we observed suggesting high erosionary turnover include extreme wind abrasion on artifacts located in sites where no sand dunes exist and coarse-grained sediments (gravels, small cobbles) were exposed to view. Artifacts located in sites that had sand dunes tended to have less surface abrasion.

5.3 Assessment of Effects

5.3.1 Effects Under the National Historic Preservation Act

Under Section 106 of the NHPA, adverse effects to a historic property (i.e., a cultural resource eligible for or listed in the NRHP) can include physical demolition, destruction, relocation, or alteration of the property or its immediate surroundings such that the integrity of the property's location, design, setting, materials, workmanship, feeling, or association would be materially impaired or diminished.

Section 106 regulation states that the regulatory definition of "effect," pursuant to 36 CFR Part 800.16 (i) is that the term means "alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register." In practice, a direct effect under Section 106 is that which is a "direct physical disturbance of a historic property." Effects that are immediate but not physical in character, such as visual intrusion, and reasonably foreseeable effects that may occur at some point after the implementation of the proposed undertaking are referred to as "indirect effects."

Direct effects on historic properties in the 3-D Study area could result from driving over sites by vibroseis vehicles, generating vibrational energies that cause existing site elements to shift positions or become buried beneath silty sands, dropping helicopter-transported cache bags containing geophone equipment onto existing sites, or placing geophones into features within site boundaries. Indirect effects could result from the public visiting historic properties that were tracked to by vibroseis vehicles.

Under the terms of this analysis, all archaeological and historic sites are assumed to be historic properties/historical resources until further evaluation is necessary. In some cases, POWER has provided a recommended eligibility statement that notes that the resource is likely to be ineligible even though the formal evaluation has not yet taken place. This caveat was applied to certain historic-era trash scatters mostly located near State Route 86.

5.3.2 Impacts under the California Environmental Quality Act

Under CEQA, a project is considered to have an impact on the environment if it alters any characteristics of a historical resource that qualify it for inclusion in the CRHR. Furthermore, it is stated in CEQA that the lead agency may require that reasonable efforts be made to permit any or all these resources to be preserved in place or left in an undisturbed state. CEQA also requires that impacts as defined by PRC 21083.2 must be addressed and mitigated as outlined in PRC 15126.4 and 15331.

CEQA impact significance thresholds include:

- Would the project cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?
- Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?
- Would the project disturb any human remains, including those interred outside of formal cemeteries?

Evaluation for impacts under CEQA guidelines follows the same technical procedures as NEPA and the Section 106 process except with slightly different background concepts.

6.0 RESULTS

6.1 Results of Records Search

A total of 31 cultural resource studies have been conducted in and within one-half mile of the proposed APE. Three of the previous surveys identified by the SCIC occurred in the past 10 years, and the rest occurred between 11 and 45 years ago. The earliest studies were associated with the widening of State Route 86 and represent the first modern archaeological studies in this region. Table 1 lists the studies that are in, or are within, one-half mile of the proposed APE, while Table 2 lists the resources that are near the proposed APE. In addition to the SCIC search, POWER obtained copies of archaeological studies undertaken at the CEQA level for the County' Landfill Expansion project directly from a contractor, Tierra Environmental Services of San Diego. These are also noted in Table 1 below for a total of 32 known studies in and very near the proposed APE.

TABLE 1 PREVIOUS CULTURAL RESOURCE STUDIES IN THE PROPOSED APE AND 0.5 MILE FROM THE PROPOSED APE

SCIC REPORT NUMBER	AUTHOR	YEAR	REPORT TITLE
IM-00001	GROSS, TIM and EDWARD J. GERMESHAUSEN	1973	AN ARCHAEOLOGICAL SURVEY OF PROPOSED ROUTES OF FREEWAY 86 FROM KANE SPRING TO INTERSTATE FREEWAY 8
IM-00190	RHODE, DAVID	1979	REPORT OF AN ARCHAEOLOGICAL SURVEY OF A PROPOSED HIGHWAY WIDENING PROJECT ON HIGHWAY 86 IMPERIAL COUNTY
IM-00243	WESTEC SERVICES, INC.	1981	TRUCKHAVEN PROSPECT GEOTHERMAL EXPLORATORY WELLS DRAFT ENVIRONMENTAL IMPACT REPORT
IM-00266	STUART, BOB	1982	DRAFT ENVIRONMENTAL IMPACT REPORT AIRPORT LAND USE PLAN
IM-00302	ROSEN, MARTIN	1983	REPORT OF AN ARCHAEOLOGICAL SURVEY ON STATE ROUTE 86 IN IMPERIAL COUNTY FROM 0.6 MILE NORTH OF KANE SPRING (P.M. 42.6) TO CAMPBELL WASH (P.M. 51.87)
IM-00308	ROSEN, MARTIN	1984	FIRST ADDENDUM REPORT OF AN ARCHAEOLOGICAL SURVEY ON STATE ROUTE 86 IN IMPERIAL AND RIVERSIDE COUNTIES FROM CAMPBELL WASH (11-IMP-86, P.M. 51.87) TO OASIS (11-RIV-86, P.M. 3.2)
IM-00350	ROSEN, MARTIN	1986	ARCHAEOLOGICAL SURVEY REPORT FOR THE TRUCKHAVEN AND BLUFF MATERIAL SITES
IM-00354	DEPARTMENT OF PARKS AND RECREATION	1986	OCOTILLO WELLS EAST ACQUISITION FINAL ENVIRONMENTAL IMPACT REPORT
IM-00401	CALTRANS	1988	INTERIM MINING AND RECLAMATION PLAN FOR THE TRUCKHAVEN MATERIAL SITE (IMPERIAL COUNTY)
IM-00403	CALTRANS	1988	INTERIM MINING AND RECLAMATION PLAN FOR THE SIX AND ONE HALF (6 1/2) MILE MATERIAL SITE (IMPERIAL COUNTY)

SCIC REPORT NUMBER	AUTHOR	YEAR	REPORT TITLE
IM-00409	ROSEN, MARTIN	1988	HIGHWAY 86 EXPRESSWAY PHASE II ARCHAEOLOGICAL TEST EXCAVATION REPORT CA-IMP-5097, CA-IMP-5279 & CA-IMP-5457, TRUCKHAVEN MATERIAL SITE 11-IMP-86, 55.7/60.9, 11208-182651, HIGHWAY 86 EXPRESSWAY UNIT 4 INTERCHANGES & FRONTAGE ROADS
IM-00429	GALLEGOS, DENNIS and ANDREW PIGNIOLO	1989	CULTURAL RESOURCE SURVEY OF EIGHT GEOTHERMAL WELL SITES AND ACCESS ROADS IN THE TRUCKHAVEN PROJECT AREA, IMPERIAL COUNTY, CALIFORNIA
IM-00441	ENSR CONSULTING AND ENGINEERING	1990	ENVIRONMENTAL ASSESSMENT/INITIAL STUDY FOR THE PLACEMENT OF FIBER OPTIC FACILITIES BETWEEN SALTON MICROWAVE STATION AND CALEXICO CALIFORNIA
IM-00442	GALLEGOS, DENNIS and ANDREW PIGNIOLO	1990	CULTURAL RESOURCE SURVEY OF EIGHT GEOTHERMAL WELL SITES AND ACCESS ROADS IN THE TRUCKHAVEN PROJECT AREA, IMPERIAL COUNTY, CALIFORNIA
IM-00503	NAPTON, L. KYLE and E.A. GREATHOUSE	1993	CULTURAL RESOURCES INVESTIGATIONS OF THE PROPOSED INDIO TO SALTON LIGHTGUIDE SYSTEM PROJECT, 46.2 MILES IN RIVERSIDE AND IMPERIAL COUNTIES, CALIFORNIA
IM-00517	IMPERIAL COUNTY PLANNING DEPARTMENT	1994	WEST SHORES/SALTON CITY URBAN AREA PLAN
IM-00726	ROSEN, MARTIN	1984	FIRST SUPPLEMENTAL HISTORIC PROPERTY SURVEY MATERIAL SITES FOR IMPERIAL 86 EXPRESSWAY
IM-00727	ROSEN, MARTIN	1984	THIRD ADDENDUM ARCHAEOLOGICAL SURVEY REPORT HIGHWAY 86 EXPRESSWAY MATERIAL SITES (DIVERSION DIKES, SIX ONE-HALF MILE, AND HAZARD FISH SPRINGS)
IM-00731	PEAK & ASSOCIATES	1989	CULTURAL RESOURCE SURVEY AND CLEARANCE - SALTON SEA RADIO SITE TO CALEXICO, IMPERIAL COUNTY, CALIFORNIA. AMERICAN TELEPHONE AND TELEGRAPH COMPANY'S FIBEROPTIC COMMUNICATION CABLE
IM-00751	ROSEN, MARTIN	1984	HISTORIC PROPERTY SURVEY IMPERIAL/RIVERSIDE 86 EXPRESSWAY
IM-00806	ECKHARDT, WILLIAM	2002	CULTURAL RESOURCES INVENTORY REPORT - MALIN SPACE SCIENCE SYSTEMS TEMPORARY USE PERMIT
IM-00939	DICE, MICHAEL	2003	RECORDS SEARCH FOR CINGULAR TELECOMMUNICATIONS FACILITY CANDIDATE SD-563-01 (SHERIFF STATION), 2098 FRONTAGE ROAD, SALTON CITY, IMPERIAL COUNTY, CALIFORNIA
IM-00942	UNDERWOOD, JACKSON	2003	ARCHAEOLOGICAL SURVEY AND MONITORING OF TRUCKHAVEN GEOPHYSICAL TEST SITES OCOTILLO WELLS STATE VEHICULAR RECREATION AREA, IMPERIAL COUNTY, CALIFORNIA
IM-01087	STEIDL, LESLIE	2006	ARCHAEOLOGICAL SURVEY REPORT - OW-LAYMAN GEO THERMAL DRILLING
IM-01218	BROCK, JAMES	2006	PHASE I CULTURAL RESOURCES ASSESSMENT FOR 40 SINGLE FAMILY HOUSE LOTS, SALTON SEA AREA OF RIVERSIDE AND IMPERIAL COUNTIES, CALIFORNIA

SCIC REPORT NUMBER	AUTHOR	YEAR	REPORT TITLE
IM-01224	MIRRO, VANESSA	2006	PHASE I ARCHAEOLOGICAL ASSESSMENT OF FOUR RESERVOIRS IN IMPERIAL AND RIVERSIDE COUNTIES, CALIFORNIA
IM-01348	SCHAEFER, JERRY	2006	A CLASS I CULTURAL RESOURCES INVENTORY OF THE TRUCKHAVEN GEOTHERMAL LEASING AREA, IMPERIAL COUNTY, CALIFORNIA
IM-01372	MCGINNIS, PATRICK and HILLARY MURPHY	2008	CULTURAL RESOURCE SURVEY FOR THE 320-ACRE SALTON CITY LANDFILL PROJECT IMPERIAL COUNTY, CALIFORNIA
IM-01458	ICF INTERNATIONAL	2011	FINAL ENVIRONMENTAL IMPACT REPORT FOR THE SALTON CITY LANDFILL EXPANSION
IM-01496	MEALEY, MARLA	2012	ARCHAEOLOGICAL SITE REEXAMINATION AND RECONNAISSANCE AT OCOTILLO WELLS STATE VEHICULAR RECREATION AREA, 2008 THROUGH 2011
IM-01538	PRICE, HARRY J.	2012	STATE HISTORIC PRESERVATION OFFICE REQUEST FOR CONCURRENCE FOR THE CLINICAS DE SALUD DEL PUEBLO WEST SHORES FACILITY IN SALTON CITY, IMPERIAL COUNTY (RECON NO. 5512.1)
NN	MCGINNIS, PATRICK and HILLARY MURPHY	2010	DRAFT CULTURAL RESOURCES TESTING, EVALUATION AND DATA RECOVERY FOR THE 320-ACRE SALTON CITY LANDFILL, COUNTY OF IMPERIAL, CALIFORNIA.

The records search identified 219 archaeological sites and 183 historic-era isolates within one-half mile of the proposed APE. In 2017, POWER recorded 12 sites and 12 isolates during the 2017 field season as part of the Truckhaven Wells analysis (POWER 2018). Seven of these sites are in the proposed 3-D Study APE. Because the Proponents' geophysical contractor and POWER archaeological staff were tasked with moving proposed seismic drive pathways away from archaeological sites listed by the SCIC, no cultural resources were predicted to be inside the beginning 2016 inventory area, and none were located inside the beginning 2018 inventory area.

Copies of all previously recorded DPR 523 form sets have been attached in Appendix H, which took the form of a DVD bearing all site forms the SCIC supplied.

TABLE 2 ARCHAEOLOGICAL RESOURCES RECORDED IN THE PROPOSED APE AND 0.5 MILE FROM THE PROPOSED APE

P NUMBER	TRINOMIAL	RESOURCE TYPE	NOTES	SVRA SITE OR 0.5 MILE BUFFER ONLY?
P-13-000047	CA-IMP-000047	Prehistoric Site	Not in APE. Avoided completely	No
P-13-001311	CA-IMP-001311	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-001325	CA-IMP-001325	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-001326	CA-IMP-001326	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-001327	CA-IMP-001327	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-001328	CA-IMP-001328	Prehistoric Site	Not in APE. Avoided completely	Yes

P NUMBER	TRINOMIAL	RESOURCE TYPE	NOTES	SVRA SITE OR 0.5 MILE BUFFER ONLY?
P-13-001329	CA-IMP-001329	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-001336	CA-IMP-001336	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-001337	CA-IMP-001337	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-001338	CA-IMP-001338	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-001994	CA-IMP-001994	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-003178	CA-IMP-003178	Prehistoric Site	Not in APE. Avoided completely	No
P-13-003219	CA-IMP-003219	Historic-era Site	Not in APE. Avoided completely	buffer only
P-13-003220	CA-IMP-003220	Historic-era Site	Not in APE. Avoided completely	buffer only
P-13-003221	CA-IMP-003221	Historic-era Site	Not in APE. Avoided completely	No
P-13-003222	CA-IMP-003222	Historic-era Site	Not in APE. Avoided completely	buffer only
P-13-003223	CA-IMP-003223	Historic-era Site	Not in APE. Avoided completely	No
P-13-003224	CA-IMP-003224	Historic-era Site	Not in APE. Avoided completely	No
P-13-003225	CA-IMP-003225	Historic-era Site	Not in APE. Avoided completely	buffer only
P-13-003226	CA-IMP-003226	Historic-era Site	Not in APE. Avoided completely	Yes
P-13-003227	CA-IMP-003227	Historic-era Site	Not in APE. Avoided completely	buffer only
P-13-003228	CA-IMP-003228	Historic-era Site	Not in APE. Avoided completely	No
P-13-003229	CA-IMP-003229	Historic-era Site	Not in APE. Avoided completely	buffer only
P-13-003232	CA-IMP-003232	Historic-era Site	Not in APE. Avoided completely	No
P-13-003247	CA-IMP-003247	Historic-era Site	Not in APE. Avoided completely	Yes
P-13-003248	CA-IMP-003248	Historic-era Site	Not in APE. Avoided completely	buffer only
P-13-003249	CA-IMP-003249	Historic-era Site	Not in APE. Avoided completely	Yes
P-13-003250	CA-IMP-003250	Historic-era Site	Not in APE. Avoided completely	buffer only
P-13-005086	CA-IMP-005086	Prehistoric Site	Not in APE. Avoided completely	No
P-13-005183	CA-IMP-005183	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-005184	CA-IMP-005184	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-005185	CA-IMP-005185	Prehistoric Site	Not in APE. Avoided completely	Yes

P NUMBER	TRINOMIAL	RESOURCE TYPE	NOTES	SVRA SITE OR 0.5 MILE BUFFER ONLY?
P-13-005279	CA-IMP-005279	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-005321	CA-IMP-005321	Prehistoric Site	Not in APE. Avoided completely	No
P-13-005322	CA-IMP-005322	Prehistoric Isolate	Not in APE. Avoided completely	No
P-13-005323	CA-IMP-005323	Prehistoric Isolate	Not in APE. Avoided completely	No
P-13-005324	CA-IMP-005324	Prehistoric Isolate	Not in APE. Avoided completely	No
P-13-005325	CA-IMP-005325	Prehistoric Isolate	Not in APE. Avoided completely	No
P-13-005326	CA-IMP-005326	Prehistoric Isolate	Not in APE. Avoided completely	No
P-13-005327	CA-IMP-005327	Prehistoric Isolate	Not in APE. Avoided completely	No
P-13-005328	CA-IMP-005328	Prehistoric Isolate	Not in APE. Avoided completely	No
P-13-005329	CA-IMP-005329	Prehistoric Isolate	Not in APE. Avoided completely	No
P-13-005330	CA-IMP-005330	Prehistoric Isolate	Not in APE. Avoided completely	No
P-13-005331	CA-IMP-005331	Historic-era Site	Not in APE. Avoided completely	No
P-13-005518	CA-IMP-005518	Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-005603	CA-IMP-005603	Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-005604	CA-IMP-005604	Prehistoric Isolate	Not in APE. Avoided completely	No
P-13-005605	CA-IMP-005605	Prehistoric Isolate	Not in APE. Avoided completely	No
P-13-005606	CA-IMP-005606	Prehistoric Isolate	Not in APE. Avoided completely	No
P-13-005607	CA-IMP-005607	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-005608	CA-IMP-005608	Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-005612	CA-IMP-005612	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-005650	CA-IMP-005650	Prehistoric Isolate	Not in APE. Avoided completely	No
P-13-005651	CA-IMP-005651	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-005665	CA-IMP-005665	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-005666	CA-IMP-005666	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-005667	CA-IMP-005667	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-005668	CA-IMP-005668	Prehistoric Isolate	Not in APE. Avoided completely	Yes

P NUMBER	TRINOMIAL	RESOURCE TYPE	NOTES	SVRA SITE OR 0.5 MILE BUFFER ONLY?
P-13-006244	CA-IMP-006244	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-006245	CA-IMP-006245	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-006246	CA-IMP-006246	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-006247	CA-IMP-006247	Prehistoric Site	Not in APE. Avoided completely	No. Partially private land
P-13-006248	CA-IMP-006248	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-006249	CA-IMP-006249	Prehistoric Site	In APE. Avoided completely. Recorded during Wells Study (POWER 2018)	Yes
P-13-006250	CA-IMP-006250	Prehistoric Site	In APE. Updated as CN-15	Yes
P-13-006251	CA-IMP-006251	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006252	CA-IMP-006252	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006253	CA-IMP-006253	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006254	CA-IMP-006254	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006255	CA-IMP-006255	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006256	CA-IMP-006256	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006257	CA-IMP-006257	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006258	CA-IMP-006258	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006259	CA-IMP-006259	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006260	CA-IMP-006260	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006261	CA-IMP-006261	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006291	CA-IMP-006291	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006292	CA-IMP-006292	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006293	CA-IMP-006293	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006294	CA-IMP-006294	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006301	CA-IMP-006301	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-006302	CA-IMP-006302	Prehistoric Site	Not in APE. Avoided completely	No
P-13-006303	CA-IMP-006303	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006304	CA-IMP-006304	Prehistoric Isolate	Not in APE. Avoided completely	No

P NUMBER	TRINOMIAL	RESOURCE TYPE	NOTES	SVRA SITE OR 0.5 MILE BUFFER ONLY?
P-13-006305	CA-IMP-006305	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006306	CA-IMP-006306	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006307	CA-IMP-006307	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006308	CA-IMP-006308	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006318	CA-IMP-006318	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-006320	CA-IMP-006320	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-006322	CA-IMP-006322	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-006323	CA-IMP-006323	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-006327	CA-IMP-006327	Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-006369	CA-IMP-006369	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006371	CA-IMP-006371	Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-006372	CA-IMP-006372	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006373	CA-IMP-006373	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006374	CA-IMP-006374	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006375	CA-IMP-006375	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006376	CA-IMP-006376	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006377	CA-IMP-006377	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006378	CA-IMP-006378	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006379	CA-IMP-006379	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-006382	CA-IMP-006382	Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-006383	CA-IMP-006383	Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-006387	CA-IMP-006387	Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-006388	CA-IMP-006388	Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-006399	CA-IMP-006399	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-006556	CA-IMP-006556	Prehistoric Site	Not in APE. Avoided completely	out
P-13-006559	CA-IMP-006559	Prehistoric Site	Not in APE. Avoided completely	Yes

P NUMBER	TRINOMIAL	RESOURCE TYPE	NOTES	SVRA SITE OR 0.5 MILE BUFFER ONLY?
P-13-006565	CA-IMP-006565	Prehistoric Isolate	Not in APE. Avoided completely	out
P-13-006642	CA-IMP-006642	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-006978	CA-IMP-006978	Historic-era Site	Not in APE. Avoided completely	buffer only
P-13-007597		Prehistoric Isolate	Not in APE. Avoided completely	No
P-13-007598		Prehistoric Isolate	Not in APE. Avoided completely	No
P-13-007733	CA-IMP-007621	Prehistoric Site	Not in APE. Avoided completely	No
P-13-007776		Historic-era Site	Not in APE. Avoided completely	No
P-13-008145	CA-IMP-007745	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-008146	CA-IMP-007746	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-008147	CA-IMP-007747	Prehistoric Site	Not in APE. Avoided completely	No
P-13-008148	CA-IMP-007748	Prehistoric Site	In APE. Avoided completely.	No
P-13-008149	CA-IMP-007749	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-008150	CA-IMP-007750	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-008379	CA-IMP-007860	Prehistoric Site	In APE. Avoided completely.	No. Recordation placed site on private land only.
P-13-008385		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-008390	CA-IMP-007867	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-008565		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-008670		Prehistoric Site	Not in APE. Avoided completely	No
P-13-008671		Prehistoric Site	Not in APE. Avoided completely	No
P-13-008672		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-008673		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-008674		Historic-era Site	Not in APE. Avoided completely	Yes
P-13-008878	CA-IMP-008298	Prehistoric Site	Not in APE. Avoided completely	No
P-13-009272		Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-009273		Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-009274		Prehistoric Site	Not in APE. Avoided completely	Yes

P NUMBER	TRINOMIAL	RESOURCE TYPE	NOTES	SVRA SITE OR 0.5 MILE BUFFER ONLY?
P-13-009275	CA-IMP-008473	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-009276	CA-IMP-008474	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-009277	CA-IMP-008475	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-009278	CA-IMP-008476	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-009510	CA-IMP-008606	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-009511	CA-IMP-008607	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-009512	CA-IMP-008608	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-009552		Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-009554	CA-IMP-008620	Historic-era Site	Not in APE. Avoided completely	Yes
P-13-009555	CA-IMP-008621	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-009560	CA-IMP-008625	Historic-era Site	Not in APE. Avoided completely	Yes
P-13-009561		Historic-era Site	Not in APE. Avoided completely	Yes
P-13-009562	CA-IMP-008626	Historic-era Site	Not in APE. Avoided completely	Yes
P-13-011102	CA-IMP-010108	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-011103	CA-IMP-010109	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-011107	CA-IMP-010113	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-011109	CA-IMP-010115	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-011115	CA-IMP-010121	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-011119	CA-IMP-010125	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-011120	CA-IMP-010126	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-011122	CA-IMP-010128	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-011127	CA-IMP-010133	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-011131	CA-IMP-010137	Prehistoric Site	Not in APE. Avoided completely	out
P-13-011134	CA-IMP-010140	Historic-era Site	Not in APE. Avoided completely	No
P-13-011137	CA-IMP-010143	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-011140	CA-IMP-010146	Prehistoric Site	Not in APE. Avoided completely	Yes

P NUMBER	TRINOMIAL	RESOURCE TYPE	NOTES	SVRA SITE OR 0.5 MILE BUFFER ONLY?
P-13-011141	CA-IMP-010147	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-011144	CA-IMP-010150	Prehistoric Site	Not in APE. Avoided completely	out
P-13-011145	CA-IMP-010151	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-011147	CA-IMP-010153	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-011149	CA-IMP-010155	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-011154	CA-IMP-010160	Prehistoric Site	In APE. Avoided completely.	Yes
P-13-011160	CA-IMP-010166	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-011161	CA-IMP-010167	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-011163	CA-IMP-010169	Historic-era Site	Not in APE. Avoided completely	buffer only
P-13-011164	CA-IMP-010170	Prehistoric Site	Not in APE. Avoided completely	No
P-13-011166	CA-IMP-010172	Prehistoric Site	In APE. Avoided completely.	Yes
P-13-011171	CA-IMP-010177	None	Not in APE. Avoided completely	Yes
P-13-011172	CA-IMP-010178	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-011321	CA-IMP-010281	Historic-era Site	Not in APE. Avoided completely	Yes
P-13-011322	CA-IMP-010282	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-011323	CA-IMP-010283	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-011327	CA-IMP-010287	Historic-era Site	Not in APE. Avoided completely	buffer only
P-13-011328	CA-IMP-010288	Historic-era Site	Not in APE. Avoided completely	buffer only
P-13-011329	CA-IMP-010289	Historic-era Site	Not in APE. Avoided completely	Yes
P-13-011803	CA-IMP-010623	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012005	CA-IMP-010770	Historic-era Site	Not in APE. Avoided completely	buffer only
P-13-012006	CA-IMP-010748	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012008	CA-IMP-010749	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012009		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-012010		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-012011	CA-IMP-010750	Historic-era Site	Not in APE. Avoided completely	buffer only

P NUMBER	TRINOMIAL	RESOURCE TYPE	NOTES	SVRA SITE OR 0.5 MILE BUFFER ONLY?
P-13-012012		Historic-era Isolate	Not in APE. Avoided completely	buffer only
P-13-012013	CA-IMP-010751	Historic-era Site	Not in APE. Avoided completely	buffer only
P-13-012014		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-012015		Historic-era Site	Not in APE. Avoided completely	buffer only
P-13-012017		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-012018	CA-IMP-010753	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012019		Historic-era Site	Not in APE. Avoided completely	buffer only
P-13-012020		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-012021	CA-IMP-010754	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012022	CA-IMP-010755	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012023	CA-IMP-010756	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012024	CA-IMP-010757	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012025	CA-IMP-010758	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012026	CA-IMP-010759	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012027		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012028		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-012029	CA-IMP-010760	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012030		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-012031	CA-IMP-010761	Historic-era Site	Not in APE. Avoided completely	buffer only
P-13-012032		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-012038	CA-IMP-010763	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012039	CA-IMP-010764	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012040	CA-IMP-010765	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012041	CA-IMP-010766	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012042		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012043	CA-IMP-010767	Prehistoric Site	Not in APE. Avoided completely	Yes

P NUMBER	TRINOMIAL	RESOURCE TYPE	NOTES	SVRA SITE OR 0.5 MILE BUFFER ONLY?
P-13-012044		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012045	CA-IMP-010768	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012046	CA-IMP-010769	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012070	CA-IMP-010794	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012125	CA-IMP-010834	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012126	CA-IMP-010835	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012463		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012464		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012465		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012466		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012467		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012468	CA-IMP-011027	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012469	CA-IMP-011028	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012470		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012471		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012472		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012473		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012474		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-012475		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012476	CA-IMP-011029	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012477		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012478		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012479	CA-IMP-011030	Prehistoric Site	In APE. Avoided completely	Yes
P-13-012480		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-012481		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012482		Prehistoric Isolate	Not in APE. Avoided completely	Yes

P NUMBER	TRINOMIAL	RESOURCE TYPE	NOTES	SVRA SITE OR 0.5 MILE BUFFER ONLY?
P-13-012483		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012484		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012485		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012486		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012487		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012488	CA-IMP-011031	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012489		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012490		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012491		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012492		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012493	CA-IMP-011032	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012494		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012495	CA-IMP-011033	Historic-era Site	Not in APE. Avoided completely	Yes
P-13-012496		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012497		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012498		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012499		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-012500		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-012501		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-012502		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012503		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012504		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012505		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-012506		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012507		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012508	CA-IMP-011034	Prehistoric Site	In APE. Avoided completely	Yes

P NUMBER	TRINOMIAL	RESOURCE TYPE	NOTES	SVRA SITE OR 0.5 MILE BUFFER ONLY?
P-13-012509	CA-IMP-011035	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012510		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012511		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012512		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012513		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012514		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012515	CA-IMP-011036	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012516	CA-IMP-011037	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012517		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-012518	CA-IMP-011038	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012519		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012520	CA-IMP-011039	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012521	CA-IMP-011040	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012589		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012590	CA-IMP-011098	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012591		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012592	CA-IMP-011099	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012593	CA-IMP-011100	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012594	CA-IMP-011101	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012595		Historic-era Site	Not in APE. Avoided completely	Yes
P-13-012596	CA-IMP-011102	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012597		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-012601		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-012602		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-012603	CA-IMP-011104	Historic-era Site	Not in APE. Avoided completely	Yes
P-13-012605		Prehistoric Isolate	Not in APE. Avoided completely	Yes

P NUMBER	TRINOMIAL	RESOURCE TYPE	NOTES	SVRA SITE OR 0.5 MILE BUFFER ONLY?
P-13-012607		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-012609		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-012612	CA-IMP-011108	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012613	CA-IMP-011109	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012614	CA-IMP-011110	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012615	CA-IMP-011111	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012616		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012617		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-012618		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-012619	CA-IMP-011112	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012620		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012621		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012622		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012623		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012625		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012626	CA-IMP-011113	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012627	CA-IMP-011114	Historic-era Site	Not in APE. Avoided completely	Yes
P-13-012628		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-012629		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-012631	CA-IMP-011115	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012632	CA-IMP-011116	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012633		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-012634		Prehistoric Isolate	In APE. Avoided completely	Yes
P-13-012635	CA-IMP-011117	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012636	CA-IMP-011118	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012637	CA-IMP-011119	Historic-era Site	Not in APE. Avoided completely	Yes

P NUMBER	TRINOMIAL	RESOURCE TYPE	NOTES	SVRA SITE OR 0.5 MILE BUFFER ONLY?
P-13-012639		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-012640	CA-IMP-011121	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012641		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012644	CA-IMP-011123	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012646		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012647	CA-IMP-011125	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012648	CA-IMP-011126	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012649	CA-IMP-011127	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012650		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012651	CA-IMP-011128	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012652		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-012653	CA-IMP-011129	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012654	CA-IMP-011130	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012655	CA-IMP-011131	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012656	CA-IMP-011132	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012657		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-012658		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-012659	CA-IMP-011133	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012660	CA-IMP-011134	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012661	CA-IMP-011135	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012662	CA-IMP-011136	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012663		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-012664	CA-IMP-011137	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-012665		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012666		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012668		Prehistoric Isolate	Not in APE. Avoided completely	buffer only

P NUMBER	TRINOMIAL	RESOURCE TYPE	NOTES	SVRA SITE OR 0.5 MILE BUFFER ONLY?
P-13-012669		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-012672	CA-IMP-011140	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012673		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012674	CA-IMP-011141	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012675	CA-IMP-011142	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-012676		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-012677		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-012719	CA-IMP-011169	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-013315		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-013321	CA-IMP-011505	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-013322	CA-IMP-011506	Prehistoric Site	Not in APE. Avoided completely	buffer only
P-13-013323	CA-IMP-011507	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-013324	CA-IMP-011508	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-013327	CA-IMP-011510	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-013336		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-013350		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-013351	CA-IMP-011516	Historic-era Site	Not in APE. Avoided completely	buffer only
P-13-013353	CA-IMP-011518	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-013367	CA-IMP-011522	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-013369		Historic-era Isolate	Not in APE. Avoided completely	buffer only
P-13-013376		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-013384		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-013385		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-013389		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-013390	CA-IMP-011533	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-013400	CA-IMP-011537	Prehistoric Site	Not in APE. Avoided completely	buffer only

P NUMBER	TRINOMIAL	RESOURCE TYPE	NOTES	SVRA SITE OR 0.5 MILE BUFFER ONLY?
P-13-013401		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-013406	CA-IMP-011538	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-013435	CA-IMP-011552	Prehistoric Site	In APE. Avoided completely	Yes
P-13-013437		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-013440		Historic-era Isolate	Not in APE. Avoided completely	buffer only
P-13-013445	CA-IMP-011555	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-013447		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-013449	CA-IMP-011558	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-013452	CA-IMP-011560	Historic-era Site	Not in APE. Avoided completely	Yes
P-13-013453	CA-IMP-011561	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-013459	CA-IMP-011563	Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-013466	CA-IMP-011568	Historic-era Site	Not in APE. Avoided completely	Yes
P-13-013473		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-013475		Prehistoric Isolate	Not in APE. Avoided completely	buffer only
P-13-013478		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-013480		Prehistoric Isolate	Not in APE. Avoided completely	Yes
P-13-013675	CA-IMP-011730	Historic-era Site	In APE. Avoided completely	Yes
P-13-014305	CA-IMP-012074	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-014306		Historic-era Isolate	In APE. Not avoided completely. Re-recorded as a possible historic-era road set.	Yes
P-13-014307		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-014308		Historic-era Isolate	Not in APE. Avoided completely	Yes
P-13-014309	CA-IMP-012075	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-014310	CA-IMP-012076	Prehistoric Site	Not in APE. Avoided completely	Yes
P-13-014311	CA-IMP-012077	Prehistoric Site	Not in APE. Avoided completely	buffer only

The archaeological sites previously recorded in and within one-half mile from the 3-D Study area consist mainly of artifact scatters, although sites bearing stacked rock features and what appears to be habitation foundations are plentiful near large washes, especially the wash banks just west of State Route 86. No sites have been recorded on the floor of any wash, although a few isolates are known. Sites bearing the remnants of prehistoric fish traps or weir foundations, which in this area take the form of V- or J-shaped single-coursed cobble alignments (Dice et.al. 2018) are also recorded in the 3-D Study area. Many of these can be seen on high-resolution aerial photographs. Historic trash and metal debris do occur near older roads, including dummy bombs and rounds that may have been dropped by World War II training planes between approximately 1940 and 1943 in and near the "Winona I" site (P13-13675). Trash litters both sides of the State Route 86 right-of-way and some of this is mixed with debris that may be more than 50 years old.

6.2 Results of Pedestrian Survey

The field investigations included an intensive pedestrian cultural resource survey of 2,505.9 acres. Numerous new cultural resources were detected and when combined with the seven sites previously recorded by POWER (2018a) during the wells survey, some of which intersect with the surveyed seismic pathway buffer zones, a total of 175 archaeological sites and 91 isolated artifacts have been identified within the proposed APE. The DPR 523 form sets are attached to this report as Appendix I (in the form of a DVD) and an excel file provided to POWER by the SCIC allows for cross-referencing. POWER GIS has added the SCIC-provided primary and trinomials to our database.

A description of each cultural resource site encountered during the inventories follows Table 3 below. Table 3 also includes specific recommendations for site avoidance during the 3-D Study. Site types found below are generalized; lithic scatters contained only debitage and/or individually point-located stone tools and tested cobbles. Ceramic scatters contained only pottery. Artifact scatters contained lithics, pottery and/or historic artifacts. Temporary camps typically contained one or more prehistoric artifacts plus thermal (hearth) features or activity loci. Cairn features and cairn sites exhibited stacked and multi-coursed sandstone slabs and typically lacked artifacts within 50 centimeters from the cairn base. Fish trap sites were represented by one or more cobble foundations expressed as various shapes (C, J and V shapes were the most common) and these typically lacked associated artifacts. Features were human-built constructions including hearths, rock clearings, rock rings and in a few cases squarish "roomblock" type constructions. The activity loci were defined as dense prehistoric artifact scatters where more than one artifact for every 10 to 20 square centimeters was located.

TABLE 3 CULTURAL RESOURCES ENCOUNTERED AND RECORDED DURING THE CLASS III INVENTORY, 2016 AND 2018 FIELD SEASONS

#	TEMP / PRIMARY NUMBER	TRINOMIAL CA-IMP-	OWNER	ERA	TYPE AND FEATURES	ELIGIBILITY STATEMENT	RECOMMENDED SPECIFIC AVOIDANCE MEASURE. 175 SITES AVOIDED BY SEISMIC DRIVE PATHWAY USE.
1	P13-17573 (CN-1)	-12892	BLM	Prehistoric	Artifact scatter. Three loci, no features.	Considered potentially eligible.	None.
2	P13-17574 (CN-2)	-12893	Private	Prehistoric	Artifact scatter. One cremation feature.	Considered potentially eligible.	Seismic energy source location must avoid cremation feature by at least 100 feet (31 meters)..
3	P13-17575 (CN-3)	-12894	BLM	Prehistoric site and Historic isolate	Artifact scatter. No features.	Considered potentially eligible.	None.
4	P13-17576 (CN-4)	-12895	BLM	Prehistoric site and Historic isolate	Artifact scatter. Two loci, one feature.	Considered potentially eligible.	None.
5	P13-17577 (CN-5)	-12896	BLM	Historic	Two metal debris features.	Considered potentially ineligible but regarded as a historic property until a formal NRHP/CRHR evaluation can be completed.	None.
6	P13-17578 (CN-7)	-12897	BLM	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
7	P13-17597 (CN-11)	-12898	BLM	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
8	P13-17580 (CN-12)	-12899	California State Parks	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
9	P13-17581 (CN-13)	-12900	BLM	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
10	P13-17582 (CN-14)	-12901	BLM	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.

#	TEMP / PRIMARY NUMBER	TRINOMIAL CA-IMP-	OWNER	ERA	TYPE AND FEATURES	ELIGIBILITY STATEMENT	RECOMMENDED SPECIFIC AVOIDANCE MEASURE. 175 SITES AVOIDED BY SEISMIC DRIVE PATHWAY USE.
11	P13-6250 (CN-15)	-6250	BLM	Prehistoric	Lithic scatter. One loci, two features. Note: includes vast expansion of site P13-6250, new number request.	Considered potentially eligible.	None.
12	P13-17583 (CN-16)	-12902	California State Parks	Prehistoric/ unknown	Lithic scatter. No features. Rock piles of uncertain heritage.	Considered potentially eligible.	None.
13	P13-17584 (CN-17)	-12903	California State Parks	Prehistoric	Artifact scatter Eight fish trap features	Considered potentially eligible.	Seismic energy source location must avoid all fish trap features by at least 50 feet (15.25 meters).
14	P13-17585 (CN-18)	-12904	California State Parks	Prehistoric/ unknown	Artifact scatter. Three fish trap features. Rock piles of uncertain heritage.	Considered potentially eligible.	Seismic energy source location must avoid all fish trap features by at least 50 feet (15.25 meters).
15	P13-17586 (CN-19)	-12905	California State Parks	Prehistoric	Artifact scatter. Seventy-seven fish trap features.	Considered potentially eligible.	Seismic energy source location must avoid all fish trap features by at least 50 feet (15.25 meters).
16	P13-17587 (CN-21)	-12906	California State Parks	Prehistoric	Artifact scatter. One feature.	Considered potentially eligible.	None
17	P13-17588 (CN-22)	-12907	California State Parks	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
18	P13-17589 (CN-23)	-12908	BLM	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
19	P13-17637 (CN-24)	-12961	Private	Prehistoric	Artifact scatter. Two loci, two features.	Considered potentially eligible.	None.
20	P13-17638 (CN-29)	-12962	Private	Prehistoric	Artifact scatter. One feature.	Considered potentially eligible.	None.
21	P13-17639 (CN-30)	-12963	Private	Prehistoric	Artifact scatter. One locus, one feature.	Considered potentially eligible.	None.

#	TEMP / PRIMARY NUMBER	TRINOMIAL CA-IMP-	OWNER	ERA	TYPE AND FEATURES	ELIGIBILITY STATEMENT	RECOMMENDED SPECIFIC AVOIDANCE MEASURE. 175 SITES AVOIDED BY SEISMIC DRIVE PATHWAY USE.
22	P13-17640 (CN-31)	-12964	Private	Prehistoric	Artifact scatter. Two loci, six features. One possible cremation locus.	Considered potentially eligible.	Seismic energy source location must avoid cremation feature by at least 100 feet (31 meters). Seismic energy source location must avoid possible habitation feature by at least 50 feet (15.25 meters).
23	P13-17641 (CN-32)	-12965	California State Lands Commission and Private	Prehistoric	Artifact scatter. Five features.	Considered potentially eligible.	None.
24	P13-17642 (CN-33H)	-12966	California State Lands Commission	Probable historic	Historic-era road and can dump.	Considered potentially ineligible but regarded as a historic property until a formal NRHP/CRHR evaluation can be completed.	None
25	P13-17643 (CN-34)	-12967	Private	Prehistoric	Lithic scatter. Five features.	Considered potentially eligible.	Seismic energy source location must avoid cairn features by at least 50 feet (15.25 meters).
26	P13-17644 (CN-35)	-12968	Private	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
27	P13-17645 (CN-36)	-12969	Private	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
28	P13-17646 (CN-37)	-12970	Private	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
29	P13-17647 (CN-38E)	-12971	Private	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.

#	TEMP / PRIMARY NUMBER	TRINOMIAL CA-IMP-	OWNER	ERA	TYPE AND FEATURES	ELIGIBILITY STATEMENT	RECOMMENDED SPECIFIC AVOIDANCE MEASURE. 175 SITES AVOIDED BY SEISMIC DRIVE PATHWAY USE.
30	P13-17648 (CN-38W)	-12972	Private	Prehistoric	Artifact scatter. Two features.	Considered potentially eligible.	Seismic energy source location must avoid slab features by at least 50 feet (15.25 meters).
31	P13-17649 (CN-39E)	-12973	Private and California State Lands Commission	Prehistoric	Artifact scatter. Eight loci, 28 features, human remains and cremations.	Considered potentially eligible.	Seismic energy source location must avoid cremation features and human remains by at least 100 feet (31 meters). Seismic energy source location must avoid possible habitation feature by at least 50 feet (15.25 meters).
32	P13-8671 (CN-39W)	-12974	Private	Prehistoric	Artifact scatter. Four loci and four features. Possible unexposed cremations per tribal monitors.	Considered potentially eligible.	Seismic energy source location must avoid possible habitation features by at least 50 feet (15.25 meters)..
33	P13-17650 (CN-41)	-12975	Private	Prehistoric	Artifact scatter. Eight loci and 50 features. Human remains, cremations, hearths, possible habitations and fish traps.	Considered potentially eligible.	Seismic energy source location must avoid cremation features and human remains by at least 100 feet (31 meters). Seismic energy source location must avoid possible habitation feature by at least 50 feet (15.25 meters).
34	P13-17651 (CN-46)	-12976	Private	Prehistoric	Artifact scatter. Three features.	Considered potentially eligible.	None.

#	TEMP / PRIMARY NUMBER	TRINOMIAL CA-IMP-	OWNER	ERA	TYPE AND FEATURES	ELIGIBILITY STATEMENT	RECOMMENDED SPECIFIC AVOIDANCE MEASURE. 175 SITES AVOIDED BY SEISMIC DRIVE PATHWAY USE.
35	P13-17652 (CN-47)	-12977	Private	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
36	P13-17653 (CN-48)	-12978	Private and BLM	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
37	P13-17654 (CN-49)	-12979	Private	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
38	P13-17655 (CN-50)	-12980	Private	Prehistoric	Artifact scatter. Two loci, ten features.	Considered potentially eligible.	Seismic energy source location must avoid possible habitation features by at least 50 feet (15.25 meters). None.
39	P13-17656 (CN-51)	-12981	Private, California State Lands Commission, and California State Parks	Prehistoric	Artifact scatter. Two features.	Considered potentially eligible.	None.
40	P13-17657 (CN-53)	-12982	Private	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
41	P13-17658 (CN-54W)	-12983	Private	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
42	P13-17659 (CN-55)	-12984	Private	Prehistoric	Artifact scatter. Two features, one juvenile human long bone.	Considered potentially eligible.	Seismic energy source location must avoid possible burial ground and human remains by at least 100 feet (31 meters). Seismic energy source location must avoid possible cairn feature by at least 50 feet (15.25 meters).

#	TEMP / PRIMARY NUMBER	TRINOMIAL CA-IMP-	OWNER	ERA	TYPE AND FEATURES	ELIGIBILITY STATEMENT	RECOMMENDED SPECIFIC AVOIDANCE MEASURE. 175 SITES AVOIDED BY SEISMIC DRIVE PATHWAY USE.
43	P13-17660 (CN-56)	-12985	Private	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
44	P13-17661 (CN-58)	-12986	Private	Prehistoric	Lithic scatter. One feature.	Considered potentially eligible.	None.
45	P13-17662 (CN-59)	-12987	Private	Prehistoric	Artifact scatter. One loci, four features.	Considered potentially eligible.	None.
46	P13-17663 (DM-3)	-12988	BLM and Private	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
47	P13-17664 (DM-4)	-12989	Private	Prehistoric	Artifact scatter. Two loci, four features.	Considered potentially eligible.	None.
48	P13-17590 (DM-6)	-12909	Private	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
49	P13-17591 (DM-8)	-12910	Private	Prehistoric	Lithic scatter. Ten features.	Considered potentially eligible.	Seismic energy source location must avoid cairn features and slab features by at least 50 feet (15.25 meters).
50	P13-17592 (DM-9)	-12911	California State Lands Commission	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
51	P13-17593 (DM-22)	-12912	Private	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
52	P13-17594 (KRM-14)	-12913	Private	Prehistoric	Artifact scatter. Three loci, nine features.	Considered potentially eligible.	None.
53	P13-17595 (KRM-15)	-12914	Private	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
54	P13-17596 (KRM-16)	-12915	Private	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
55	P13-17597 (KRM-17)	-12916	Private	Prehistoric	Artifact scatter. Two loci, eight features.	Considered potentially eligible.	None.
56	P13-17598 (KRM-18)	-12917	Private	Prehistoric	Artifact scatter. Two loci, one feature.	Considered potentially eligible.	None..
57	P13-17599 (KRM-19)	-12918	Private	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.

#	TEMP / PRIMARY NUMBER	TRINOMIAL CA-IMP-	OWNER	ERA	TYPE AND FEATURES	ELIGIBILITY STATEMENT	RECOMMENDED SPECIFIC AVOIDANCE MEASURE. 175 SITES AVOIDED BY SEISMIC DRIVE PATHWAY USE.
58	P13-17600 (KRM-20)	-12919	Private	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
59	P13-6248	-6248	BLM	Prehistoric	Lithic scatter. Sixteen features. Site update adds to original record. No cremations or human remains are discussed in original record forms.	Considered potentially eligible.	Seismic energy source location must avoid cairn features and slab features by at least 50 feet (15.25 meters).
60	P13-6249	-6249	BLM and Private	Prehistoric	Artifact scatter. No features. Site update adds to original record. No cremations, human remains, or upright slab features are discussed in original record forms. Recorded during Wells Study (POWER 2018).	Considered potentially eligible.	None.
61	P13-8148	-7748	California State Lands Commission	Prehistoric	Artifact scatter. Three features. Site update revises original record. No cremations or human remains are discussed in original record forms.	Considered potentially eligible.	Seismic energy source location must avoid slab features by at least 50 feet (15.25 meters).
62	P13-8379	-7860	Private	Prehistoric	Artifact scatter. Eleven loci and one feature. Site update revises original record. No cremations, human remains, or upright slab features are discussed in original record forms.	Considered potentially eligible.	None.

#	TEMP / PRIMARY NUMBER	TRINOMIAL CA-IMP-	OWNER	ERA	TYPE AND FEATURES	ELIGIBILITY STATEMENT	RECOMMENDED SPECIFIC AVOIDANCE MEASURE. 175 SITES AVOIDED BY SEISMIC DRIVE PATHWAY USE.
63	P13-11154	-10160	California State Parks	Prehistoric	Lithic scatter, site extension portion only. Site update adds to original record. No cremations, human remains, or upright slab features are discussed in original record forms.	Considered potentially eligible.	None.
64	P13-11166	-10172	California State Parks BLM in northwest segment	Prehistoric	Artifact scatter and one feature, site extension portion only. Site update adds to original record. No cremations, human remains, or upright slab features are discussed in original record forms.	Considered potentially eligible.	Seismic energy source location must avoid cairn features and possible fish trap/habitation feature by at least 50 feet (15.25 meters).
65	P13-12479	-11030	California State Parks	Prehistoric	Artifact scatter and one feature. Site update revises original record slightly. No cremations or human remains are discussed in original record forms.	Considered potentially eligible.	Seismic energy source location must avoid slab feature by at least 50 feet (15.25 meters).
66	P13-12508	-11034	California State Parks	Prehistoric	Artifact scatter. No new features. Site update adds to original record. No cremations, human remains, or upright slab features are discussed in original record forms.	Considered potentially eligible.	None.

#	TEMP / PRIMARY NUMBER	TRINOMIAL CA-IMP-	OWNER	ERA	TYPE AND FEATURES	ELIGIBILITY STATEMENT	RECOMMENDED SPECIFIC AVOIDANCE MEASURE. 175 SITES AVOIDED BY SEISMIC DRIVE PATHWAY USE.
67	P13-12654	-11130	California State Parks	Prehistoric and Historic	Artifact scatter and historic-era metal debris. One locus and four features. No cremations or human remains are discussed in original record forms.	Considered potentially eligible.	Seismic energy source location must avoid slab feature/possible fish trap or habitation feature by at least 50 feet (15.25 meters).
68	P13-13435	-11552	California State Parks	Prehistoric	Artifact scatter. Eight features. Relocated in 2016 and original museum form is accurate. No cremations or human remains are discussed in original record forms.	Considered potentially eligible.	Seismic energy source location must avoid slab feature/possible fish trap or habitation feature by at least 50 feet (15.25 meters).
69	P13-13675	-11730	BLM and California State Parks	Historic	Historic metal debris: Winona I historic-era practice bombing range. Extension to site added in 2018.	Considered potentially eligible.	None.
70	P13-14306	none	BLM, Private, And California State Parks	Possible historic-era road	Historically bulldozed roads recorded as segments. SCIC coded resource as isolate: this was corrected during recordation. POWER reanalyzed the road network and concluded that certain segments of the road network were not constructed during World War II	Considered potentially ineligible but regarded as a historic property until a formal NRHP/CRHR evaluation can be completed.	Apply mitigation to avoid.

#	TEMP / PRIMARY NUMBER	TRINOMIAL CA-IMP-	OWNER	ERA	TYPE AND FEATURES	ELIGIBILITY STATEMENT	RECOMMENDED SPECIFIC AVOIDANCE MEASURE. 175 SITES AVOIDED BY SEISMIC DRIVE PATHWAY USE.
71	P13-17173	-12788	BLM	Prehistoric	Lithic scatter. No features. Recorded during Wells Study (POWER 2018).	Considered potentially eligible.	None.
72	P13-17174	-12789	BLM	Prehistoric	Lithic scatter. Three features (fish traps). Recorded during Wells Study (POWER 2018).	Considered potentially eligible.	Seismic energy source location must avoid fish trap features by at least 50 feet (15.25 meters).
73	P13-17175	-12790	California State Lands Commission and Private	Prehistoric	Lithic scatter. No features. Recorded during Wells Study (POWER 2018).	Considered potentially eligible.	None.
74	P13-17176	-12791	California State Lands Commission and Private	Prehistoric	Lithic scatter. No features. Recorded during Wells Study (POWER 2018).	Considered potentially eligible.	None.
75	P13-17177	-12792	California State Lands Commission	Prehistoric	Lithic scatter. No features. Recorded during Wells Study (POWER 2018).	Considered potentially eligible.	None.
76	P13-17182	-12795	Private	Prehistoric	Lithic scatter. No features. Recorded during Wells Study (POWER 2018) then re-recorded in 2018.	Considered potentially eligible.	None.
77	P13-17665 (RK-1)	-12991	Private	Prehistoric and one historic isolate	Artifact scatter. No features.	Considered potentially eligible.	None.
78	P13-17666 (RK-2)	-12992	Private	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
79	P13-17667 (RK-3)	-12993	Private	Prehistoric	Artifact scatter. Two loci, one feature.	Considered potentially eligible.	Placement of geophones must avoid all features and loci.

#	TEMP / PRIMARY NUMBER	TRINOMIAL CA-IMP-	OWNER	ERA	TYPE AND FEATURES	ELIGIBILITY STATEMENT	RECOMMENDED SPECIFIC AVOIDANCE MEASURE. 175 SITES AVOIDED BY SEISMIC DRIVE PATHWAY USE.
80	P13-17668 (RK-4)	-12994	Private	Prehistoric	Artifact scatter. One locus, four features.	Considered potentially eligible.	Seismic energy source location must avoid possible habitation feature by at least 50 feet (15.25 meters).
81	P13-17669 (RK-5N)	-12995	California State Lands Commission and Private	Prehistoric	Artifact scatter. Three loci, two features.	Considered potentially eligible.	None.
82	P13-17670 (RK-5S)	-12996	California State Lands Commission and Private	Prehistoric	Artifact scatter. One loci, five features.	Considered potentially eligible.	Seismic energy source location must avoid all possible habitation features by at least 50 feet (15.25 meters). Placement of geophones must avoid all features and loci.
83	P13-17671 (RK-5H)	-12997	Private and California State Lands Commission	Historic	Three separate trash dumps.	Considered potentially ineligible but regarded as a historic property until a formal NRHP/CRHR evaluation can be completed.	None.
84	P13-17672 (RK-6)	-12998	Private	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
85	P13-17673 (RK-7)	-12999	Private	Prehistoric	Lithic scatter. Two features.	Considered potentially eligible.	None.
86	P13-17674 (RK-9H)	-13000	California State Parks	Historic	Trash scatter. No features.	Considered potentially ineligible but regarded as a historic property until a formal NRHP/CRHR evaluation can be completed.	None.

#	TEMP / PRIMARY NUMBER	TRINOMIAL CA-IMP-	OWNER	ERA	TYPE AND FEATURES	ELIGIBILITY STATEMENT	RECOMMENDED SPECIFIC AVOIDANCE MEASURE. 175 SITES AVOIDED BY SEISMIC DRIVE PATHWAY USE.
87	P13-17675 (RK-10)	-13001	California State Parks	Prehistoric	Lithic scatter. One loci, two features.	Considered potentially eligible.	None.
88	P13-17676 (RK-11)	-13002	California State Parks	Prehistoric and one historic isolate	Artifact scatter. No features.	Considered potentially eligible.	None.
89	P13-17677 (RK-12)	-13003	California State Parks and California State Lands Commission	Prehistoric and historic	Artifact scatter. No features.	Considered potentially eligible.	None.
90	P13-17678 (RK-13)	-13004	California State Lands Commission	Historic	Trash scatter. One Caltrans concrete marker.	Considered potentially ineligible but regarded as a historic property until a formal NRHP/CRHR evaluation can be completed.	None.
91	P13-17679 (RK-14)	-13005	California State Parks	Uncertain	No artifacts. One sandstone slab alignment of unknown function.	Considered potentially eligible.	Seismic energy source location must avoid slab feature by at least 50 feet (15.25 meters).
92	P13-17680 (RK-15)	-13006	BLM	Prehistoric and historic isolate	Artifact scatter. No features	Considered potentially eligible.	None.
93	P13-17681 (RK-17)	-13007	Private	Prehistoric	Artifact scatter. One locus, four features	Considered potentially eligible.	Seismic energy source location must avoid slab features by at least 50 feet (15.25 meters).
94	P13-17682 (RK-18)	-13008	BLM	Prehistoric	Lithic scatter. No features	Considered potentially eligible.	None.
95	P13-17683 (RK-19)	-13009	BLM	Prehistoric	Ceramic scatter. One fish-trap feature.	Considered potentially eligible.	Seismic energy source location must avoid fish trap feature by at least 50 feet (15.25 meters).

#	TEMP / PRIMARY NUMBER	TRINOMIAL CA-IMP-	OWNER	ERA	TYPE AND FEATURES	ELIGIBILITY STATEMENT	RECOMMENDED SPECIFIC AVOIDANCE MEASURE. 175 SITES AVOIDED BY SEISMIC DRIVE PATHWAY USE.
96	P13-17684 (RK-20)	-13010	BLM and California State Parks	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
97	P13-17685 (RK-21)	-13011	California State Parks	Prehistoric	Lithic scatter. No features	Considered potentially eligible.	None.
98	P13-17686 (RK-22)	-13012	California State Parks	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
99	P13-17687 (RK-23)	-13013	California State Parks	Prehistoric	Lithic scatter. Three fish-trap features.	Considered potentially eligible.	Seismic energy source location must avoid all fish trap features by at least 50 feet (15.25 meters).
100	P13-17688 (RK-24)	-13014	California State Parks	Prehistoric	Artifact scatter. One possible fish-trap feature.	Considered potentially eligible.	Seismic energy source location must avoid possible fish trap feature by at least 50 feet (15.25 meters).
101	P13-17689 (RK-25)	-13015	California State Parks	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
102	P13-17690 (RK-26)	-13016	California State Parks	Prehistoric	Artifact scatter. One possible fish-trap feature.	Considered potentially eligible.	Seismic energy source location must avoid possible fish trap feature by at least 50 feet (15.25 meters).
103	P13-17691 (RK-27)	-13017	BLM and California State Parks	Prehistoric	Lithic scatter. Two features.	Considered potentially eligible.	Seismic energy source location must avoid cairn feature by at least 50 feet (15.25 meters).
104	P13-17692 (RK-28)	-13018	BLM	Prehistoric	Lithic scatter. One locus.	Considered potentially eligible.	None.

#	TEMP / PRIMARY NUMBER	TRINOMIAL CA-IMP-	OWNER	ERA	TYPE AND FEATURES	ELIGIBILITY STATEMENT	RECOMMENDED SPECIFIC AVOIDANCE MEASURE. 175 SITES AVOIDED BY SEISMIC DRIVE PATHWAY USE.
105	P13-17693 (RK-29)	-13019	BLM and California State Parks	Prehistoric	Artifact scatter. One locus, five features. One feature was believed to be a ceremonial area by a tribal monitor.	Considered potentially eligible.	Seismic energy source location must avoid cairn features by at least 50 feet (15.25 meters) and the possible ceremonial area by at least 100 feet (31 meters).
106	P13-17694 (RK-30)	-13020	BLM	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
107	P13-17695 (RK-31)	-13021	California State Parks and BLM	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
108	P13-17696 (RK-32)	-13022	BLM	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
109	P13-17697 (RK-33)	-13023	BLM	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
110	P13-17698 (RK-34)	-13024	California State Lands Commission and California State Parks	Prehistoric	Artifact scatter. Two loci, four features.	Considered potentially eligible.	Seismic energy source location must avoid possible fish trap/habitation features by at least 50 feet (15.25 meters).
111	P13-17699 (RK-35)	-13025	BLM and California State Parks	Prehistoric	Artifact scatter. Six features, some may be fish-traps. Two fossils noted.	Considered potentially eligible.	Seismic energy source location must avoid possible fish trap/habitation features by at least 50 feet (15.25 meters).
112	P13-17700 (RK-36)	-13026	BLM	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
113	P13-17701 (RK-37)	-13027	BLM and California State Parks	Prehistoric	Artifact scatter. One locus, four features.	Considered potentially eligible.	Seismic energy source location must avoid slab features by at least 50 feet (15.25 meters).

#	TEMP / PRIMARY NUMBER	TRINOMIAL CA-IMP-	OWNER	ERA	TYPE AND FEATURES	ELIGIBILITY STATEMENT	RECOMMENDED SPECIFIC AVOIDANCE MEASURE. 175 SITES AVOIDED BY SEISMIC DRIVE PATHWAY USE.
114	P13-17702 (RK-38/55)	-13028	BLM and California State Parks	Prehistoric and historic metal debris	Artifact scatter. Fourteen features.	Considered potentially eligible.	Seismic energy source location must avoid possible fish trap/habitation features by at least 50 feet (15.25 meters).
115	P13-17703 (RK-39)	-13029	California State Parks	Prehistoric	Lithic scatter. One feature.	Considered potentially eligible.	None.
116	P13-17704 (RK-40)	-13030	California State Parks	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
117	P13-17705 (RK-41)	-13031	California State Parks	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
118	P13-17706 (RK-42)	-13032	California State Parks	Prehistoric	Artifact scatter. One possible feature.	Considered potentially eligible.	None.
119	P13-17707 (RK-44)	-13033	California State Parks	Prehistoric	Artifact scatter. Five features.	Considered potentially eligible.	Seismic energy source location must avoid slab feature by at least 50 feet (15.25 meters).
120	P13-17708 (RK-45)	-13034	California State Parks	Prehistoric	Lithic scatter. Two features (one roomblock).	Considered potentially eligible.	Seismic energy source location must avoid slab feature by at least 50 feet (15.25 meters).
121	P13-17709 (RK-47)	-13035	California State Parks	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
122	P13-17710 (RK-48)	-13036	California State Parks	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
123	P13-17711 (RK-49)	-13037	California State Parks	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
124	P13-17712 (RK-50)	-13038	California State Parks	Prehistoric	Lithic scatter. Four features.	Considered potentially eligible.	Seismic energy source location must avoid slab features by at least 50 feet (15.25 meters).
125	P13-17713 (RK-51)	-13039	BLM	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.

#	TEMP / PRIMARY NUMBER	TRINOMIAL CA-IMP-	OWNER	ERA	TYPE AND FEATURES	ELIGIBILITY STATEMENT	RECOMMENDED SPECIFIC AVOIDANCE MEASURE. 175 SITES AVOIDED BY SEISMIC DRIVE PATHWAY USE.
126	P13-17714 (RK-52)	-13040	BLM	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
127	P13-17715 (RK-54)	-13041	BLM	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
128	P13-12495 (RK-55)	-11033	California State Parks	Prehistoric and historic metal debris	Artifact scatter. No features.	Considered potentially eligible.	None.
129	P13-17716 (RK-57)	-13042	California State Parks	Prehistoric	No artifacts. Two possible fish trap features.	Considered potentially eligible.	Seismic energy source location must avoid possible fish trap features by at least 50 feet (15.25 meters).
130	P13-17717 (RK-58)	-13043	California State Parks	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
131	P13-17718 (RK-59)	-13044	California State Parks	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
132	P13-12634 (RK-60)	-12990	California State Parks	Prehistoric	Lithic scatter. No features. Note: includes isolate P13-12634	Considered potentially eligible.	None.
133	P13-17601 (S-04-001)	-12920	Private	Prehistoric	Lithic scatter. One feature.	Considered potentially eligible.	Seismic energy source location must avoid cairn feature by at least 50 feet (15.25 meters).
134	P13-17602 (S-04-002)	-12921	California State Lands Commission	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
135	P13-17603 (S-04-003)	-12922	California State Lands Commission	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
136	P13-17604 (S-04-004)	-12923	California State Lands Commission	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.

#	TEMP / PRIMARY NUMBER	TRINOMIAL CA-IMP-	OWNER	ERA	TYPE AND FEATURES	ELIGIBILITY STATEMENT	RECOMMENDED SPECIFIC AVOIDANCE MEASURE. 175 SITES AVOIDED BY SEISMIC DRIVE PATHWAY USE.
137	P13-17605 (S-04-005)	-12924	California State Lands Commission	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
138	P13-17606 (S-04-006)	-12925	Private and California State Lands Commission	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
139	P13-17607 (S-04-007)	-12926	Private	Prehistoric	Artifact scatter. One feature.	Considered potentially eligible.	None
140	P13-17608 (S-04-010)	-12927	California State Lands Commission	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
141	P13-17609 (S-04-012)	-12928	Private	Prehistoric	Ceramic scatter. No features.	Considered potentially eligible.	None.
142	P13-17610 (S-04-013)	-12929	Private	Prehistoric	Artifact scatter. One feature.	Considered potentially eligible.	None
143	P13-11134 (TW-1)	-10140	California State Parks	Prehistoric and historic	Artifact scatter. One well feature, one trash feature.	Considered potentially eligible.	None
144	P13-17611 (TW-2)	-12930	California State Parks	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
145	P13-17612 (TW-3)	-12931	Private	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
146	P13-17613 (TW-4)	-12932	Private	Prehistoric and historic	Artifact scatter. Two well features.	Considered potentially eligible.	None
147	P13-17614 (TW-5)	-12933	California State Parks	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
148	P13-17615 (TW-8)	-12934	California State Parks	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
149	P13-17616 (TW-9)	-12935	BLM and California State Parks	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
150	P13-17617 (TW-10)	-12936	BLM	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.

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151	P13-17617 (TW-11)	-12937	BLM	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
152	P13-17617 (TW-12)	-12938	California State Parks	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
153	P13-17620 (TW-13)	-12939	BLM	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
154	P13-17621 (TW-14)	-12940	BLM	Prehistoric and historic	Artifact scatter. No features.	Considered potentially eligible.	None.
155	P13-17622 (TW-15)	-12941	BLM	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
156	P13-17623 (TW-16)	-12942	BLM	Prehistoric and historic	Artifact scatter. No features.	Considered potentially eligible.	None.
157	P13-17624 (TW-17)	-12943	BLM	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
158	P13-17625 (TW-18)	-12944	California State Parks	Prehistoric and historic	Artifact scatter. No features.	Considered potentially eligible.	None.
159	P13-17626 (TW-20)	-12945	California State Parks	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
160	P13-17627 (TW-21)	-12946	California State Parks	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
161	P13-17628 (TW-22)	-12947	BLM and California State Parks	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
162	P13-17629 (TW-23)	-12948	BLM	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
163	P13-12505 (TW-25)	-12949	California State Parks	Prehistoric and historic metal debris	Artifact scatter. No features.	Considered potentially eligible.	None.
164	P13-12491 (TW-26)	-12950	California State Parks	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
165	P13-12492 (TW-27)	-12951	California State Parks	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
166	P13-17630 (TW-28)	-12952	California State Parks	Prehistoric and historic trash	Artifact scatter. No features.	Considered potentially eligible.	None.

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167	P13-12477 (TW-30)	-12953	California State Parks	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
168	P13-17631 (TW-31)	-12954	California State Parks	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
169	P13-17632 TW-32	-12955	California State Parks	Prehistoric	Artifact scatter. One locus, one potdrop feature which was considered ceremonial by tribal monitor.	Considered potentially eligible.	Seismic energy source location must avoid possible ceremonial area by at least 100 feet (31 meters).
170	P13-17633 (TW-33)	-12956	California State Parks	Prehistoric	Artifact scatter. No features.	Considered potentially eligible.	None.
171	P13-12464 (TW-34)	-12953	California State Parks	Prehistoric	Artifact scatter. One locus, five features.	Considered potentially eligible.	None
172	P13-17634 (TW-36)	-12954	California State Parks	Prehistoric	Artifact scatter. Six loci, 29 probable fish trap and/or habitation features.	Considered potentially eligible.	Seismic energy source location must avoid possible fish trap features by at least 50 feet (15.25 meters).None
173	P13-17635 (TW-37)	-12955	California State Parks	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
174	P13-17636 (TW-38)	-12956	California State Parks	Prehistoric	Lithic scatter. No features.	Considered potentially eligible.	None.
175	P13-17719 (TW-39)	-13045	California State Parks	Prehistoric	Lithic scatter. No features. Overlain by the Winona I practice bombing site.	Considered potentially eligible.	None.

Site 1: CA-IMP-12892 (CN-1)
Description: Artifact scatter
Period: Likely Late Prehistoric
Dimensions: 125 m (N/S) by 200 m (E/W), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a prehistoric lithic and ceramic scatter with three activity loci bearing varying types and quantities of artifacts. The site is on a relatively flat mesa containing a variety of small cobbles and gravels, with low-lying eroding sand dunes and sandstone outcrops. The southern portion of the site contains finger ridges [redacted], plus associated deepening wash tributaries. The site contains approximately 115 potsherds, two projectile points, one quartz projectile point midsection, two core fragments, 10 pieces of debitage, and a sample of red ochre. No formal features were identified. Survey visibility was 98%, off-roading impacts were considered minor, and the southern site boundary is being cut into by the wash. The site boundary will be avoided by viberoseis paths and source points by at minimum 61.8 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 2: CA-IMP-12893 (CN-2)
Description: Artifact scatter and cremation
Period: Possibly Late Prehistoric
Dimensions: 141 m (N/S) by 92 m (E/W), with unspecified depth.
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a prehistoric ceramic, ground stone, and lithic scatter with an eroding human cremation in the southwestern site quadrant. The site is on a sandstone bench bisected by a narrow slot wash trending southeast through the site [redacted]. Several smaller braided washes cut and rill the southern portion of the site. Four mesquite-hummock dunes lie north of a narrow slot wash that cuts the site into two; two of the hummocks lie within the site boundary. One of the dunes contains a looter's pile of ceramics and a small amount of charcoal/ash (lacking fire-affected rock) eroding out of the northern edge. There is a total of 30 point-located artifacts site wide; 13 of these are located north of the bisecting wash and 17 to the south. Ten pieces of fire-altered rock were located south of the slot wash. A total of 145 brownware and buffware potsherds, 17 pieces of debitage (predominately primary flakes), and 18 stone tools were recorded at the site. Vegetation includes sparse creosote and mesquite and the ground visibility during the survey was 99%. The cremation was inspected by the tribal Most Likely Descendant (MLD) in 2016. The site boundary will be avoided by viberoseis paths and source points by at minimum 53 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information

important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 3: CA-IMP-12894 (CN-3)
Description: Lithic scatter / historic metal isolate
Period: Multicomponent: unspecified Prehistoric Period plus an isolated World War II-era artifact
Dimensions: 60 m (N/S) by 37 m (E/W), with unspecified depth.
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small prehistoric debitage and tool scatter consisting of one bifacial quartzite tool, one quartzite core, two quartzite flakes and one Wonderstone flake. A .50 caliber bullet case, likely dating to the World War II-era, was also recorded at the site. The site is on a cobbly flat near a bench edge [redacted]. The site is sparsely vegetated, predominately with saltbush, and there no features were observed at the site. The site is bisected by an off-road vehicle trail running north-to-south paralleling a low ephemeral drainage. Survey visibility was 99%. The site boundary will be avoided by vibroseis paths and source points by at minimum 6.4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 4: CA-IMP-12895 (CN-4)
Description: Temporary prehistoric encampment / historic artifact scatter
Period: Multicomponent: likely Late Prehistoric period plus World War II-era historic period
Dimensions: 270 m (NW/SE) by 130 m (SW/NE), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site consists of a prehistoric artifact scatter containing one decomposed hearth feature and two dense artifact scatters recorded as Activity Locus A and B. Locus A is located at the northwest end of the site [redacted] and contains 77 pieces of debitage, four point-located stone tools, 91 potsherds, two rimsherds, and a charcoal deposit suggestive of a hearth (Feature 1). Locus B contains 19 pieces of debitage and two tools. Debitage, potsherds and stone tools are lightly scattered about the site between these areas. Creosote bush scrub vegetation is very light, and the silty soils exhibit decomposed sandstone blocks and cobbles. Erosion [redacted] is slight, but the rivulets become more pronounced toward the northeast part of the site boundary. The site also includes one brown bleach bottle base fragment and one hole-in-top can that is considered isolated historic trash. No other historic debris or evidence of historic structures are visible in the area and use of the area by off-road enthusiasts is occasional. The site boundary will be avoided by vibroseis paths and source points by at minimum 4.4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information

important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 5: CA-IMP-12896 (CN-5)
Description: Historic metal debris field
Period: Likely World War II era
Dimensions: 130 m (SW/NE) by 40 m (NW/SE) with likely no depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Ineligible but regarded as a historic property until a formal NRHP/CRHR evaluation can be completed.

The site consists of two clusters of historic metal debris. Locality A measures 75 m (NE/SW) by 42 m (NW/SE) and can be found in the southwest end of the site. This contains one strap and three fragments of a probable World War II-era training bomb. Locality B contains 10 fragments of training bomb debris within a 25 m diameter area. The site setting is an open, very flat vegetation-free area of somewhat silty soil with gravels and small cobbles. Single, light, off-road tracks are present in the general area. Ephemeral braided drainages lie to the south and southeast. No vegetation is in the vicinity and survey visibility was 100%. The site boundary will be avoided by vibroseis paths and source points by at minimum 15.6 meters.

Eligibility Recommendation
This resource appears potentially ineligible for the NRHP and the CRHR even though the integrity of the site is considered good; it is unlikely that additional historic-era resources are located herein, and all historic components have been identified. Finally, the site is unlikely to yield yielded or may be likely to yield information important to the prehistory of the region. However, the site should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 6: CA-IMP-12897 (CN-7)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 165 m (N/S) by 106 m (E/W), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a large lithic scatter consisting of chert, Wonderstone, grey quartzite, and black basalt materials. Several cores, one edge-modified flake or scraper, and several pieces of debitage lie within the site boundary. A north-to-south trending drainage bisects the site, and artifacts are scattered along the banks. No features were identified. Several two-track roads parallel the drainage and have been used for off-roading, while two other roads bear old blading scars. The site is on a cobbly flat, with low-lying eroding sand dunes and sandstone outcrops. Desert scrub vegetation including saltbush and white bursage is very sparse, and ground visibility during the survey was 100%. The site boundary will be avoided by vibroseis paths and source points by at minimum 9.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 7: CA-IMP-12898 (CN-11)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 200 m (NE/SW) by 105 m (NW/SE), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a dispersed lithic scatter containing seven point-located stone tools and three quartzite flakes. There were no features identified. The site is on a cobbly flat with several low-lying sandstone outcrops between ephemeral braided washes trending northeast-to southwest through the site. The [redacted] soils exhibit a distinct reddish hue. A few faint off-road tracks run north to south through the site, and one regularly used track cuts across the northern portion of the site. It is very sparsely vegetated with a few saltbushes; survey ground visibility was 100%. The site boundary will be avoided by vibroseis paths and source points by at minimum 50 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 8: CA-IMP-12899 (CN-12)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 131 m (NW/SE) by 85 m (NE/SW), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Eligible

This site is a sparse lithic scatter containing eight formal stone tools and nine pieces of debitage. The site is on a flat characterized by long, low-lying sandstone outcrops and thin cobbly sand and silt topsoil, possibly a relic shoreline of Lake Cahuilla. No cultural features were identified. A northeast-to-southwest trending ephemeral wash runs through the center of the site, and several smaller, shallower drainages run parallel throughout the remainder of the site. T[redacted] Vegetation is sparse and includes creosote and saltbush, with 99% ground surface visibility. The site boundary will be avoided by vibroseis paths and source points by at minimum 31.5 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 9: CA-IMP-12900 (CN-13)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 200 m (NE/SW) by 150 m (NW/SE), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a sparse lithic scatter. Fourteen heavily weathered formal stone tools and six pieces of debitage were recorded at the site. Thirteen of the tools were in the southern half of the site. Low-lying sandstone outcrops, cobbles and gravels cover the site, which is crossed by northeast to southwest trending braided ephemeral washes and a deep wash. No features were observed. The vegetation at the site consists of sparse creosote and saltbush, providing 99% ground surface visibility during the survey. The site boundary will be avoided by vibroseis paths and source points by at minimum 58.1 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 10: CA-IMP-12901 (CN-14)
Description: Lithic scatter
Period: Unspecified Prehistoric period era
Dimensions: 95 m (NW/SE) by 50 m (NE/SW), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small lithic scatter containing three stone tools and 10 pieces of debitage. All of which are highly wind-adbraded. The scatter is extremely light, with 10 to 30 meters between each artifact. Scattered low sandstone outcrops and small braided ephemeral drainages cross the site. The terrain is relatively flat, and the soil is fine-grained silty sand with a variety of native cobbles on the surface, including sandstone, quartzite, and basalt. No features were identified. Vegetation consists of sparse creosote scrub and the ground surface visibility was 99%. A faint bladed road runs northeast to southwest through the site. The site boundary will be avoided by vibroseis paths and source points by at minimum 13.8 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 11: CA-IMP-6250 (CN-15)
Description: Temporary encampment
Period: Unspecified Prehistoric era
Dimensions: 333 m (NW/SE) by 160 m (NE/SW), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site includes the three pieces of debitage recorded in 1989 as CA-IMP-6250 but not seen during survey. The difference in quantity of identified cultural resources between the initial 1989 and 2016 survey can most likely be attributed to aeolian transport of sand and silts within the landscape. The choice to add CN-15 into CA-IMP-6250 was due to their close proximity. During the 2016 field season, an activity locus (Locus A), two thermal features (Features 1 and 2), 39 pieces of debitage (primarily quartzite with some Wonderstone, chert, and basalt) and 25 flaked and ground stone tools were recorded. No ceramics were observed. A low-lying tabular sandstone outcrop that may be a relic shoreline of Lake Cahuilla runs north-to-south in the eastern portion of the site, as well as several smaller sandstone outcrops. Several small shallow ephemeral washes trend east-to-west across the site. The soil is a fine silty sand covered with a variety of cobbles and gravels. Two bladed roads, one bulldozer push pile and several off-road tracks are also within the site. Ground surface visibility is 99% and little vegetation except saltbush is in the area. The site boundary will be avoided by vibroseis paths and source points by at minimum 20.6 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 12: CA-IMP-12902 (CN-16)
Description: Lithic scatter and rock piles
Period: Multicomponent: Unspecified Prehistoric era / historic? rock piles (may be related to historic road construction)
Dimensions: 260 m (NW/SE) by 110 m (NE/SW), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site consists of 41 small rock piles of unknown origin similar in size and shape to those found at site CN-19 (described below) located 200 meters to the northeast. All rock piles may either be modern, historic or possibly prehistoric. Although a few prehistoric artifacts were noted, the age of the rock piles is unknown. The site is on a desiccated lake flat west of a series of archaeological sites containing prehistoric cobble fish trap features. This site is bisected by [redacted] dirt roads that may have been bladed recently or during the historic era. Off-road use in this area is minimal. Some modern-looking scraping or ripping by a bulldozer was also noted inside the site boundary. The region bears extremely sparse creosote scrub and saltbush. Ground visibility during the survey was 100%. The site boundary will be avoided by vibroseis paths and source points by at minimum 24.4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been

exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 13: CA-IMP-12903 (CN-17)
Description: Fish trap site
Period: Possibly Late Prehistoric
Dimensions: 247 m (NW/SE) by 143 m (NE/SW), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is on a cobbly terrace [redacted] and consists of eight single-course or two-course rock alignments composed of granite and sandstone cobbles. The alignments resemble a "J" or a "V" and some have a gap in their centers, which are always downslope. These have been interpreted as fish trap foundations that were built in the shallows of Lake Cahuilla. The site also contains one rock circle, one ceramic potsherd, and four formal point-located stone tools; a quartzite edge-modified flake, an early stage chert biface, and a chert biface midsection and a core. Ground surface visibility during the survey was 99%, with vegetation including creosote, saltbush, and other desert scrub brush. Small washes cut through the site boundary and are slowly eroding it away. The site boundary will be avoided by vibroseis paths and source points by at minimum 46.9 meters.

Eligibility Recommendation
Because there is potential that prehistoric data is buried below the modern ground surface, this site is considered eligible to the NRHP under Criterion D and the CRHR under Criterion 4. The site is also considered eligible to the NRHP under Criterion A and the CRHR under Criterion 1 because it exhibits a fish trap and lies several miles northwest of the Southwest Lake Cahuilla Recessional Shoreline Archaeological District which was listed on the NRHP in 1999 under Criteria A and D. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 14: CA-IMP-12908 (CN-18)
Description: Fish traps with rock piles and a sparse artifact scatter
Period: Likely Late Prehistoric
Dimensions: 200 m (W/E) by 80 m (N/S), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site consists of three circular and semi-circular single-course rock alignments that are believed to represent fish trap foundations. One large tested cobble was also observed. The site is on a cobbled terrace between 35 and 40 feet bsl. Cobbles and boulders that were used to build the fish traps are predominately rounded to subrounded granitic rocks. There are about 16 small rock piles that do not appear to be associated with cultural activities scattered throughout the site; the piles may be related to WWII military activity/road building or possibly associated with fish trap construction. One "Prince Albert" tobacco tin was also observed, and seven potsherds tat retrofit into two large fragments were also noted. Ground surface visibility during the survey was 95%, with vegetation including sparse creosote and other types of desert scrub vegetation. The site boundary will be avoided by vibroseis paths and source points by at minimum 26 meters.

Eligibility Recommendation
Because there is potential that prehistoric data is buried below the modern ground surface, this site is considered eligible to the NRHP under Criterion D and the CRHR under Criterion 4. The site is also considered eligible to the NRHP under Criterion A and the CRHR under Criterion 1 because it contains fish traps and lies several miles northwest of the Southwest Lake Cahuilla Recessional Shoreline Archaeological District which was listed on the NRHP in 1999 under Criteria A and D. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 15: CA-IMP-12905 (CN-19)
Description: Fish trap and rock pile site
Period: Possibly Late Prehistoric
Dimensions: 675 m (SW/NE) by 180 m (NW/SE), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site contains several clusters of cobblestone fish trap foundations likely built from adjacent cobble outcrops. A total of 70 fish traps, generally shaped as arcs of various configurations, are located in six clusters or activity loci. This site is located on a low west to east finger ridge with northern and southern views of the ancient Lake Cahuilla lake surface. One additional set of weir features may be found at the extreme eastern end of the site; these can be seen on aerial photographs. A few flaked stones and potsherds are located inside the site boundary in aand near some of the features. No thermal features were observed. Crossed by two historic era dirt roads (both P13-14306), the site also exhibits a series of rock piles upstream from the weir features. The origin of the rock piles is unknown. For the purposes of recordation, the cobble weirs were placed into clusters (activity loci) based on their proximity to each other and relative topographic positions. A few of the artifacts and weir cobbles were partially encrusted with tufa, suggesting that this site may have been submerged after construction. The site boundary will be avoided by vibroseis paths and source points by at minimum 65.6 meters.

Eligibility Recommendation
Because there is potential that prehistoric data is buried below the modern ground surface, this site is considered eligible to the NRHP under Criterion D and the CRHR under Criterion 4. The site is also considered eligible to the NRHP under Criterion A and the CRHR under Criterion 1 because it exhibits fish traps and lies several miles northwest of the Southwest Lake Cahuilla Recessional Shoreline Archaeological District which was listed on the NRHP in 1999 under Criteria A and D. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 16: CA-IMP-12906 (CN-21)
Description: Temporary encampment
Period: Possibly Late Prehistoric era occupation
Dimensions: 230 m (NE/SW) by 90 m (NW/SE), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

The site is located in a slight depression near a shallow wash on a desiccated lake flat. This site consists of a potential thermal feature (Feature 1), a sparse lithic scatter, a few stone tools, and one buffware potsherd. Isolate P13-8565 is mapped inside the site boundary, however this previously recorded rimsherd was not observed during the survey. Ground surface visibility was 100% during

survey within an extremely sparse creosote and salt bush scrub environment. Topsoil is very silty-sandy and is subject to wind erosion. The site boundary will be avoided by vibroseis paths and source points by at minimum 3.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 17: CA-IMP-12907 (CN-22)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 73 m (NE/SW) by 30 m (NW/SE), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is comprised of three quartzite primary flakes within 40 meters of one another on an open alluvial plain with excellent visibility. No features were identified within the site boundaries. The site rests between two arms of a historic road network with a low slope to the south. The ground surface visibility was 100% during recordation. The existence of debitage could have resulted from testing nearby quartzite cobbles, which litter the low finger ridge to the north near the fish trap features of site CN-18 (CA-IMP-12908) and CN-19 (CA-IMP-12909). The site boundary will be avoided by vibroseis paths and source points by at minimum 62.3 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 18: CA-IMP-12908 (CN-23)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 84 m (N/S) by 60 m (W/E), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is comprised of three flaked stone tools within 40 m of one another on a flat with excellent visibility. There are no features. The site rests due north of a low ephemeral wash [redacted]. The tools were not accompanied by debitage or ceramics, which is uncommon for sites in this area. Vegetation within the site boundary consisted of very sparse creosote and survey ground surface visibility was 100%. The site boundary will be avoided by vibroseis paths and source points by at minimum 7.4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been

exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 19: CA-IMP-12961 (CN-24)
Description: Long-term encampment
Period: Likely Late Prehistoric era
Dimensions: 122 m (NE/SW) by 76 m (NW/SE), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This is a probable long-term encampment located near the northern cut bank of Tule Wash. Numerous stone tools, two thermal features, debitage and ceramics were recorded at the site. Feature 1 and Feature 2 are thermal features and Feature 2 is located inside Activity Locus 2. Locus 2 consists of an artifact scatter suggestive of many days of concentrated prehistoric activity. Activity Locus 1 is similar but smaller and contains no thermal features. Burned rock, both sandstone and granite, were noted across the site, as well as 15 pieces of debitage, 32 point-located stone tools and 12 ceramic body sherds. The site is located on a bench [redacted] and it has some minor off-road vehicle damage in the form of off-road tracks. The existence of ceramics and proximity to what was likely a drying Lake Cahuilla suggests the site was utilized as a long-term encampment sometime during the Late Prehistoric. The site boundary will be avoided by vibroseis paths and source points by at minimum 10.7 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 20: CA-IMP-12962 (CN-29)
Description: Short-term encampment
Period: Likely Late Prehistoric era
Dimensions: 49 m (N/S) by 40 m (W/E), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a prehistoric artifact scatter located on a sandy but eroding flat [redacted]. One thermal feature was observed. Artifacts observed included three stone tools, one buffware body potsherd and 15 pieces of debitage. These artifacts suggest that expedient use of local quartzite cobble materials for tools and cooking of foodstuffs was occurring on a limited basis. The total assemblage suggests the site was used as a short-term encampment. Ground visibility during the survey was 98% and the site is being impacted by wind-related erosion and an ephemeral wash to the northwest. The site boundary will be avoided by vibroseis paths and source points by at minimum 17.5 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield

information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 21: CA-IMP-12963 (CN-30)
Description: Short-term encampment
Period: Likely Late Prehistoric era
Dimensions: 65 m (N/S) by 102 m (W/E), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a prehistoric artifact scatter located on a flat [redacted] One thermal feature composed of burned stones was observed near the southern edge of the site, and a stone tool reduction activity locus was also recorded at the site. Artifacts identified include 12 stone tools, nine body potsherds, one rimsherd, and 95 pieces of debitage. The lithic materials suggest expedient use of local quartzite cobble materials for tools. No manos nor milling slabs, which would be suggestive of grinding and preparing food, were identified. The total assemblage suggests the site was used as a short-term encampment. Ground visibility during the survey was 98% and vegetation consisted of saltbush with occasional creosote. The site boundary will be avoided by vibroseis paths and source points by at minimum 20.7 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 22: CA-IMP-12964 (CN-31)
Description: Long-term encampment
Period: Likely Late Prehistoric era
Dimensions: 200 m (N/S) by 200 m (W/E), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is long-term encampment bearing two activity loci, two possible habitation foundations, and three thermal features (two of which are severely deflated). Located on a flat [redacted], a possible cremation area was located along the southeast edge of the site and the recorders were asked by a tribal monitor to not record this locus, which was centered near [redacted]. The stone habitation foundation (Feature 1) consist of two cleared areas in a linear bedrock outcrop with stone uprights and a shared “wall”. Located within a linear deposit of natural sandstone bedrock, a few point-located stone tools and potsherds were recorded in Activity Locus 1 in the western portion of the site. Two hearths that appear to be relatively intact, numerous tools including manos and milling slabs, and potsherds are recorded in Activity Locus 2. Artifacts between each locus were rare. The survey visibility was 99% and vegetation consisted of saltbush and rare creosote. The site boundary will be avoided by vibroseis paths and source points by at minimum 22.8 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield

information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 23: CA-IMP-12965 (CN-32)
Description: Short-term encampment
Period: Likely Late Prehistoric era
Dimensions: 269 m (NW/SE) by 116 m (SW/NE), with unspecified depth
Jurisdiction: California State Lands Commission/Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a short-term encampment bearing five possible thermal features, all of which are severely eroded. In addition, 26 stone tools and other point-located artifacts, 51 pieces of debitage and a few potsherds of uncertain type were recorded at the site. A soapstone sucking tube, deemed highly significant by the tribal monitor, was also recorded at the site. The site is located on a flat [redacted] that is being eroded by low developing wash tributaries. The ground survey visibility was 99% and vegetation consisted of saltbush and rare creosote. The site boundary will be avoided by vibroseis paths and source points by at minimum 59.6 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 24: CA-IMP-12966 (CN-33H)
Description: Historic-era bulldozed road
Period: Likely built post-1945
Dimensions: 1,450 feet (N/S) by 12 feet (W/E), no depth.
Jurisdiction: California State Lands Commission
NRHP/CRHR Eligibility Recommendation: Considered Potentially Ineligible but regarded as a historic property until a formal NRHP/CRHR evaluation can be completed.

A bulldozed dirt road and small can dump were recorded at this site. The road was created by bulldozing 1,450 feet of path running north-northwest to south-southeast. Slightly mounded shoulders flank the road on both sides, which ends abruptly at the south end at a low pushpile. Numerous unpaved roads and four-wheel drive and off-roading tracks crisscross this area. This road was recorded due to an associated scatter of historic-era cans. Survey visibility was 98%. The site boundary will be avoided by vibroseis paths and source points by at minimum 8.1 meters.

Eligibility Recommendation
This resource does not appear eligible for the NRHP and the CRHR under Criterion D/4 nor under Criterion A/1 due to lack of associated evidence with the nearby historic-era Salton Test Base. Although the integrity of the site is considered good, buried historic features are not likely to occur thus the description has exhausted the potential data set. Despite these concerns, this resource should be treated as a historic property until formal NRHP/CRHR evaluation can be completed.

Site 25: CA-IMP-12967 (CN-34)
Description: Cairns and lithic scatter
Period: Unspecified Likely Prehistoric era
Dimensions: 46 m (N/S) by 42 m (W/E), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site contains several possibly prehistoric cairn features and associated lithic scatter located on a slightly dissected flat [redacted] between two low and ephemeral drainages. Four tumbled (these were likely stacked with several courses at one time) rock features were identified. According to the tribal monitor, their locations form a triangle that could have been visualized prehistorically creating potentially significant point-to-point symbolic orientation and meaning. Artifacts included four stone tools and one primary flake. If the tumbled rock stacks once bore meaning as a geoglyph, the site might be considered ceremonial. Survey visibility was 98% and the area bears sparse creosote and saltbush. Off-roading impacts are minimal in this area. The site boundary will be avoided by vibroseis paths and source points by at minimum 53.2 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 26: CA-IMP-12968 (CN-35)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 42 m (W/E) by 22 m (S/N), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a very small lithic scatter located on a slightly dissected flat south and east of the collapsing bank of an unnamed wash. Artifacts included one stone tool and several pieces of quartzite debitage. The size of the site suggests that the area had been used on occasion for expedient tool manufacturing from local cobble deposits. Ground visibility during the survey was 98% with saltbush and the occasional creosote. The north edge of the site is directly adjacent to an ephemeral wash that was noted to be about two meters deep with cut banks in some locations near the site, but no artifacts were identified within the wash floors. The site boundary will be avoided by vibroseis paths and source points by at minimum 11.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 27: CA-IMP-12969 (CN-36)
Description: Large lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 195 m (W/E) by 150 m (S/N), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a lithic scatter located between two very ephemeral washes and on a slightly dissected flat [redacted]. Thirty-one stone tool point locations and 88 pieces of mostly quartzite debitage were identified. Minimally impacted by off-road activity, the site exhibits low eroded tabular sandstone and a gravelly surface with sands and silts. This site lacks features and ceramics, which is uncommon because this site bears a comparatively large number of artifacts. Survey visibility was 99% and the site bears saltbush and the occasional creosote. The site boundary will be avoided by vibroseis paths and source points by at minimum 105.2 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 28: CA-IMP-12970 (CN-37)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 258 m (N/S) by 118 m (E/W), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small lithic scatter located just east of an unnamed ephemeral wash. It bears one thermal feature, two concentrations of burned sandstone and fire-altered quartzite cobbles that may represent two highly deflated thermal features, 35 pieces of debitage, and six stone tools. No pottery was observed. The size and nature of the site suggests that the area was being used prehistorically for expedient tool manufacturing due to the occurrence of sparse cobble deposits within older alluvium. Visibility during the survey was 100% and very little vegetation is located inside the site boundary except for a few creosote bushes. The site boundary will be avoided by vibroseis paths and source points by at minimum 4.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 29: CA-IMP-12971 (CN-38E)
Description: Artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 220 m (W/E) by 140 m (S/N), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a prehistoric artifact scatter on desiccated lakebed. A total of 33 stone tools, four rimsherds, 87 pieces of debitage/tested cobbles and 12 body potsherds were identified at the site. No features were identified. The site is located on the west edge of an ephemeral unnamed wash and lies on a flat [redacted]. Affected by multiple small washes that have cut through the site, this resource is located between two very large probable village sites, CN39E and CN41, and could be directly associated with them. Ground visibility during the survey was 99% and vegetation was limited to saltbush, the occasional creosote bush and recently deceased mesquite in deflating hummocks. The site boundary will be avoided by vibroseis paths and source points by at minimum 43.4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 30: CA-IMP-12972 (CN-38W)
Description: Probable habitation site
Period: Likely Late Prehistoric era
Dimensions: 46 m (W/E) by 28 m (S/N), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This is a probable habitation site bearing stone tools and numerous potsherds. Two features were observed: a probable habitation foundation and a small ring of sandstone slabs. Resting on a low sandstone ridge, the slabs of the habitation and slab ring have been lifted upright, used for construction, then subsequently collapsed. A few slabs remain completely upright. No thermal features were identified. The artifact assemblage is varied, including possibly two types of ceramics, and numerous grinding stones. The site is in an area with a few scattered creosote bushes. It is subject to extreme wind erosion and has had some off-roading damage. It is located west of a modern designed to shunt water [redacted]. Because of this, the area is eroding, and gullying may soon destroy the site. Survey visibility was 100%. The site boundary will be avoided by vibroseis paths and source points by at minimum 33.8 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 31: CA-IMP-12973 (CN-39E)
Description: Probable village site
Period: Late Prehistoric era
Dimensions: 930 m (NW/SE) by 500 m (NE/SW), with unspecified depth
Jurisdiction: Private/California State Lands Commission
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

The resource is a probable Late Prehistoric village site located on a gravelly, sandstone bedrock covered plain [redacted]. Crossed twice during the 2016 field season by a large contingent of archaeologists and tribal monitors, but not observed in their 50-foot survey corridors, the area was revisited in 2018 and the site was discovered. Wind erosion appears to have removed much of the original prehistoric sand dune environment (Lake Cahuilla beach strand) when this site area was occupied, leaving small remnants of the dunes and many of the artifacts and features behind. The occupational loci are separated by narrow eroded areas that are artifact-free. Taking weeks to record, POWER surveyors and recorders found gaps of resource-free space for vibroseis use between this and other sites in this area, including CN-31 (CA-IMP-12964), RK-3, RK-4 and RK-5N (CA-IMP-17667, -8 and -9), [redacted]. It is possible these all formed from one huge site, and that wind and water erosion has created sterile space between each site boundary.

The [redacted] forms much of the eastern border of the site and artifact and tool deposits seem to gradually decrease as this road is reached. Construction of the [redacted] appears to have damaged the eastern side of this site, has damaged this site, and easy access to this site because of road access has possibly caused site elements to be removed by the public. The site bears seven activity loci which were characterized by a combination of features and dense artifact scatters in close contact. A total of 28 features were recorded including hearth/deflated hearths, cremations, cairns, purposefully cleared areas within sandstone bedrock outcrops, possible habitation foundations, and a few possible fish traps (which may be habitation foundations). Tribal monitors consider the site highly significant and several areas may have been related to ceremonial duties. Utilizing an approved random block-tally system to estimate non-tool debitage and ceramic body sherd counts, it is estimated that there are more than 1000 non-tool debitage and ceramic body sherds within the site boundary. At current analysis, 565 individual point located artifacts were identified including formal stone tools, ground stones, mammal and fish bones, possible human bones, rimsherds, and shell artifacts. Only one or two projectile points were identified, although collector's piles were observed at the site and therefore removal of artifacts is likely. Ground surface visibility was 99% and vegetation is sparse including creosote and saltbush. Bedrock outcrops are numerous, there are a few remnant sand dunes and mesquite hummocks. Off-roading tracks are common and clear in the sandy parts of the site. It is also likely that the [redacted] has been picked of artifacts over the decades, but none were observed east of this road. The site boundary will be avoided by vibroseis paths and source points at the [redacted] by at minimum of 5.3 meters.

Eligibility Recommendation

This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair to poor and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 32: CA-IMP-12974 (CN-39W)
Description: Large encampment and possible ceremonial center
Period: Likely Late Prehistoric era
Dimensions: 520 m (N/S) by 320 m (E/W), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This large site represents a deflated but large encampment or possible village that probably developed after the last infilling of Lake Cahuilla. Although there are no sandstone uprights or slab features suggestive of habitation foundations, there are several deflated hearths, numerous potdrops and ceramic scatters, many stone tools, and cremated human remains. Monitors regarded this site as a ceremonial center and the 2018 recordation was truncated at their request. Four Activity Loci were defined, and four deflated features were recorded. The site bears 233 point-located artifacts (potsherds, stone tools, ground stones and unique objects), and many additional potsherds and ground stones. The possibility of unexposed cremated human remains within this site is considered good. The site contains many pieces of fire-altered rock, granitic gravels, and ground stones that had been cracked in fire. Many of the artifacts have been weathered by sandblasting. The site rests on a sloping flat [redacted]. The flat and banks of the wash are dissecting and are now cutting into the loci and features. Survey visibility was 100% and vegetation consisted of saltbush and the occasional creosote. The site boundary will be avoided by vibroseis paths and source points by at minimum 18.7 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 33: CA-IMP-12975 (CN-41)
Description: Probable village site
Period: Late Prehistoric era
Dimensions: 1,650 m (N/S) by 500 m (E/W), with unspecified depth and narrowing of the site boundary at the north end
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

The resource is a probable Late Prehistoric village site located in a sand dune complex [redacted] Most of the recorded activity loci are found in these dunes, and the site density gradually declines to the east where a sandy flat and numerous other small prehistoric sites are located. Clear sterile gaps between CN-41 and the other sites to the east, namely CN-55, CN-47, CN-46, CN-58, CN-53, CN-54 and CN-49, do exist and could be driven by vibroseis buggies. Sand hummocks bearing healthy mesquite as anchors are common in this area and have done much to protect the site from erosional harm. Wind erosion does not appear to have removed much of the original sand dune environment (a Lake Cahuilla beach strand here is likely) when this site area was occupied, but water erosion and site visitation by the public on off-road vehicles may have caused some damage after abandonment.

Taking weeks to record and due to its sheer size, not all parts of the southeastern-most quadrant of this site were specifically examined, but the full site boundary was clearly and definitely demarcated: the site's artifact scatter density declined substantially once the western dune section was left and

surveyors travelled east. The site bears twelve activity loci which were characterized by a combination of features and dense artifact scatters in close contact. A total of 50 Features were recorded including hearth/deflated hearths, cremations, cairns, purposefully cleared areas within sandstone bedrock outcrops, possible habitation foundations, a few possible cobblestone fish trap foundations (which may also be decomposed habitation foundations). Tribal monitors consider the site highly significant and several areas may have been related to ceremonial duties: recordation was truncated at their request at certain places bearing human remains (a large possible burial ground was observed at the request of the MLD [Carmen Lucas] in January 2018 [redacted]). Seven hundred individual point located artifacts were identified including formal stone tools, ground stones, mammal and fish bones, possible human bones, rimsherds, personal items, and shell artifacts.

An estimate of the total amount of debitage and ceramic body sherds was made based on average count of such items from all loci, with extrapolation based on the total site acreage. It is believed that well over 3,000 ceramic body sherds and debitage are located on this site and all material types are represented including the ubiquitous quartzite derived from local cobbles plus, basalt, obsidian, cherts and Wonderstone. Current analysis shows that only three projectile points occur on this large site and all are late styles (Cottonwood). There are a few collector's piles, but no apparent digging pits were observed. Survey and recording visibility was 95% and vegetation is sparse including creosote, saltbush and many mesquite hummocks. Bedrock outcrops are non-existent. Off-roading tracks are common. On private land, this site may be protected from collecting harm because the dunes [redacted], a common off-road thoroughfare, hide the site from casual discovery. The site boundary will be avoided by vibroseis paths and source points by at minimum 9.2 meters, but most of the vibroseis travel will occur on the floors of nearby washes where the site lies above the floor of the wash on the dunal area.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 34: CA-IMP-12976 (CN-46)
Description: Short-term encampment
Period: Possible Late Prehistoric era
Dimensions: 160 m (N/S) by 90 m (E/W), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a prehistoric artifact scatter on a flat surrounded by nearby sand dunes that have been anchored by mesquite. Three deflated hearths were observed and one large rimsherd broken into several pieces was detected. Fifteen point-located stone tools, a rimsherd, and four pieces of debitage were also identified. There is one low ephemeral wash crossing this site and no discernable off-roading impacts. The site bears creosote, some mesquite, saltbush, low gravel bars, and six-foot-tall tall sand dunes to the north, west and east. Ground surface visibility was 99 percent across the site. The site boundary will be avoided by vibroseis paths and source points by at minimum 8.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield

information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 35: CA-IMP-12977 (CN-47)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 170 m (E/W) by 82 m (N/S), with unspecified depth.
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a prehistoric lithic scatter on a flat surrounded by nearby sand dunes that have been anchored by mesquite. There are a few ephemeral washes crossing this site. Neither features nor ceramics were identified. Fourteen stone tool point locations and five pieces of debitage were observed. The site is a temporary camp lying 400 meters east of village site CN41 and 150 meters southwest of a large encampment known as CN-55. The site may represent expedient collecting of local quartzite cobbles for tool manufacture. Survey visibility was 98% and the site bears creosote, mesquite, and what appear to be saltbush. Low gravel bars and tall mesquite-anchored dunes to the north, west and east. Off-road activity on the site is considered occasional but rare. The site boundary will be avoided by vibroseis paths and source points by at minimum 9.3 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 36: CA-IMP-12978 (CN-48)
Description: Artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 200 m (NE/SW) by 90 m (NW/SE), with unspecified depth and the scatter likely continues to the northwest and out of the formal Truckhaven study area
Jurisdiction: Private/BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a prehistoric artifact scatter located on a lightly dissected flat east of Campbell Wash. Recordation stopped 50 meters beyond the project area because POWER did not have permission to cross onto land that Ormat has not gotten trespassing rights for. Per the Work Plan, recordation stopped when sites fell outside the original project area boundary by 50 meters. It is assumed that the scatter extends further to the east and northeast. Twenty-two stone tools were point-located, 33 pieces of debitage were observed, and seven unclassified body sherds were also noted. No features were identified. Lightly impacted by off-roading activity, the site exhibits low eroded tabular sandstone bedrock outcrops and a gravelly surface with sands and silts. It bears a few substantive mesquite hummocks which anchor dunes and there is more mesquite to the northeast that can be observed on modern satellite photographs. Survey visibility was 95%. The site boundary will be avoided by vibroseis paths and source points by at minimum 146.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield

information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 37: CA-IMP-12979 (CN-49)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 180 m (NE/SW) by 105 m (NW/SE), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a prehistoric lithic scatter located on a lightly dissected flat [redacted]. Seven stone tool point locations and 12 pieces of debitage were observed. No ceramics nor features were identified. Lightly impacted by off-road travel, the site exhibits low eroded tabular sandstone and a gravelly surface with sands and silts. It lacks substantive mesquite-anchored dunes; these are located nearby, and these areas tend to contain significant numbers of features. One small dune near the eastern site boundary was anchored by mesquite. A small low wash crosses the northern boundary, but the site is hemmed by ephemeral washes to the northwest and southeast. Survey visibility was 100% and most of the vegetation consisted of rare creosote and saltbush. The site boundary will be avoided by vibroseis paths and source points by at minimum 6.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 38: CA-IMP-12980 (CN-50)
Description: Probable habitation site
Period: Late Prehistoric era
Dimensions: 150 m (N/S) by 83 m (W/S), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a probable prehistoric habitation site and artifact scatter located in an area with mesquite hummocks, natural sandstone outcrops and low dunes. There are two separate activity loci, each with a run of four circular clusters of native sandstone slabs bearing a relatively clear void in the center. The features appear to have been made by pulling sandstone slabs upward from the native bedrock and forming circular habitation foundations. Most have east-facing “openings” or gaps in the feature. There are many point-located stone tools, including a Desert Side Notch point, milling slabs and at least one mano. At minimum eight different ceramic vessels were seen, many body sherds (oxidized buff to red and buff) and some debitage. Off-road travel impacts can be seen nearby but the site had no tracks running through it. It bears a few substantive mesquite plants anchoring dunes at the north end of the site and there are more to the east and west that can be observed on modern satellite imagery. Overall, the site suggests a Lake Cahuilla beach strand habitation site during the Late Prehistoric that has been protected from wind damage by the mesquite hummocks. It is possible that more artifacts and features carry east as the recorders were working at the easternmost limits of the formal Truckhaven project area. The site boundary will be avoided by vibroseis paths and source points by at minimum 245.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 39: CA-IMP-12981 (CN-51)
Description: Lithic quarry and core reduction site
Period: Likely Late Prehistoric era
Dimensions: 510 m (N/S) by 290 m (W/S), with unspecified depth
Jurisdiction: Private/California State Lands Commission/California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This is a large widely scattered artifact scatter that appears to be a quartzite cobble core collection and primary flake reduction site. More than 60 stone tools and 116 pieces of debitage including many tested cobbles were identified. Many unaltered quartzite cobbles can be seen eroding out of arroyos and flats in this area. No grinding slabs nor metate fragments were seen and only two manos and a few pieces of ceramics were identified. Two thermal features were observed and each appeared eroded. Very little vegetation exists in this area and the ground is very flat with a few ephemeral washes. The southwest portion of the site lies near the State Route 86 fence and that portion has suffered from off-road traffic and modern trash deposits tossed from passing cars. Before being truncated by State Route 86, the site may have run southwestward into site RK-10. Due to a lack of clearly diagnostic artifacts and the difficulty of discerning between quartzite gravels and true flakes, this site has been repeatedly missed by compliance archaeologists including Caltrans-sponsored crews. Survey visibility was 100% and a few creosote bushes were located inside the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 7.2 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 40: CA-IMP-12982 (CN-53)
Description: Artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 81 m (NW/SE) by 25 m (SW/NE), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small prehistoric artifact scatter on a flat surrounded by nearby sand dunes anchored by mesquite. Four stone tool point locations and four sets of rim/body potsherds suggestive of a large fragmented vessel broken into several refittable pieceswere observed. No features were identified. There are a few very small ephemeral washes crossing this site and one enlarging wash to the southeast that generally drains toward the northeast. Ground surface visibility was 98%. The site bears creosote, mesquite, and what appear to be saltbush, low gravel bars, and taller mesquite-anchored dunes to the west and east. The site boundary will be avoided by vibroseis paths and source points by at minimum 15.1 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 41: CA-IMP-12983 (CN-54W)
Description: Artifact scatter
Period: Possible Late Prehistoric era
Dimensions: 133 m (N/S) by 126 m (W/E), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small artifact scatter located adjacent to a low ephemeral wash. Fourteen pieces of debitage, five stone tools and one potsherd were recorded at the site. No features were identified. The size and nature of the site suggests that the flats near large sand dune site CN-41 was being used prehistorically for expedient tool manufacturing due to the occurrence of sparse cobble deposits within exposures of older alluvium. Creosote and saltbush occur in the site boundary and cutting into the southeast part of the site has begun by the wash to the southeast. Survey and recording visibility was 95%. The site boundary will be avoided by vibroseis paths and source points by at minimum 7.2 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 42: CA-IMP-12984 (CN-55)
Description: Artifact scatter and possible burial ground
Period: Late Prehistoric era
Dimensions: 425 m (N/S) by 450+ m (W/E), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a large artifact scatter on a gentle flat within and surrounded by sand dunes anchored by mesquite. There is evidence of one human burial lacking a definitive mortuary context (Feature 3: POWER was not allowed to record this area by the tribal monitor) and a possible cremation area (Locus 1) in the southwest quadrant which (according to the tribal monitor) held personal artifacts but no human bones therein. A deflated thermal feature is located inside Locus 1 and one stacked rock feature was also identified. One possibly modern thermal feature was detected in the northeast quadrant. The site probably extends to the east outside the survey area. More than 100 point-located tools, ceramics, and unique artifacts were found in the dunes and flats plus more than 150 pieces of debitage. There are a few ephemeral washes crossing this site [redacted]. The site bears creosote, mesquite, saltbush, low gravel bars. Taller dunes can be observed to the south and southwest, but the site appears to represent the most northern use area in the dunes [redacted] with a low central wash extending out of the site to the north. Recordation of Feature 3 was truncated at tribal request. The site boundary will be avoided by vibroseis paths and source points by at minimum 38.3 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 43: CA-IMP-12985 (CN-56)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 75 m (NE/SW) by 50 m (NW/SE), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small prehistoric artifact scatter on a flat surrounded by nearby sand dunes anchored by mesquite. Neither features nor ceramics were detected. Ten stone tool points and two pieces of debitage were observed. There are a few very low ephemeral washes crossing this site and it bears creosote, mesquite, and what appear to be saltbush, low gravel bars, and taller dunes to the north, west and east. The site boundary will be avoided by vibroseis paths and source points by at minimum 11.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 44: CA-IMP-12986 (CN-58)
Description: Small encampment
Period: Unspecified Prehistoric era
Dimensions: 295 m (NW/SE) by 47 m (NE/SW), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small dispersed prehistoric lithic scatter with a single thermal feature. Ten stone tools and two pieces of debitage were identified. No ceramics was identified. Located on a flat with gentle undulations located between north-south rows of sand dunes anchored by mesquite, there are a few ephemeral washes crossing this site as the site is rather linear. The site bears creosote and what appear to be saltbush, low gravel bars, and mesquite in the distance west and east. Survey visibility was 98%. The site boundary will be avoided by vibroseis paths and source points by at minimum 5.5 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 45: CA-IMP-12987 (CN-59)
Description: Temporary camp
Period: Likely Late Prehistoric.
Dimensions: 295 m (NW/SE) by 47 m (NE/SW), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a prehistoric artifact scatter with one activity Locus and four probable deflated hearth features located on a flat between north-to-south rows of sand dunes that have been anchored by mesquite. There is one activity locus containing a dense scatter of artifacts in the eastern part of the site, a sandstone tabular and rock cluster of unspecified purpose and three deflated thermal features. There are 22 stone tool point locations, 43 pieces of debitage and six point-located rimsherds. Minimally impacted by off-road vehicle use, the site exhibits many large potsherds and a clean pebbly surface with blow sands and silts. The site bears creosote and what appears to be saltbush, low gravel bars, and mesquite on the periphery. It lacks substantive dunes; these are located east and west. Ground surface visibility during the survey was more than 95%. The site boundary will be avoided by vibroseis paths and source points by at minimum 21.8 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 46: CA-IMP-12988 (DM-3)
Description: Artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 193 m (NW/SE) by 80 m (SW/NE), with unspecified depth
Jurisdiction: Private/BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a prehistoric artifact scatter on a flat [redacted]. The 2016 fieldwork identified a few pieces of debitage and a Cottonwood triangular projectile point made of finely flaked crystal quartz. Additional survey in 2018 revealed a few potsherds and two additional stone tools, with a slight extension of the site perimeter to a point just inside the SVRA boundary. No features were identified. The site is located west of the southern portion of the Salton City development and is subject to arroyo damage and wind erosion. There is almost no vegetation and survey and recording visibility was 99%. Off-road vehicle use in this area is common, but no tracks crossed this site. The site boundary will be avoided by vibroseis paths and source points by at minimum 22.7 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 47: CA-IMP-12989 (DM-4)
Description: Large encampment
Period: Likely Late Prehistoric era with possible early component
Dimensions: 59 m (W/E) by 170 m (N/S), with unspecified depth
Jurisdiction: Private.
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

Two activity Loci and four features were identified at this site on a wind-scoured flat [redacted]. Locus 1 contains several point-located stone tools and three deflated hearths (Features 1, 2 and 3). Locus 2 is a tool manufacturing area bearing numerous flakes taken from a single quartzite cobble. Feature 4 is an isolated deflated thermal feature located in the far eastern section of the site. This resource bears a unique and rare artifact: a bear-shaped flaked chert object (Artifact 55 was discovered by Frank Salazar, Campo monitor) that has been classified as a bear-shaped crescent. No ceramics and many ground stones were observed site-wide. Ground surface visibility during the survey was 100% and little vegetation occurs within the site boundary. Originally recorded during the 2016 POWER Truckhaven field season, an attempt was made in 2018 to survey the south side of the original site for new vibroseis pathways but additional artifacts were discovered on the new path routes, which were subsequently abandoned. The site boundary will be avoided by vibroseis paths and source points by at minimum 31.2 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 48: CA-IMP-12909 (DM-6)
Description: Small lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 80 m (N/S) by 60 m (W/E), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small lithic scatter on a flat [redacted]. Two quartzite choppers, a sandstone metate, one rhyolite scraper, and one chert scraper were identified at the site. Debitage, including three non-cortical quartzite flakes, two non-cortical chert flakes, a semi-cortical quartz flake and one piece of non-cortical quartz shatter was also observed. No features were identified, and no artifacts were determined diagnostic. The site is subject to water and wind erosion. Off-road vehicle use in this area is common. Visibility during the survey was 99% and the site exhibited a very sparse creosote bush scrub vegetation. The site boundary will be avoided by vibroseis paths and source points by at minimum 43.4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 49: CA-IMP-12910 (DM-8)
Description: Cairn site and lithic scatter
Period: Possibly Late Prehistoric period
Dimensions: 185 m (N/S) by 75 m (W/E), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site consists of 10 cairns of possibly prehistoric age, two purposely cleared circles at the top of a low knoll, two slab ring features, and a small associated debitage and tool scatter. No ceramics were observed. The site is a low but prominent knoll covered in tabular sandstone outcrops [redacted]. Nine of the cairns are dry-laid stacked rock structures/cairns uniform in construction. They are roughly square, average 1.7 m to a side, and are approximately 1.0 m in height. Eight of the 10 cairns roughly frame the entire knoll. Two sandstone slab rock circles were also identified plus a rough square feature outlined with a single course of large slabs. Many of the slabs were clearly moved after tufa had been deposited upon them. Visibility was 99% and very sparse creosote bush scrub was present. The knoll is framed by shallow washes. These cairns can be observed utilizing high-quality satellite imagery. The site boundary will be avoided by vibroseis paths and source points by at minimum 16.3 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 50: CA-IMP-12911 (DM-9)
Description: Small lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 7 m (N/S) by 5 m (W/E), with unspecified depth
Jurisdiction: California State Lands Commission
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small lithic scatter [redacted] just west of an existing water pipeline. This site consists of one stone tool and two pieces of quartzite debitage in a 7 meter (N/S) x 5 meter (E/W) area. No lithics or features were identified at the site. Vegetation is very sparse, and the flat upon which the site rests is slowly becoming rilled and windblown. There is no vegetation inside the site boundary and visibility was 100%. Off-roading activity is substantial in this area. The site boundary will be avoided by vibroseis paths and source points by at minimum 2.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 51: CA-IMP-12912 (DM-22)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 17 m (N/S) by 10 m (W/E), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small lithic scatter [redacted] just west of an existing water pipeline. This site consists of one stone tool and two pieces of quartzite debitage. The edges of each artifact appear dulled by wind abrasion. No ceramics or features were identified.. Vegetation is very sparse, and the flat is slowly becoming rilled and windblown and there was 100% visibility during the survey. Off-road use is substantial in this area. The site boundary will be avoided by vibroseis paths and source points by at minimum 3.3 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 52: CA-IMP-12913 (KRM-14)
Description: Temporary encampment
Period: Likely Late Prehistoric era
Dimensions: 230 m (NE/SW) by 170 m (NW/SE), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

The resource likely represents a long-term encampment [redacted]. The site is located on a low bench [redacted] east of a smaller unnamed wash. This area was likely near a finger of water that extended into the arroyo as Lake Cahuilla dried. The site consists of three Activity Loci in the western portion and three potdrops in the northeast quadrant. Locus A contains six deflated thermal features with 15 stone tools and one large body sherd. Locus B contains a lithic reduction area with two stone tools and a Cottonwood dart point. Locus C contains one thermal feature with three stone tools. Site-wide, 67 pieces of debitage were recorded. Vegetation in this area consists of a sparse creosote bush scrub affording 99% ground surface visibility. The site boundary will be avoided by vibroseis paths and source points by at minimum 3.7 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 53: CA-IMP-12914 (KRM-15)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 173 m (NW/SE) by 147 m (NE/SW), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

The site is a large dispersed lithic scatter containing five formal tools and 21 pieces of debitage. One lithic tool reduction locus, Activity Locus A, was recorded in the northern portion of the site south of and adjacent to a swale that forms northeast corner site boundary. Three pieces of debitage and a stone tool were recorded on a sandy rise north of the swale. Scattered cobbles and rocks were identified across the site. The formal tools recorded at the site include three quartzite cores, one quartzite scraper and one milky quartz bidirectional core. No ceramics was observed. The site is on a dissected lake flat with almost no vegetation [redacted] and ground visibility during the survey was 100%. The site boundary will be avoided by vibroseis paths and source points by at minimum 22.2 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 54: CA-IMP-12914 (KRM-16)
Description: Artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 81 m (N/S) by 62 m (E/W), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a diffuse lithic scatter consisting of seven quartzite flakes and one basalt multi-directional core. Four brownware ceramic sherds were also found. No features were identified. The site is located on a bench [redacted]. The landscape is windblown and has been impacted by frequent off-road vehicle use. Ground surface visibility during the survey was 99%, and sparse ambrosia and saltbush were the only vegetation encountered in the site. The site boundary will be avoided by vibroseis paths and source points by at minimum 8.6 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 55: CA-IMP-12918 (KRM-17)
Description: Probable small village or temporary encampment
Period: Likely Late Prehistoric era
Dimensions: 180 m (N/S) by 200 m (E/W), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a large lithic and ceramic scatter with thermal features that may reflect a village or long-term habitation. [redacted] there are two activity loci, Locus A and Locus B. Locus A contains six thermal features and two potdrops. Locus B contains one thermal feature. Artifacts recorded at the site include 167 pieces of debitage and 178 potsherds of both buffware and brownware oxidized (or slipped?) to cream, red, purple, and brown exterior colors. Fifty-seven point located artifacts were recorded including whole and fragmentary metates, manos, rim sherds, scrapers, hammerstones, choppers, cores, a pecking stone and spokeshaves. Lithic material types included quartzite, basalt, Wonderstone, obsidian, quartz and chalcedony. Spalls of and on certain potsherds indicate that the site may have been the location of ceramic production (firing) features. Heat spalls on many lithic artifacts were noted; these were possibly being heat treated for flint knapping and/or could reflect heating of cobbles composed of similar materials. [redacted]. The landscape is very windblown with much off-roading use in this area. Ground survey visibility was 99% due to a lack of vegetation. Sparse ambrosia and saltbush were the only vegetative types observed within the site. The site boundary will be avoided by vibroseis paths and source points by at minimum 12.4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 56: CA-IMP-12917 (KRM-18)
Description: Short-term encampment
Period: Likely Late Prehistoric era
Dimensions: 110 m (N/S) by 73 m (E/W), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a large lithic and ceramic artifact scatter west of the floor of Tule Wash on a windy plain [redacted]. Two activity loci were identified. Locus A contains numerous artifacts plus a pile of artifacts left by a collector/looter. A total of 18 pieces of debitage was identified, most of which lay outside the two Loci, plus 31 ceramic body sherds and two rimsherds. Feature 1, located in Locus A, is a thermal (hearth) feature bearing burned rock and charcoal eroding out from the sediments. The landscape is very wind-blown and there is abundant evidence of off-road vehicle use. Survey visibility was 99% amid very sparse ambrosia and saltbush. The site boundary will be avoided by vibroseis paths and source points by at minimum 13 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 57: CA-IMP-12918 (KRM-19)
Description: Probable long-term encampment
Period: Likely Late Prehistoric era
Dimensions: 70 m (N/S) by 78 m (E/W), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a long-term encampment [redacted] on a deeply eroded relict lake bed. The site contains ground stone, ceramics, lithic tools, cores and debitage. Sixteen lithic tools were identified and included two metate fragments and a fine pestle fragment, seven hammerstones, a small spokeshave style scraper, a small chopper or pecking stone, and a core which exhibits utilization as a hammer or pecking stone. One granitic digging tool was also observed. One core and one core fragment are also present, as well as 23 pieces of debitage and 19 body sherds. A potdrop was recorded at the site. The landscape is very windblown with much local off-road use. Survey visibility was 99% with only saltbush observed inside the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 77 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 58: CA-IMP-12919 (KRM-20)
Description: Small artifact scatter
Period: Possible Late Prehistoric era
Dimensions: 25 m (N/S) by 5 m (E/W), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site consists of one piece of debitage and two buffware body sherds. The landscape is very windblown with much off-roading use in this area. Survey visibility was 100% and no features were observed. The site boundary exhibits washes cutting through fine silts and sand [redacted]. Sparse creosote and saltbush were observed at the site. The site boundary will be avoided by vibroseis paths and source points by at minimum 35.5 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 59: CA-IMP-6248 update
Description: Sandstone cairn features and upright slabs with a sparse debitage scatter
Period: Unspecified prehistoric period (cairns may be modern)
Dimensions: 335 m (NW/SE) by 130 m (NE/SW), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

First recorded in 1989 without the benefit of GPS, this site is a dispersed set of 16 stacked or upright sandstone features with a few lithic artifacts. Cairns similar to those described in the 1989 site form were identified during the Truckhaven survey. A new enlarged site boundary was developed that extended the site northwest from the original plot. The site is predominantly located on bare sandstone or a thin layer of aeolian sediment. POWER staff recorded all the stacked rock features in a new portion of the site boundary which extended northwest from the original 1989 boundary. It is unknown if each stacked rock feature is prehistoric, historic or modern. Some may be related to off-road use. The site is in an area with very little vegetation and visibility was 100%. Ten pieces of debitage and 15 point-located stone tools and cores were recorded in 1989; POWER recorded eight pieces of debitage in the extended site boundary. One isolated quartzite flake (P13-6261) is inside the site boundary and was added to the total. The site boundary will be avoided by vibroseis paths and source points by at minimum 40.3 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 60: CA-IMP-6249 update
Description: Artifact scatter
Period: Likely Late Prehistoric era
Dimensions: Roughly 254 m (N/S) by 132 m (E/W), with unspecified depth
Jurisdiction: BLM/Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

In 1989, two flakes and one core both of brown quartzite were identified at this site without the advantage of GPS. These artifacts were not relocated during the 2016 field season, possibly due to the construction of a proposed access road that was described in the original site record forms. The site was re-examined in 2017 as part of the Truckhaven Wells study APE (see POWER 2018), portions of which overlapped the 1989 site boundary plot. Approximately 10 primary and secondary quartzite, chert, and rhyolite flakes and a concentration of seven ceramic sherds were observed by POWER staff in 2017. No features were identified. A northeast to southwest trending braided ephemeral drainage bisects the site. A graded road runs along the north side of the previously recorded site section. Topsoil is fine-grained, somewhat silty sand. The terrain is flat, with small cobbles and gravels, and sandstone outcrops are in the vicinity. Vegetation is very sparse and includes salt bush and bursage. Ground visibility during the survey was 99%. The site boundary will be avoided by vibroseis paths and source points by at minimum 15.4 meters.

Eligibility Recommendation
The resource appears eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and additional buried features may not yet have been exposed to view by

natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. The original site boundary from 1989 was checked and no artifacts are located inside the 1989 site plot.

Site 61: CA-IMP-7748 update
Description: Possible small habitation site with a sparse debitage scatter
Period: Likely Late Prehistoric era
Dimensions: 70 m (NW/SE) by 33 m (NE/SW), with unspecified depth
Jurisdiction: California State Lands Commission
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

The original plot of this previously recorded site was provided to POWER by the SCIC (the DPR form was dated 1998), and upon visiting this area, the site was a clearly misplotted as to location:it had been plotted 30 meters northwest of the features POWER staff observed. In 1998, five sandstone rock alignment features were recorded at the site, as well as a few pieces of quartzite debitage, a mano and one brownware potsherd. [redacted] one feature (Feature D, a sandstone alignment) may have been destroyed by [redacted] road blading. Two sandstone circles (Features A and B) are southwest of the [redacted] road cut: Feature A is three meters southwest and Feature B is 10 m southwest of the bladed [redacted] road berm. The artifacts that were recorded in 1989 were not relocated. Note that during the Truckhaven 3-D Seismic project, the seismic vehicles will have to utilize the furthest [redacted] road segment (a fully disturbed fiber optic cable excavation scar) to bypass this site by the indicated amount below. The site boundary will be avoided by vibroseis paths and source points by at minimum 4.3 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 62: CA-IMP-7860 update
Description: Probable village site
Period: Late Prehistoric era.
Dimensions: 730 m (NW/SE) by 330 m (N/S), with unspecified depth
Jurisdiction: Private.
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site was originally recorded in 2001. As a result of the Truckhaven survey, the site boundary was enlarged significantly: 360 m beyond its original northwestern boundary, 60 meters beyond its original eastern boundary, and 200 meters beyond its original northern boundary. In addition, the southern site boundary line was moved northward. Over 800 potsherds and over 200 pieces of debitage were identified at the site. A total of 149 stone tools and rimsherds were recorded. Of the 12 activity loci recorded in 2001, several were relocated. The site probably represents a multicomponent village that likely rested near the shore of Lake Cahuilla. Visibility during the survey was 99% among sparse creosote bush scrub. Off-roading trails cross the site, dunes are plentiful in the northern portions, and there is evidence of collecting but no looter pits. The site boundary will be avoided by vibroseis paths and source points by at minimum 22.8 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 63: CA-IMP-10160 update
Description: Artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 296 m (NW/SE) by 108 m (NE/SW), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

The newly observed portion of this site was recorded during the 2016 Truckhaven field season: it is at the very southern tip of the original amid exposed sandstone bedrock outcrops. The whole site represents an artifact scatter composed of debitage and ceramics, while the 2016 extension bears lithic material only. The extended portion of site P13-11154 is near an unnamed wash and includes an area about 56 meters (N/S) x 40 meters (E/W) in size. An unnamed off-road trail runs across the newly described area from east to west, and two shallow ephemeral washes, one to the north of the new area and the other to the south of the new area, run east to west along this off-road trail and drain into a wide wash to the southwest of the site proper. The cultural constituents are along the north side of the off-road trail, with debitage along the banks of the northern drainage. Artifacts identified within the extended area include five pieces of quartzite debitage (primary and secondary flakes) and five individually recorded formal flaked and ground stone tools. Ground visibility in 2016 was 90%, obscured by sparse creosote in the area, and some desert scrub. The site boundary will be avoided by vibroseis paths and source points by at minimum 31 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 64: CA-IMP-10172 update
Description: Possible small habitation or fish trap foundation with an associated artifact scatter
Period: Likely Late Prehistoric period
Dimensions: 14 m (N/S) by 11.5 m (E/S), with unspecified depth (extension section only)
Jurisdiction: California State Parks/BLM (far northwest section only)
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

The latest DPR 523 form for this site was updated by California State Parks in 2010 and appears accurate. A new element of the site (Feature 1) was added to the most extreme southern end of the site boundary by POWER staff, and it appears that recent arroyo cutting has separated the main body of the site from the newly described elements. The new feature ncludes a deflated semicircle of sandstone slabs that may have been upright at one time and adjacent ceramics, debitage, tested quartzite cobbles and fish bones. No additional artifacts were identified on the surrounding banks and wash floors. The area contains creosote bush mostly confined to dissecting arroyos [redacted]. Erosion is extreme and many of the sandstone slabs of the feature rest

on soil columns; areas lacking sandstone slabs have washed away while the soils below the slabs have not. Visibility during recording was 100%. The site boundary will be avoided by vibroseis paths and source points by at minimum 34 meters.

Eligibility Recommendation
This resource element appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site element is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 65: CA-IMP-11030 update
Description: Circular sandstone structure and small lithic scatter
Period: Unspecified Prehistoric period
Dimensions: 35 m (SW/NE) by 20 m (NW/SE), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site was re-examined during the 2016 Truckhaven field season by POWER surveyors, however; new documentation and revisions were not created because the discovery was a good match the original 2007 site record and the site sketch map crafted by Tierra. POWER detected one quartz primary flake and a quartzite secondary flake within the original site boundary about 10 meter from the Feature 1 circular sandstone feature; these two pieces of debitage were not discussed in the original Tierra report. Although the area has been subjected to off-roading disturbances, the site appears relatively intact. The site boundary will be avoided by vibroseis paths and source points by at minimum 41.6 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 66: CA-IMP-11034 update
Description: Artifact scatter
Period: Likely Late Prehistoric period
Dimensions: 115 m (W/E) by 78 m (N/S), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site consists of six brownware potsherds (three of which can be retrofit), 28 pieces of debitage and 13 formal stone tools. No features were observed. Situated on a flat, an ephemeral wash trends east-to-west through center of the site, and a second winding, ephemeral wash runs northeast to southwest along the southern edge of the site. An unnamed off-road trail lies immediately to the south, and a fenced-in area, “Salt Dome,” is to the southeast. Ground visibility is 99%, with linear clusters of creosote growing in breaks in the sandstone, as well as sparse saltbush and white bursage. The site boundary will be avoided by vibroseis paths and source points by at minimum 197 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 67: CA-IMP-11130 update (RK-43 and TW6)
Description: Long-term prehistoric encampment and historic metal debris
Period: Late Prehistoric era / World War II metal debris
Dimensions: 570 m (NE/SW) by 160 m (NW/SE), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

Recorded during the 2018 field season as a unique site and incorporating data collected during the 2016 field season (site TW-6), it was decided to combine the 2018 "RK-43" recordation with the 2016 data to previously recorded site CA-IMP-11130 (P13-12654) in the lab and issue an updated site form by adding POWER's two new data sets to the original resource. POWER notes that RK43 is much larger than P13-12654 (the Salt Spring Site), whereas TW-6 is much smaller. Nonetheless, the original site is now larger and encompasses all three resource areas.

The additional site elements consisted of activity Locus 1, a dense artifact scatter. Feature 2 lies within this locus and although it was recorded as a fish-trap, it bears resemblance to other features on the site as it is a semi-circular rock ring of sandstone tabs some of which were fire-affected suggesting a habitation foundation. Fish bones were located inside the ring. Features 1 and 3 are isolated rock rings near an old bulldozed roadway in the northwestern part of the site; this may represent additional habitation foundations or fish-traps. Feature 4 is an area within natural sandstone outcrops south of Locus 1 that was probably cleared prehistorically leaving a rock-free void. "J-shaped", the structure suggests a fish trap foundation but may be another habitation foundation. Hundreds of fish bones are in the topsoil near this feature. The new site area exhibited 94 fragments of World War II-era metal, 64 point-located artifacts including formal stone tools, ground stones, rimsherds, and a few possible personal items. The additional area also included 36 pieces of debitage and one body sherd. Visibility during the survey was 98%; a few low dunes and many linear sandstone outcrops were observed. Virtually no vegetation save for a few creosote bushes and some saltbush was seen inside this site boundary. Many off-road tracks were observed inside the site boundary. Damage to this site, due to increased visitation possibilities, should probably be expected. The site boundary will be avoided by vibroseis paths and source points by at minimum 42.5 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 68: CA-IMP-11552 (no update)
Description: Short term encampment
Period: Likely Late Prehistoric era
Dimensions: 185 m (NW/SE) by 92 m (NE/SW), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

Encountered during the 2016 Truckhaven field season, a new Primary record and revisions to the old site record was not created because the site was checked and the State Parks site record (dated 2010) was clear and concise. No changes to site condition were in evidence. All features described in the 2010 site form were relocated and no change to the overall erosion or off-road visitation conditions of the site were noted. The site contains numerous rock (sandstone) circles and semicircles some of which are conjoined. Fish bones and debitage was scattered around these features and a few of the structures may be modern. Quartzite debitage is scattered throughout the site and a few buffware potsherds were also observed. The site boundary will be avoided by vibroseis paths and source points by at minimum 143.4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 69: CA-IMP-11730 (update on extension section only)
Description: World War II-era practice bombing range (Winona I)
Period: World War II era.
Dimensions: 200 m (E/W) by 125 m (N/S), with unspecified depth
Jurisdiction: California State Parks/BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This update to an original DPR 523 form set represents an identified extension of the resource to a point about 670 feet due north of the northwest corner of the County Landfill. The site extension measures 670 feet north-south from the Landfill fence and is about 1,100 feet wide but the landfill portion (2,600 feet long) likely destroyed the linkage between each section. The southern end of this site was avoided by the Truckhaven survey teams at the Proponents' request. It is believed that construction [redacted] truncated the original linear historic-era bombing range site leaving this extension as the only defined north-end remnant. The new site area contains 107 rocket ignitor fragments, 18 .50 caliber clips, two .50 caliber casings, a wind-opened sardine can and a few fragments of clear glass. The historic materials rest on a lithic scatter (TW-39), which was defined during the Truckhaven 2016 and 2018 field seasons. These artifacts are located on a flat [redacted] with a few exposures of sandstone bedrock in the area. There are no visible historic-era features. Visibility during the survey and recordation periods was 98%; a few low dunes were observed, the topsoil is very gravelly, and little vegetation save for a few creosote bushes and saltbush was seen inside the site boundary. Several off-road vehicle tracks cross the resource boundary, and the northern limits of the resource end at a shallow west-east trending wash. The site boundary will be avoided by vibroseis paths and source points by at minimum 29.6 meters.

Eligibility Recommendation
Although the integrity of this resource is considered poor because of a probable loss of site elements to development, the resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because unrecorded buried historic features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the history of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 70: P13-14306 (update)
Description: Historic-era bulldozed roadway
Period: Pre-World War II era?
Dimensions: More than one mile of roadway remains in five segments and the path is roughly 12 feet wide.
Jurisdiction: California State Parks/BLM/Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Ineligible but regarded as a historic property until a formal NRHP/CRHR evaluation can be completed

Our update to an original DPR 523 form set, which was categorized by the SCIC as an "isolated historic resource", represents a review of a bulldozed road resource that is adjacent to many of the proposed Truckhaven seismic pathway routes. Originally defined as lying in Sections 7 and 8 by Parks in 2012, examination of Google earth aerial photographs showed that other segments of the resource (which is a bulldozed path about 10 feet wide with low shoulders, particularly Segment "F" in Section 12 and Segment "A" in Section 5), may also exist. [redacted] Since Pole Line Road and Dump Road had not been constructed at that time, this bulldozed road was the only access to these springs in this area in 1950. POWER also noted that the bulldozed road crossed [redacted] in a straight line. Since the base of the Arroyo is roughly 10 feet below the edge pf the sandy, this fact suggests that the floor of the Arroyo has dropped due to the extensive drop of the water table plus an increase in sand transport since 1950.

Likely used during World War II to access the Winona I practice bombing area (P13-13675), the roadway was likely cut before the war to gain access to these rare springs, which represent one of two spring area [redacted]. None of the segments, save for the longest, Segment "A," appears on the 1950 photograph. POWER believes that the extra segments were carved after 1950 possibly during the post-war well exploration period when the land was managed exclusively by BLM.

Ormat has avoided crossing this roadway except at a point [redacted] at road Segment "B" and two additional crossing [redacted]. A "swamp mat" can be placed over these roads before the seismic equipment crosses, then the mat can be removed. The shoulders of the resource must be protected as well as the roadway surface itself.

Eligibility Recommendation
The integrity of this resource is considered poor because of a probable loss of site elements to development and erosion: and for this reason, the resource appears potentially ineligible for the NRHP and the CRHR. Under the terms of the Truckhaven survey parameters, this site should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 71: CA-IMP-12788 update (CN-10)
Description: Lithic Scatter
Period: Unspecified Prehistoric era
Dimensions: 200 m (E/W) by 125 m (N/S), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

Originally recorded in 1989, the site area was re-examined in 2016 and again in 2017 as part of the Truckhaven Wells study (POWER 2018). This site is a dispersed lithic scatter, and includes a pumice stone concentration, as well as an activity locus containing a concentration of lithic materials. The site is located on a sandstone-littered cobbly flat bearing natural tool stone materials such as quartzite and basalt. Activity Locus A includes a cluster of approximately 17 artifacts in a small area in the center of the site. No other features were identified. An east-to-west trending braided ephemeral drainage runs through the southern portion of the site. A larger braided wash, up to three meters deep, trends northeast to southwest along the northern edge of the site and is several meters wide and forms the northern site boundary as well as some of the west and northeast boundaries. A bladed road running northeast to southwest runs diagonally through the center of the site. Vegetation is very sparse, and ground visibility was 100% during the survey. The site boundary will be avoided by vibroseis paths and source points by at minimum 10 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 72: CA-IMP-12789 update (CN-20)
Description: Fish traps and lithic artifact scatter
Period: Possibly Late Prehistoric era
Dimensions: 162 m (NW/SE) by 57 m (NE/SW), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site contains three single-course “J” and “V” shaped rock alignments believed to be the foundations of fish traps, plus a very sparse artifact scatter (see POWER 2018). The site is located atop an eroded sandstone outcrop mantled by recessional lakeshore silts, gravels, and cobbles. The site is [redacted] bordered to the west and east by eroding sandstone outcrops and cobbles devoid of cultural material, and to the south by an unnamed bladed dirt and gravel road. The site surface is undulating, with stabilized cobble/gravel bars slightly raised above diffuse swales of silt and erosionally-sorted rocks. The lithology is composed of granitic rocks, which are dominant, and gneiss and fine-grained basalts and schists; quartzite is rare. The landform is overall stabilized, with moderately developed pavement, and few rills and incised ephemeral drainages. All three rock features are within 20 meters of one another in the east-central portion of the site. Eleven tools were identified, as well as four pieces of debitage resulting from early stages of stone tool reduction. All the artifacts are very weathered. Ground visibility during the survey was 95%, with very sparse creosote, bursage, and saltbush. The site boundary will be avoided by vibroseis paths and source points by at minimum 3.2 meters.

Eligibility Recommendation
Because there is potential that prehistoric data is buried below the modern ground surface, this site is considered eligible to the NRHP under Criterion D and the CRHR under Criterion 4. The site is also considered eligible to the NRHP under Criterion A and the CRHR under Criterion 1 because it exhibits a fish trap and lies several miles northwest of the Southwest Lake Cahuilla Recessional Shoreline Archaeological District which was listed on the NRHP in 1999 under Criteria A and D. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 73: CA-IMP-12790 update (DM-1)
Description: Large lithic scatter
Period: Possibly Late Prehistoric era
Jurisdiction: California State Lands Commission/Private
Dimensions: 184 m (E/W) by 174 m (N/S) with unspecified depth
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

First observed in 2016 (POWER 2018), this resource is a sparse prehistoric lithic scatter covering a large area truncated by washes. The site is on a desiccated lakebed that is being eroded to the northeast. The site contains 150 plus pieces of debitage, mostly quartzite, with a few quartz, basalt and possibly Wonderstone flakes. All stages of reduction are present, but the majority of the flakes are primary followed by secondary, and very few tertiary flakes. The degree of wind and sand erosion on the artifacts is substantial. Most raw materials present are readily available on the site and in the surrounding area as cobbles. Twenty-two tools were recorded. These include choppers, scraping tools, cores, and a small sandstone metate repurposed from a larger metate fragment. As with the debitage, most tools are of quartzite except for one basalt core and three quartz scraping tools. No features were identified. Visibility is near 100 percent with creosote and saltbush present. The site boundary will be avoided by vibroseis paths and source points by at minimum 31.8 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 74: CA-IMP-12791 update (DM-2)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Jurisdiction: California State Lands Commission/Private
Dimensions: 169 m (N/S) by 98 m (E/W), with unspecified depth
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

The site is sparse lithic scatter on a relict Lake Cahuilla bed (POWER 2018). Eight stone tools, 24 quartzite flakes, eight quartz flakes, two chert flakes and three basalt flakes were recorded at the site. The stone tools include two choppers, one stone tool, one spokeshave/end scraper, one tested cobble, a core/hammerstone, and two hammerstones with bipolar reduction scarring. Although the debitage reflects all stages of lithic reduction, and cortical and semi cortical flakes predominate. Only five interior (tertiary) flakes were identified. Out of 37 pieces of debitage, 10 are the result of bipolar percussion. Four tested cobbles (three quartzite and one quartz) were identified. All identified utilized lithic materials are likely from local cobbles. No features or ceramics were identified. Disturbances

on the site include erosion and modern human activity; the site is bisected in the east portion by a deep and relatively modern arroyo created by a large berm likely built by Caltrans. Several smaller ephemeral washes cross the site trending roughly east-to-west. A modern fire ring identified by a burnt aluminum can is in the southwest portion of the site. Two modern five-gallon oil drums were also identified. Creosote scrub is the main vegetation at the site, affording 99% ground surface visibility. The site boundary will be avoided by vibroseis paths and source points by at minimum 11.3 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 75: CA-IMP-12792 update (DM-5)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Jurisdiction: California State Lands Commission
Dimensions: 42 m (N/S) by 15 m (E/W), with unspecified depth
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a sparse lithic scatter on the edge of a low pebbly terrace, likely a relict Lake Cahuilla shoreline, and was originally recorded in 2016. The site includes six pieces of debitage and one tested cobble. The site has been disturbed by erosion and two sets of recent tire tracks cross the site. Two quartzite flakes and three quartz flakes, both fully cortical, appear to have been reduced through bipolar reduction. The three quartz flakes all appear to have been reduced by freehand percussion. A quartzite tested cobble was also observed. No features were identified. Re-examination of the site in 2017 (POWER 2018) showed that the site also included one bifacially worked quartzite core, a possible scraper and three quartzite flakes (one primary and two secondary). The site boundary will be avoided by vibroseis paths and source points by at minimum 6.8 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 76: CA-IMP-12795 update (RK3 [2017] and RK16 [2018])
Description: Lithic scatter and modern cairns
Period: Possibly Late Prehistoric period
Dimensions: 145 m (W/E) by 92 m (N/S), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site was initially recorded during the 2017 Truckhaven field season as RK-3 and added to the Truckhaven Wells APE (POWER 2018). It was revisited during the 2018 field season, during which the site boundary was expanded. The site is on a denuded flat just northwest of a large graded area [redacted]. Manos, a few other stone tools, and

debitage were recorded at the site. Two cairns, believed to be modern, were recorded at the site. The site is in an area denuded of vegetation, is subject to extreme wind erosion, and bears some minor off-roading damage. It is roughly 20 meters east of a ditch designed to direct water northward to Arroyo Salada and away from the housing tract. Visibility during the survey was 100% and no vegetation exists within the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 12.7 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 77: CA-IMP-12991 (RK-1)
Description: Temporary encampment
Period: Likely Late Prehistoric era
Dimensions: 131 m (N/S) by 127 m (E/W), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a prehistoric artifact scatter or encampment consisting of varying concentrations of artifacts and two Loci. It has been explored by the public (possible digging pits and modern Dr. Pepper bottle frags were seen) and contains one small pile of flakes in Locus 1, which also contains a small mound of soil, tabular sandstone, a few tools and ceramics. The only ceramics within this site boundary were found in Locus 1. Locus 2 is a large ashy area near the eastern site edge which may represent a blown-out hearth or a burned mesquite remnant. Fire affected rock was identified within two clusters at the north end. The site contains three pot sherds, two flake tools, one scraper, one granite mano, six core/core tools, one percussive tool, six flakes, a metal ammo clip and fire altered rock fragments. This site is subject to looting due to its location near housing as well as impacts from all-terrain vehicle use. Visibility during the survey was 95% and vegetation consisted of primarily saltbush. The site boundary will be avoided by vibroseis paths and source points by at minimum 6.4 meters.

Eligibility Recommendation
This resource appears eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until formal NRHP/CRHR evaluation can be completed.

Site 78: CA-IMP-12992 (RK-2)
Description: Lithic scatter.
Period: Unspecified Prehistoric era.
Dimensions: 154 m (NW/SE) by 65 m (NE/SW), with unspecified depth
Jurisdiction: Private.
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a lithic scatter consisting of mostly quartzite materials with a single metavolcanic flake. Three formal stone tools and 39 pieces of debitage were recorded within the site boundary. There

were no features and no ceramics identified at the site. The site is on a low bench [redacted] and is crossed by several associated tributaries. Off-roading tracks are common in this area and several cross the site. Desert scrub vegetation including saltbush and creosote is very sparse, and ground visibility during the survey and recordation was 100%. The site boundary will be avoided by vibroseis paths and source points by at minimum 9.4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 79: CA-IMP-12993 (RK-3)
Description: Large artifact scatter
Period: Late Prehistoric era
Dimensions: 475 m (N/S) by 215 m (W/E), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a large linear artifact scatter on what was possibly a Lake Cahuilla beach strand. It contains two activity loci and one deflated thermal feature. On a bench [redacted], the site has been subjected to informal public collection and possible looting due to its proximity to [redacted], and has clear evidence of recent off-roading across the site. Locus 1 is a concentration of artifacts in the east-central part of the site with five dense clusters of ceramics, two of which appear to be looter piles. Locus 1 also contains stone tools and debitage. Approximately 350 to 400 individual artifacts can be seen in Locus 1. Locus 2, in the southwest quadrant of the site, contains 300 to 400 artifacts, including several dense accumulations of ceramics, tools and debitage in what the accompanying tribal monitor felt were prehistoric "offering caches." Appearing like looter piles, several of the artifacts were under sandstone slabs. Feature 1, at the northern tip of the site, is a deflated hearth with 20+ pieces of fire-affected granite cobbles and a few other pieces of sandstone and metavolcanic cobbles. The feature also bears a few artifacts and has been eroded by small washes. Outside of the loci and the feature, Off-roading tracks are common in this area and several cross the site. Desert scrub vegetation including saltbush and creosote is very sparse, and ground visibility during the survey was 98%. The site boundary will be avoided by vibroseis paths and source points by at minimum 6.2 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 80: CA-IMP-12994 (RK-4)
Description: Long term encampment or habitation site
Period: Likely Late Prehistoric era
Dimensions: 190 m (N/S) by 220 m (E/W), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site contains a prehistoric artifact scatter, a possible habitation foundation composed of cobblestones, and several deflated hearths on a dissected flat between the southeastern bank of Tule Wash and one of its tributaries. The primary activity area, Locus 1, is in the extreme southeast part of the site and likely represents a food preparation locus in that it contains grinding tools, ceramics and many stone flakes. Other features are also found in the southeast quadrant of the site. Artifacts observed included 33 point-located stone tools and cultural objects, two potsherds, one vessel base, roughly 60 tested quartzite/quartz cobbles and 75 pieces of debitage (nearly all quartzite). The artifact assemblage suggested expedient use of local quartzite cobble materials for tools. The total assemblage suggests the site was used as a long-term encampment/habitation that has been affected by erosion. Very little vegetation exists in this area and survey visibility was 100%. The site boundary will be avoided by vibroseis paths and source points by at minimum 31.8 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 81: CA-IMP-12995 (RK-5N)
Description: Large artifact scatter: possibly deflated long-term encampment/village site
Period: Late Prehistoric era
Dimensions: 410 m (N/S) by 210 m (E/W), with unspecified depth
Jurisdiction: California State Lands Commission/Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a very large artifact scatter with hearths in an eroded dune area [redacted]. Unlike site CN39E to the northwest, no evidence of potting was identified, however; small piles of mixed artifacts suggest that collectors have visited the site. The site contains three distinct activity loci, plus three thermal features, some of which lie within the loci. More than 200 point-located stone tools, rimsherds and other artifacts were recorded at the site. Four projectile points suggest a Late Prehistoric use of the site. Debitage and body potsherds are plentiful across the site. The site is located in an area of low sand dunes anchored by mesquite and the configuration of this site suggests that this site may have been surrounded by the Lake Cahuilla strandline. Survey visibility was 98% and vegetation consisted of mesquite, creosote and saltbush. A minor amount of metal and glass trash was identified in the northeast part of the site boundary, which is most likely attributed to off-road vehicle use. The site boundary will be avoided by vibroseis paths and source points by at minimum 24.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 82: CA-IMP-12996 (RK-5S)
Description: Probable habitation site and large artifact scatter
Period: Late Prehistoric era
Dimensions: 210 m (N/S) by 130 m (E/W), with unspecified depth
Jurisdiction: Private/California State Lands Commission
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a possible habitation site on what was, prehistorically, a probable finger of land [redacted] overlookingan ancient Lake Cahuilla beach front. Currently the site rests on low exposures of sandstone bedrock surrounded by silt plains to the north and east, with Tule Wash to the west. The bedrock flat extends southwestward [redacted] It contains one large activity loci containing four deflated thermal features, more than 480 potsherds, 146 point-located stone tools, rimsherds and ground stones, a few non-human mammal bone fragments, a shell artifact, and more than 210 pieces of debitage. Two collapsed rock rings that may represent habitation foundations and one deflated thermal feature is south of the locus. The rock rings appear to have been made from locally obtained sandstone slabs that may have been upright prehistorically but have now collapsed. None of the sandstone slabs are burned, and a few courses and partial uprights remain. A few pieces of debitage and ceramics are near these features. A small historic-era trash scatter lies at the western site boundary [redacted]. Outside of the locus and the features, the site bears a debitage, ground stone, and stone tool scatter numbering some 139 items. Off-roading tracks are common in this area and several cross the site; [redacted] construction does not appear to have impacted this site. Desert scrub vegetation including saltbush and creosote is very sparse, but in certain areas the sand is anchored by mesquite hummocks providing some stability. Ground visibility during the survey was 97%. The site boundary will be avoided by vibroseis paths and source points by at minimum 11.1 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 83: CA-IMP-12997 (RK-5H)
Description: Possible historic-era trash scatter
Period: Post-World War II historic era possible era
Dimensions: 97 feet (W/E) by 58 feet (S/N), with depth unlikely
Jurisdiction: Private/California State Lands Commission
NRHP/CRHR Eligibility Recommendation: Considered Potentially Ineligible but regarded as a historic property until a formal NRHP/CRHR evaluation can be completed.

This site consists of three dump piles containing 100 to 150 metal automobile parts, rusted metal cans, glass fragments, wire, and a few glass jars with metal screw tops. [redacted] Likely restricted to the surface, lacking depth, the resource reflects a common local dumping practice once an unimproved roadway is built through the desert. After the dumping event, sand and silt have covered some of the artifacts and desert vegetation (creosote and saltbush) has grown. The site is on topsoil that is a sandy-silt sandstone-slab rich flat with occasional gravels. Survey visibility during site recording was 99%. The site boundary will be avoided by vibroseis paths and source points by at minimum 9.6 meters.

Eligibility Recommendation
Even though the integrity of the site is considered good, this resource appears ineligible for the NRHP and the CRHR under Criterion D/4 as this site is unlikely to yield information important to the history of the region. But, under the terms of the Truckhaven survey parameters, this site should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 84: CA-IMP-12998 (RK-6)
Description: Small lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 69 m (N/S) by 41 m (E/W), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small lithic scatter on a sandy flat [redacted]. One quartzite scraper and 11 pieces of debitage were identified. The site is on the north edge of an ephemeral wash. A smaller wash crosses the site center. Visibility during the survey was 99% and the vegetation consisted of mesquite, creosote and saltbush. The site boundary will be avoided by vibroseis paths and source points by at minimum 22.7 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 85: CA-IMP-12999 (RK-7)
Description: Small encampment
Period: Unspecified Prehistoric era
Dimensions: 22 m (NW/SE) by 8 m (NE/SW), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site consists of one single quartzite hammerstone, and two small concentrations of potentially heated or burned tabular sandstone and granite cobble fragments. The site is on a flat [redacted] 77 meters west of village site CN41. The deposits may be deflated hearth remnants although the features may be partially buried in the silty soil. Visibility during the survey was 100% and the vegetation consisted of rare creosote and saltbush. The site boundary will be avoided by vibroseis paths and source points by at minimum 10.1 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 86: CA-IMP-13000 (RK-9H)
Description: Historic can and bottle scatter
Period: Post-1945 period
Dimensions: 260 feet (NW/SE) by 120 feet (NE/SW). Depth very unlikely
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Ineligible but regarded as a historic property until a formal NRHP/CRHR evaluation can be completed.

This site is a sparse historic-era artifact scatter near [redacted] State Route 86. Bottles and cans, some more than 50 years old, were identified. It is likely that these were tossed from the windows of passing cars, perhaps before State Route 86 was enlarged to two lanes both directions (circa 1980) and fenced. Survey visibility was 100% and only sparse creosote and saltbush was seen in this area. The site boundary will be avoided by vibroseis paths and source points by at minimum 24.2 meters.

Eligibility Recommendation
Even though the integrity of the site is considered good, this resource appears ineligible for the NRHP and the CRHR under Criterion D/4 as this site is unlikely to yield information important to the history of the region. But, under the terms of the Truckhaven survey parameters, this site should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 87: CA-IMP-13001 (RK-10)
Description: Large encampment
Period: Likely Late Prehistoric era
Dimensions: 250 m (SW/NE) by 100 m (SE/NW), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site represents a long-term encampment that has been heavily wind-eroded. The site is located on flat ground adjacent to [redacted] State Route 86. A large activity locus consisting of a concentration of fire-altered rock, 23 manos/ground stones, and at least one fragmented metate was recorded at the site. Many of the tools in this locus, after grinding use, have been cracked in the heat of a fire or hearth. Granite “boulders” were observed in the locus plus many granite cobbles lacking tool or firing use. At least clusters of burned rock inside the locus appear to be deflated dispersed hearths. One hearth was recorded 10 meters west of the locus. Site-wide, twelve pieces of quartzite debitage, grinding implements, and a single potsherd were identified. The site is in an area with a few creosote bushes, no dunes, very low sparse bedrock outcrops and sandy/gravelly soils. Visibility during the survey was 100%. Hundreds of off-roading tracks cross the extreme northeast portion of the site and have probably destroyed the integrity of the near the State Route 86 right of way fence. The site boundary will be avoided by vibroseis paths and source points by at minimum 21.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 88: CA-IMP-13002 (RK-11)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 85 m (NE/SW) by 71 m (SE/NW), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a sparse small prehistoric artifact scatter [redacted] the [redacted] side of State Route 86 [redacted]. Four stone tools, 10 pieces of quartzite debitage were identified at the site. A single historic-era .50 caliber bullet was also noted. Ground surface visibility was 100% amid a few creosote bushes. The site boundary will be avoided by vibroseis paths and source points by at minimum 26.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site, therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 89: CA-IMP-13003 (RK-12)
Description: Multicomponent prehistoric and historic artifact scatter
Period: Likely Late Prehistoric period and post 1945 period
Dimensions: 250 m (NW/SE) by 102 m (SW/NE), with unspecified depth
Jurisdiction: California State Parks/California State Lands Commission
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This multicomponent site is a sparse prehistoric artifact scatter containing four stone tools, a cluster of refittable potsherds believed to represent a pot-drop and 18 pieces of quartzite debitage. A series of sandstone rock clusters were also observed, likely cairns associated with State Route 86 widening (circa 1980). Historic-era and modern trash was noted in the northwestern margin of the site. [redacted] No prehistoric features were found, and the site has been heavily impacted by off-roading. Survey visibility was 99% and a scatter of creosote and saltbush was noted. The site boundary will be avoided by vibroseis paths and source points by at minimum 7.1 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site, therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 90: CA-IMP-13004 (RK-13)
Description: Historic-era can scatter
Period: Post-1945 period
Dimensions: 130 feet (W/E) by 30 feet (N/S). No depth possible
Jurisdiction: California State Lands Commission
NRHP/CRHR Eligibility Recommendation: Considered Potentially Ineligible but regarded as a historic property until a formal NRHP/CRHR evaluation can be completed.

This site is a small historic-era trash dump and historical feature. The site is located near the [redacted] edge of State Route 86. Feature 1 is a concrete Caltrans survey post. Can types observed suggests mid-century expedient dumping of trash, perhaps before State Route 86 was enlarged and fenced, from passing vehicles. The deposit may have been a one-time expedient event and it has been impacted by off-road use and erosion. Survey visibility was 99% and the site bears saltbush only. The site boundary will be avoided by vibroseis paths and source points by at minimum 8.4 meters.

Eligibility Recommendation
Even though the integrity of the site is considered fair, this resource appears ineligible for the NRHP and the CRHR under Criterion D/4 as this site is unlikely to yield information important to the history of the region. But, under the terms of the Truckhaven survey parameters, this site should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 91: CA-IMP-13005 (RK-14)
Description: Rectangular sandstone rock alignment
Period: Unspecified, unknown date
Dimensions: 12 m (SW/NE) by 3 m (NW/SE), unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site consists of one unusual rock alignment feature that can be seen on Google earth aerial imagery. There are no identified prehistoric nor historic artifacts associated with the feature. The feature is a rectangular alignment of sandstone slabs measuring 25 feet long and 5.4 feet wide. There is no coursing except where slabs overlay one another. Survey visibility was 99% and widely spaced creosote and saltbush occur in this area. The site boundary will be avoided by vibroseis paths and source points by at minimum 111.5 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 92: CA-IMP-13006 (RK-15)
Description: Small lithic scatter and military debris scatter
Period: Unspecified Prehistoric era / World War II era
Dimensions: 12 m (SW/NE) by 3 m (NW/SE), unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a sparse Linear lithic scatter tending west to east on a flat plain north of Tule Wash. An early stage biface, one tested cobble, a few pieces of debitage from quartzite, chalcedony, chert source rocks (probably local cobbles) were identified. One .50 caliber ammo belt link and a .50 caliber bullet were observed about 25 meters west of the prehistoric materials. There are no features or ceramics evident and the site has not suffered from any apparent off-roading impacts. Survey visibility was 100% and only a few scattered creosote bushes were observed. The site boundary will be avoided by vibroseis paths and source points by at minimum 21.2 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 93: CA-IMP-13007 (RK-17)
Description: Prehistoric, possibly short term, encampment
Period: Likely Late Prehistoric era
Dimensions: 260 m (N/S) by 150 m (W/E), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This is a large prehistoric artifact scatter with a series of deflated features and one Activity Locus. Two of the identified thermal features and two wide clusters of sandstone cobbles and thin slabs may represent deflated dispersed thermal features, eroded habitations or windbreaks. The artifact assemblage include stone tools, debitage, and potentially three types of ceramics (red, buff and brown). The site is in an area denuded of vegetation [redacted]s east of an artificial berm meant to direct runoff [redacted]. The site has been disturbed by off-road vehicle use and wind erosion. The site boundary will be avoided by vibroseis paths and source points by at minimum 28.2 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 94: CA-IMP-13008 (RK-18)
Description: Lithic scatter
Period: Unspecified Prehistoric era.
Dimensions: 83 m (N/S) by 104 m (W/E), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small and sparse lithic scatter on a flat [redacted]. Ten pieces of debitage and one Wonderstone core were identified at the site. The artifacts are heavily wind-abraded and thinly scattered inside the site boundary. The site ground surface visibility was 99% amid well-spaced creosote bushes. The site boundary will be avoided by vibroseis paths and source points by at minimum 28.7 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 95: CA-IMP-13009 (RK-19)
Description: Fish trap foundation and ceramic scatter
Period: Likely Late Prehistoric era
Dimensions: 8.3 m (N/S) by 8 m (W/E), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

The site is a "C" shaped cobble and sandstone possible fish trap foundation and associated artifacts on a flat [redacted]. Four brownware potsherds including one rimsherd, all of which are probably from the same vessel, were identified at the site. One piece of metal wire was identified in a creosote bush near the feature. Survey visibility was 99% and vegetation on and near the site consisted of creosote bushes. The site boundary will be avoided by vibroseis paths and source points by at minimum 29.9 meters.

Eligibility Recommendation
Because there is potential that prehistoric data is buried below the modern ground surface, this site is considered eligible to the NRHP under Criterion D and the CRHR under Criterion 4. The site is also considered eligible to the NRHP under Criterion A and the CRHR under Criterion 1 because it exhibits a fish trap and lies several miles northwest of the Southwest Lake Cahuilla Recessional Shoreline Archaeological District which was listed on the NRHP in 1999 under Criteria A and D. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 96: CA-IMP-13010 (RK-20)
Description: Small lithic scatter.
Period: Unspecified Prehistoric era
Dimensions: 130 m (NW/SE) by 30 m (SW/NE), with unspecified depth
Jurisdiction: BLM/California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small lithic scatter [redacted], consisting of six pieces of debitage and two stone tools. The site probably represents an area where alluvial cobbles were expediently procured to make stone tools. Survey visibility was 99% and vegetation consisted of creosote, saltbush and bursage. The site boundary will be avoided by vibroseis paths and source points by at minimum 13.6 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 97: CA-IMP-13011 (RK-21)
Description: Small lithic scatter.
Period: Unspecified Prehistoric era
Dimensions: 145 m (SW/NE) by 45 m (NW/SE), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small lithic scatter consisting of five pieces of debitage and two stone tools 1,000 meters [redacted], which during the prehistoric period may have been an arm of Lake Cahuilla. The site probably represents an area where alluvial cobble deposits were procured. Survey visibility was 99% and vegetation within and near the site consisted of creosote and saltbush. The site boundary will be avoided by vibroseis paths and source points by at minimum 21.4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 98: CA-IMP-13012 (RK-22)
Description: Small lithic scatter.
Period: Unspecified Prehistoric era
Dimensions: 15 m (SW/NE) by 10 m (NW/SE), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small lithic scatter consisting of three pieces of debitage on a flat [redacted]. The site probably represents an area where alluvial cobble deposits were procured. Survey visibility was 99% and surrounding vegetation consisted of creosote and saltbush. Site recordation was stopped at an SVRA fence which could not be crossed. It is possible that additional artifacts will be found to the south and inside the fence. Off-roading vehicles have followed the fence and driven over the site. The site boundary will be avoided by vibroseis paths and source points by at minimum 67.5 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site, therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 99: CA-IMP-13013 (RK-23)
Description: Fish trap foundation and lithic scatter
Period: Likely Late Prehistoric era
Dimensions: 8.3 m (N/S) by 8 m (W/E), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site exhibits what is likely three cobble and sandstone cobble fishtrap foundations and another cobble alignment may be the decomposed remnants of a fourth fish trap on a gravelly alluvial outcrop. One stone tool and one piece of debitage were located inside the site boundary. World War II-era “rocket igniters” near the fish traps were recorded as historic-era isolates. This site lies some 850 meters southwest of a series of very large fish trap sites on this same type of older alluvium exposure. [redacted] Survey visibility was 99% and vegetation consisted of creosote bush and saltbush. The site boundary will be avoided by vibroseis paths and source points by at minimum 5.6 meters.

Eligibility Recommendation
Because there is potential that prehistoric data is buried below the modern ground surface, this site is considered eligible to the NRHP under Criterion D and the CRHR under Criterion 4. The site is also considered eligible to the NRHP under Criterion A and the CRHR under Criterion 1 because it exhibits fish traps and lies several miles northwest of the Southwest Lake Cahuilla Recessional Shoreline Archaeological District which was listed on the NRHP in 1999 under Criteria A and D. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 100: CA-IMP-13014 (RK-24)
Description: Probable fish trap and artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 66 m (N/S) by 20 m (W/E), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This resource consists of a small artifact scatter and one cobble and rock alignment that likely represents one fish trap foundation on a flat that gradually slopes down to the south. The cobble feature is near a native sandstone bedrock outcrop. Artifacts observed included one small hammerstone, one piece of quartzite debitage and two buffware potsherds. The site is on a cobbly flat [redacted]. Survey visibility was 99% and vegetation consisted of creosote bushes only. The site boundary will be avoided by vibroseis paths and source points by at minimum 26.9 meters.

Eligibility Recommendation
Because there is potential that prehistoric data is buried below the modern ground surface, this site is considered eligible to the NRHP under Criterion D and the CRHR under Criterion 4. The site is also considered eligible to the NRHP under Criterion A and the CRHR under Criterion 1 because it exhibits a fish trap and lies several miles northwest of the Southwest Lake Cahuilla Recessional Shoreline Archaeological District which was listed on the NRHP in 1999 under Criteria A and D. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 101: CA-IMP-13015 (RK-25)
Description: Artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 138 m (NE/SW) by 50 m (NW/SE), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This resource consists of a small artifact scatter on a very rocky area where recent washes have carved into former Lake Cahuilla sediments. Three tools, four pieces of debitage and four brownware body sherds, all of which were highly weathered, were recorded slightly south of an area fenced [redacted] in the Ocotillo Wells SVRA. Survey visibility was 99% amid sparse creosote and saltbush. The site boundary will be avoided by vibroseis paths and source points by at minimum 9.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information

important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 102: CA-IMP-13016 (RK-26)
Description: Fish trap and lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 65 m (N/S) by 23 m (W/E), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This resource consists of a small artifact scatter and a rough "C" shaped curvilinear cobble alignment that may represent an eroded fish-trap foundation. The site is located on a rocky flat that gradually trends downslope toward the east and south. The cobble feature appears to be like other fish trap foundations in this area and there is no visible remnant coursing. Tufa is on some of the feature stones. Artifacts identified include two stone tools. Survey visibility was 100% amid sparse creosote and saltbush. The site boundary will be avoided by vibroseis paths and source points by at minimum 13.6 meters.

Eligibility Recommendation
Because there is potential that prehistoric data is buried below the modern ground surface, this site is considered eligible to the NRHP under Criterion D and the CRHR under Criterion 4. The site is also considered eligible to the NRHP under Criterion A and the CRHR under Criterion 1 because it exhibits a fish trap and lies several miles northwest of the Southwest Lake Cahuilla Recessional Shoreline Archaeological District which was listed on the NRHP in 1999 under Criteria A and D. This site, therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 103: CA-IMP-13017 (RK-27)
Description: Lithic scatter and cairns
Period: Unspecified Prehistoric era
Dimensions: 200 m (N/S) by 160 m (W/E), with unspecified depth
Jurisdiction: California State Parks/BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This resource consists of a sparse artifact scatter and two small sandstone rock cairns on a rocky flat [redacted]. The site lies between previously recorded site P13-12653 to the east and P13-13367 to the west. Artifacts identified include nine stone tools, one unifacial metate and 34 pieces of debitage. Most of the artifacts have been heavily sandblasted, even the quartzite artifacts, but the one metate bears a bit of tufa. Survey visibility was 100% and the area exhibited rare creosote and saltbush. The site boundary will be avoided by vibroseis paths and source points by at minimum 14.6 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 104: CA-IMP-13018 (RK-2)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 188 m (E/W) by 130 m (N/S), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This resource consists of a well-defined artifact scatter (activity Locus 1) bearing 13 stone tools, eight tested cobbles and 39 pieces of debitage, mostly quartzite. with additional scattered debitage of a few other material types inside the site boundary. The locus probably represents a lithic reduction location; there are no visible features and no ground stone or ceramics. Found on a silty flat [redacted], the site lies on a slightly higher point between the tributaries and exhibits linear but low exposures of sandstone/mudstone amongst low sand dunes. Exposures of older alluvium found elsewhere near Tule Wash, which may bear cobbles and flaking stone, do not exist at this site. Visibility during the survey was 99% and vegetation consisted of sparse creosote bush and saltbush. The site boundary will be avoided by vibroseis paths and source points by at minimum 45.1 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 105: CA-IMP-13019 (RK-29)
Description: Probable temporary encampment
Period: Likely Late Prehistoric era
Dimensions: 200 m (E/W) by 244 m (N/S), with unspecified depth
Jurisdiction: BLM/California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site consists of a large dense artifact scatter (activity Locus 1) and a feature within Locus 1 (Feature 1) that (according to the tribal monitor) represented a possible ceremonial area. Debitage, stone tools, a few pieces of ceramics, ground stones and fire-affected rock were recorded as part of this feature, before recording of the feature was curtailed at the request of the tribal monitor. Elsewhere in the site, two stacks of sandstone and a fire-altered rock scatter with a few ground stones and debitage that may represent two deflated hearths were recorded. Scattered debitage and ceramics were recorded inside the site boundary outside the locus and the four features. The site is located [redacted] between two large unnamed tributaries [redacted] that run toward the north-northwest and are slowly eroding toward the site boundary. Ground surface visibility was 99% amid sparse creosote and saltbush. Two mesquite hummocks were noted at the site boundary. The site is being disturbed by a well-used off-roading track [redacted] The site boundary will be avoided by vibroseis paths and source points by at minimum 25.4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information

important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 106: CA-IMP-13020 (RK-30)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 114 m (NW/SE) by 70 m (NE/SW), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site consists of a sparse lithic scatter with two edge-modified flakes, 24 scattered pieces of debitage and several bleached non-human mammal bone fragments on a dissecting silty flat [redacted]. Few low sand dunes and low exposures of sandstone bedrock were observed at the site. Visibility during the survey was 99% and vegetation consisted of sparse creosote and saltbush. Four wooden surveyor's stakes were observed in the site. The site boundary will be avoided by vibroseis paths and source points by at minimum 71.1 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 107: CA-IMP-13021 (RK-31)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 60 m (N/S) by 24 m (E/W), with unspecified depth
Jurisdiction: BLM/California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site consists of a sparse lithic scatter with one edge-modified flake, one tested cobble, and one primary flake, all quartzite on a flat [redacted]. Visibility during the survey was 100%, amid a few low dunes and sandstone outcrops with virtually no vegetation save for a few creosote bushes. No off-road tracks were observed crossing the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 46.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 108: CA-IMP-13022 (RK-32)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 82 m (NE/SW) by 42 m (SE/NW), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site consists of a sparse lithic scatter with three expedient stone tools and seven pieces of debitage all of quartzite on a flat [redacted]. Visibility during the survey was 99%, amid a few low dunes and sandstone outcrops with virtually no vegetation save for a few creosote bushes. No off-road tracks were observed crossing the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 40.2 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 109: CA-IMP-13023 (RK-33)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 93 m (NE/SW) by 53 m (SE/NW), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a sparse lithic scatter located on a flat [redacted] that bears west-to-east alignments of native sandstone outcrops highly suggestive of collapsed hoodoos. Artifacts included three stone tools, one metate, one mano, and six pieces of quartzite debitage. Visibility during the survey was 99% amid a few low dunes and sandstone outcrop alignments with virtually no vegetation save for a few creosote bushes. The site boundary will be avoided by vibroseis paths and source points by at minimum 33.1 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 110: CA-IMP-13220 (RK-34)
Description: Long term encampment/possible fish traps and habitations
Period: Likely Late Prehistoric era
Dimensions: 440 m (W/E) by 220 m (N/S), with unspecified depth
Jurisdiction: California State Parks/California State Lands Commission
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a probable long-term encampment located on a flat [redacted]. The site contains several areas of activity including a dense cluster of stone tools, debitage and fish bones in activity Locus 2, which is positioned in the extreme eastern part of the site on a bench [redacted]. A lens of discolored soil, possibly ash and charcoal (Feature 4) was identified inside this Locus. Activity Locus 1 is a small flaking station or core reduction locus positioned in the north-central part of the site. Feature 1 was deemed a collapsed cairn in the field but instead may be an eroded fish trap or habitation foundation. Feature 2 is a ring of sandstone tabs with a center void and a "tail" or alignment of stones positioned

near Feature 1. Again, this may possibly represent a highly eroded fish trap foundation or habitation foundation. Feature 3 is a small void in a natural sandstone outcrop.

Site wide, more than 70 stone tools, ground stones, unique artifacts such as crystals and marine shells were point-located and recorded. More than 225 pieces of debitage were tallied. Visibility during the survey was 99%; a few low dunes and the sandstone outcrops were identified, and virtually no vegetation save for a few creosote bushes and saltbush was seen inside the site boundary. One hummock of sand, anchored by a dying mesquite, is in the site center. No off-road tracks were observed inside the site boundary. A cut bank between the site and [redacted] Wash is about two meters high at this point which tends to prevent visitation, but one small looter pile was noted near a feature and there are few metal cans and peso coins inside the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 11.6 meters.

Eligibility Recommendation
Because there is potential that prehistoric data is buried below the modern ground surface, this site is considered eligible to the NRHP under Criterion D and the CRHR under Criterion 4. The site is also considered eligible to the NRHP under Criterion A and the CRHR under Criterion 1 because it exhibits two possible but highly decomposed fish traps and lies several miles northwest of the Southwest Lake Cahuilla Recessional Shoreline Archaeological District which was listed on the NRHP in 1999 under Criteria A and D. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 111: CA-IMP-13025 (RK-35)
Description: Possible fish traps or habitations and an artifact scatter
Period: Late Prehistoric era
Dimensions: 510 m (NW/SE) by 175 m (NE/SW), with unspecified depth
Jurisdiction: BLM/California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This is a long linear site bearing an artifact scatter, three sandstone slab features (Features 1, 2, 3), one collapsed and likely prehistoric cairn (Feature 4), a small, possibly modern fire-ring (Feature 5) and one probable modern cairn (Feature 6). The three sandstone slab features were deemed "fish traps" in the field but since ceramic artifacts were in direct association (usually a fish trap foundation exhibits few nearby artifacts), it is also possible that these represent decomposed habitation foundations; Feature 3 exhibits numerous upright and collapsing sandstone slabs. Fifty-three pieces of debitage were observed and there were 59 point-located artifacts including stone tools, rimsherds and ground stones. Most of the point-located artifacts were thinly scattered about the site boundary and not in direct association with the Features. A few non-human mammal bones were noted, and a fossilized non-human patella and long bone was also observed[5]. A small amount of historic or modern trash and one .50 caliber clip was observed. Survey and recording visibility neared 100% and a few creosote bushes are within the site boundary. The western-most edge of the site has begun to erode into quickly-developing slot washes and although there is some evidence of off-roading, the tracks have not affected the known resources. [redacted] The site boundary will be avoided by vibroseis paths and source points by at minimum 71.6 meters.

[5] The fossils were located at UTM 598611mE/3676460mN and were inspected by the tribal monitor.

Eligibility Recommendation
Because there is potential that prehistoric data is buried below the modern ground surface, this site is considered eligible to the NRHP under Criterion D and the CRHR under Criterion 4. The site is also considered eligible to the NRHP under Criterion A and the CRHR under Criterion 1 because it exhibits two or three possible sandstone slab fish traps and lies several miles northwest of the Southwest Lake Cahuilla Recessional Shoreline Archaeological District which was listed on the NRHP in 1999 under Criteria A and D. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 112: CA-IMP-13026 (RK-36)
Description: Artifact scatter
Period: Possible Late Prehistoric era
Dimensions: 93 m (E/W) by 62 m (N/S), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a sparse artifact scatter on a flat [redacted]. Five pieces of debitage, one rimsherd, a cobble tool and one bullet, all wind-abraded, were recorded at the site. Visibility during the survey was 99%; a few low dunes and the sandstone outcrop alignments were observed but the topsoil is quite rocky. Virtually no vegetation save for a few creosote bushes was seen inside the site boundary. Several off-road tracks were observed inside the site boundary and wind erosion is formidable. The site boundary will be avoided by vibroseis paths and source points by at minimum 14.3 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 113: CA-IMP-13027 (RK-37)
Description: Temporary encampment
Period: Uncertain Prehistoric period
Dimensions: 145 m (W/E) by 92 m (N/S), with unspecified depth
Jurisdiction: California State Parks/BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This is a probable longer-term encampment located on a flat [redacted]. The site bears Activity Locus 1, three highly deflated probable thermal features (Features 1, 3 and 4), and a cleared area within a bedrock outcrops (Feature 2) exhibiting a few partially upright sandstone slabs. Activity Locus 1 is an area that suggested more intensive stone tool use compared to the rest of the site. The southern part of the site lies on a high point [redacted] and gradually slopes to the north and west with slight drainage dissection and washing to the north. This site bears numerous off-road vehicle tracks; it is in an area accessible to the public, and the site has an extreme amount of sand transport evident with loose blowing topsoil occurring between and amongst linear sandstone outcrops. The lack of ceramics and the existence of one mano bearing tufa suggests the site was inundated at one time by Lake Cahuilla before the Late Prehistoric period. Most flaked stone artifacts

appear to have been heavily sand-blasted as most of the sharp edges are dulled. The site boundary will be avoided by vibroseis paths and source points by at minimum 13.6 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 114: CA-IMP-13028 (RK-38/55)
Description: Long term prehistoric encampment and fish trap foundations plus a probable 1942-3 metal scatter
Period: Likely Late Prehistoric era / World War II period metal debris
Dimensions: 790 m (NW/SE) by 150 m (NE/SW), with unspecified depth
Jurisdiction: BLM/California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This is a probable long-term encampment with several fish trap foundations on a flat overlooking a quickly-eroding slot wash [redacted]. The site exhibits eight thermal features in various stages of decomposition (Feature 1, 2, 5, 6, 8, 10, 11, 13), three possible fish trap structures (Feature 3, 7, 14), a possible cairn (Feature 4), and two rock rings (Feature 9 and 12). Many of these features are on or very near a long northwest-southeast trending sandstone outcrop that represents the high point or backbone of the site paralleling the slot wash. Feature 1 is surrounded by a set of tools and debitage and may represent a decomposed habitation area centered on the hearth. A total of about 50 artifacts are directly associated with each of the 14 features but most of the 300+ pieces of debitage, body sherds and 38 point-located tools and rimsherds lie outside of the features. Various types of rock materials are represented in the debitage assemblage. Bleached non-human bones were observed, as well as 1942-1943 bullets and metal fragments. Survey visibility neared 100% and a few creosote bushes are within the site boundary. The periphery of the site has begun to erode into quickly-developing slot washes and although there is some evidence of off-roading, tracks have not affected the known resources. The site boundary will be avoided by vibroseis paths and source points by at minimum 7 meters.

Eligibility Recommendation
Because there is potential that prehistoric data is buried below the modern ground surface, this site is considered eligible to the NRHP under Criterion D and the CRHR under Criterion 4. The site is also considered eligible to the NRHP under Criterion A and the CRHR under Criterion 1 because it exhibits two possible but highly decomposed fish traps and lies several miles northwest of the Southwest Lake Cahuilla Recessional Shoreline Archaeological District which was listed on the NRHP in 1999 under Criteria A and D. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 115: CA-IMP-13029 (RK-39)
Description: Short-term encampment
Period: Unspecified Prehistoric era
Dimensions: 240 m (N/S) by 177 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a sparse prehistoric lithic scatter and one possible decomposed hearth (Feature 1) on a flat [redacted]. A total of 29 point-located stone tools and ground stones were recorded at the site, as well as 31 pieces of debitage. Feature 1 is a small low rock ring and may be a deflated hearth. No artifacts were associated with this feature. Visibility during the survey was 98%; a few low dunes and sandstone outcrops were observed, and little vegetation save for a few creosote bushes and saltbush was seen inside the site boundary. A few low washes cross the site, gravels cover the topsoil, and several well-used off-road tracks cross the southern portion of the site. The site boundary will be avoided by vibroseis paths and source points by at minimum 9.5 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 116: CA-IMP-13030 (RK-40)
Description: Artifact scatter
Period: Possible Late Prehistoric era
Dimensions: 54 m (E/W) by 206 m (N/S), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a prehistoric artifact scatter located on a flat between two low tributaries [redacted]. The site rests mostly upon sandstone bedrock exposures. The point-located artifact count included five quartzite tools and one buffware rimsherd. The site-wide debitage count included two chert flakes, six tested quartzite cobbles and 15 quartzite flakes. Visibility during the survey was 100%; a few low dunes and sandstone outcrops were observed but the topsoil is quite rocky rather than silty-sandy. Virtually no vegetation save for a few creosote bushes was seen inside this site boundary. Several off-road tracks were observed inside the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 24.6 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 117: CA-IMP-13031 (RK-41)
Description: Artifact scatter
Period: Unspecified Prehistoric era
Dimensions: 136 m (E/W) by 65 m (N/S), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a prehistoric artifact scatter located on a flat between two low tributaries [redacted] The resource rests mostly upon sandstone bedrock exposures. The artifact count included two formal stone tools plus 15 quartzite and chert debitage from early reduction stages. Visibility during the survey was 100%; a few low dunes and sandstone outcrops were observed. Virtually no vegetation save for a few creosote bushes was seen inside this site boundary. Several off-

road tracks were observed inside the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 41.2 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 118: CA-IMP-13032 (RK-42)
Description: Short-term encampment
Period: Likely Late Prehistoric period
Dimensions: 110 m (E/W) by 185 m (N/S), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a dispersed artifact assemblage with one activity Locus on a slight rise [redacted] The site is surrounded on the north, east and west by washes, [redacted]. Locus 1 contains stone tools, ground stones, 11 pieces of debitage, tested cobbles and sandstone cobbles, and tabular chunks of sandstone suggestive of a deflated thermal feature. There is no sign of burning, charcoal or ash in this Locus. The non-locus areas of the site contain 25 point-located artifacts including ceramics, and the non-point located tally contained 63 pieces of debitage and one buffware potsherd. Visibility during the survey was 99%; a few low dunes and sandstone outcrops were observed. Virtually no vegetation save for a few creosote bushes and some saltbush was seen inside this site boundary. Several off-road tracks were observed inside the site boundary and their damage to the site appears minimal. The site boundary will be avoided by vibroseis paths and source points by at minimum 53.1 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 119: CA-IMP-13033 (RK-44)
Description: Dispersed artifact scatter and deflated hearths
Period: Likely Late Prehistoric era.
Dimensions: 720 m (E/W) by 630 m (N/S), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a very large and dispersed artifact assemblage on the slight topographic rise between [redacted] watersheds. The site is surrounded on the north, east and west by slowly developing washes which flow mostly [redacted] to the northwest. There are five identified features: three deflated thermal features, one partially upright sandstone slab feature, and one cairn. More than 160 individual tools were point-located, and more than 200 pieces of debitage plus a few potsherds were recorded. Small dunes exist on site, and exposed sandstone bedrock outcrops are plentiful. Visibility during the survey was 99%; a few low dunes and sandstone outcrops were noted. Little vegetation save for a few creosote bushes and some saltbush was seen inside this site boundary.

Several off-road tracks were observed inside the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 11.6 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 120: CA-IMP-13034 (RK-45)
Description: Unusual "room block" and midden site
Period: Unspecified Prehistoric era
Dimensions: 74 m (E/W) by 80 m (N/S), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is located on a ridgy, slightly dissected flat bearing what appears to be a unique habitation "roomblock" composed of rectangular sandstone slab alignments plus a "midden" of ashy soil and artifacts a few meters south of the roomblock. The sandstone slab structure , Feature 1, has a cleared area in the center of each of the six "rooms" and the set of slabs take on a waffle-iron pattern. If the stones were originally upright, each stone have fallen, and the north trending axis of the "roomblock" sits on about a 300-degree line. This feature probably reflects short term habitation: there is no evidence of interior burning and the rooms themselves lack artifacts. Numerous tabular outcrops exist in this area the structure was likely made by simply lifting those slabs from nearby outcrops and moving them into position; the feature is visible on the 2016 Google Earth aerial imagery. The interiors of the "rooms" appear to have been cleared of stones and gravel, but silt and sand cover the feature interiors so there may be some aeolian depth after abandonment. None of the slabs are burned and all corners of the sandstone slabs are weathered. Feature 2 is an area of ashy soil in a slight depression about 5.0 x 3.7 meters in size (possibly a thermal feature), a few meters south of Feature 1. The possibility that these are very recently constructed Features is real; most prehistoric thermal features that could have borne ash/charcoal in this Project Area have long since blown away leaving no ash behind. On the other hand, there are no historic-era artifacts at all. Six point-located stone tools were noted along with 27 pieces of debitage. The site boundary will be avoided by vibroseis paths and source points by at minimum 30.6 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 121: CA-IMP-13035 (RK-47)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 90 m (N/S) by 95 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a sparse prehistoric lithic scatter on a flat [redacted] amongst exposures of sandstone bedrock. Two formal stone tools plus nine quartzite and one metavolcanic flake were identified. Visibility during the survey was 98%; a few low dunes and sandstone outcrops were observed, and little vegetation save for a few creosote bushes and saltbush was seen inside the site boundary. A few low washes cross the southeastern part of the site and a well-used off-road track crosses the northwestern part of the site. The site boundary will be avoided by vibroseis paths and source points by at minimum 13.5 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 122: CA-IMP-13036 (RK-48)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 90 m (N/S) by 95 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a sparse prehistoric lithic scatter located on a flat [redacted] amid exposures of sandstone bedrock. Four formal stone tools plus 12 pieces of debitage, all of quartzite, were recorded at the site. Visibility during the survey was 98%; a few low dunes and sandstone outcrops were observed, and little vegetation save for a few creosote bushes and saltbush was seen inside the site boundary. A few low washes cross the site and several well-used off-road tracks cross the eastern part of the site. The site boundary will be avoided by vibroseis paths and source points by at minimum 21.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 123: CA-IMP-13037 (RK-49)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 245 m (N/S) by 135 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a large sparse prehistoric lithic scatter on a flat [redacted] amid exposures of sandstone bedrock. A deepening slot wash that runs north into Tule Wash is located at the western site boundary. Twenty point-located stone tools and 49 pieces of debitage were observed at the site. Visibility during the survey was 98%; a few low dunes and sandstone outcrops were observed, and little vegetation save for a few creosote bushes and saltbush was seen inside the site boundary. A few low washes cross the site and several well-used off-road tracks cross the eastern part of the site. The site boundary will be avoided by vibroseis paths and source points by at minimum 12.8 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 124: CA-IMP-13038 (RK-50)
Description: Temporary encampment
Period: Unspecified Prehistoric era
Dimensions: 320 m (N/S) by 290 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a large sparse prehistoric lithic scatter plus several deflated features on a flat [redacted]. Features recorded at the site included two deflated heaths (Features 1 and 2) and two possible rock rings (Features 3 and 4). The artifact count included 51 point-located stone tools plus 59 pieces of debitage; most of the material was quartzite. Many of the artifacts appeared sand-abraded. Visibility during the survey was 100%; a few low dunes and sandstone outcrops were observed, and there was very little vegetation inside the site boundary. A few low washes cross the site and several well-used off-road tracks truncate the eastern margin of the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 12.7 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 125: CA-IMP-13039 (RK-51)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 38 m (N/S) by 65 m (E/W), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a very small prehistoric lithic scatter on a flat [redacted]. A deepening wash that runs north [redacted] is located along the eastern site boundary. Although numerous off-road vehicle tracks can be seen in this area, none cross the site boundary. Four point-located stone tools and two pieces of debitage were observed at the site. Visibility during the survey was 100%; a few low dunes and sandstone outcrops were observed near the site, and no vegetation was seen inside the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 5.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 126: CA-IMP-13040 (RK-52)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 77 m (N/S) by 67 m (E/W), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a very small prehistoric lithic scatter located on a gravelly flat [redacted]. Deepening washes run north [redacted] along the eastern and western site boundaries. One cluster of cobbles was observed and thought to represent a hearth, but none appear to be fire-affected. Iron slag/nodules were observed in the cluster of cobbles. Three point-located stone tools plus three pieces of debitage were observed at the site. Visibility during the survey was 100%; a few low dunes and sandstone outcrops were observed near the site, and no vegetation was seen inside the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 48.6 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 127: CA-IMP-13041 (RK-54)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 120 m (N/S) by 110 m (E/W), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a sparse lithic scatter on a flat between two slot-wash tributaries [redacted]. Nineteen quartzite and one Wonderstone flake were identified at the site; the quartzite likely originated from nearby quartzite cobble outcrops. Visibility during the survey was 100% and virtually no vegetation save for a few creosote bushes was seen inside this site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 9.8 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 128: CA-IMP-11033 (RK-55)
Description: Lithic scatter and historic metal deposit
Period: Unspecified Prehistoric era / World War II period metal trash
Dimensions: 120 m (N/S) by 110 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is located at the northern tip of an SVRA fenced area [redacted] and, according to the SCIC records search GIS database, the RK55 site boundary encompasses several previously recorded isolated artifacts, some of which were reencountered. Site RK55 envelopes P13-12494 (mano, not relocated), P13-12495 (three historic cans, not relocated), P13-12496 (flake, possibly relocated), P13-12497 (flake, possibly relocated), and P13-12634 (two isolates, one of which was possibly relocated). Additional cultural resources were found inside the RK55 site boundary. This site is a prehistoric lithic scatter on a flat [redacted], between two slot-wash tributaries [redacted]. Off-road use of the area as likely damaged the integrity of the site. Eleven pieces of debitage including quartzite, quartz, Wonderstone and metavolcanic materials were recorded at the site, as well as a .50 caliber clip and casing, and a rocket ignitor. Visibility during the survey was 100% amid a few creosote bushes inside this site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 29.4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 129: CA-IMP-13042 (RK-57)
Description: Small cobblestone feature site, possibly two fish trap foundations
Period: Unspecified Prehistoric era
Dimensions: 35 m (N/S) by 5 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site consists of two cobblestone features, possibly fish trap foundations or highly decomposed hearths. The site is bisected by road segment E of site P13-14306 and is located on a cobbly flat [redacted]. The site is subject to extreme wind erosion. The cobble structures, Feature 1 and 2, appear undisturbed but are not accompanied by any prehistoric or historic artifacts; experienced comparison with similar cobblestone features at other Truckhaven survey sites suggested these may be dec0mposed fish trap foundations. Ground visibility during the survey was 99%, with vegetation including creosote, saltbush, and other desert scrub brush. It is possible that modern or historic-era bulldozing of Road E in site P13-14306 damaged other prehistoric components of this site. Off-roading impacts in this area are common, but no recent tracks were observed inside the site boundary. No prehistoric artifacts were observed. The site boundary will be avoided by vibroseis paths and source points by at minimum 61.4 meters.

Eligibility Recommendation
Because there is potential that prehistoric data is buried below the modern ground surface, this site is considered eligible to the NRHP under Criterion D and the CRHR under Criterion 4. The site is also considered eligible to the NRHP under Criterion A and the CRHR under Criterion 1 because it exhibits two possible fish traps and lies several miles northwest of the Southwest Lake Cahuilla Recessional Shoreline Archaeological District which was listed on the NRHP in 1999 under Criteria A and D. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 130: CA-IMP-13043 (RK-58)
Description: Artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 16 m (N/S) by 58 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a prehistoric artifact scatter located on a silty flat between washes that lead north [redacted]. An exhausted core, a battered cobble and a mano were observed at the site, as well as one brownware body sherd. Several quartzite flakes, one chert and one metavolcanic flake were also observed as was a set of three burned cobblesd. Inside the site boundary, visibility was 100% and there is no vegetation. Off-roading impacts to the site are substantial. The site boundary will be avoided by vibroseis paths and source points by at minimum 25.1 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 131: CA-IMP-13044 (RK-59)
Description: Lithic scatter.
Period: Unspecified Prehistoric era.
Dimensions: 84 m (N/S) by 39 m (E/W), with unspecified depth
Jurisdiction: California State Parks/California State Lands Commission
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a prehistoric lithic scatter located on a gravelly flat bearing several sandstone bedrock exposures adjacent to [redacted] State Route 86 [redacted]. Five formal stone tools and 13 pieces of debitage, mostly quartzite primary stage flakes were identified. One bottle base was also observed, likely associated with highway trash deposits common to this area. The site boundary has been crossed repeatedly by off-roading vehicles and the site may have been disturbed by State Route 86 construction. Survey visibility was 99% with sparse creosote and saltbush inside the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 9.3 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 132: CA-IMP-12990 (RK-60)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 62 m (SW/NE) by 22 m (NW/SE), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small debitage scatter consisting of three quartzite flakes located on a slight rise in a flat [redacted] and this site now incorporates isolate P13-12634. The area bears numerous off-road tracks, very low washes and extremely sparse creosote vegetation. The off-roading activity has probably disturbed much of the site. This site is near the northeast corner of an SVRA fenced off area, which leads to high use of the area for off-roading. Ground surface visibility was 100% during the survey. The site boundary will be avoided by vibroseis paths and source points by at minimum 3.4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 133: CA-IMP-12920 (S-04-001)
Description: Cairn and lithic isolate
Period: Unspecified Prehistoric era
Dimensions: 3 m (N/S) by 1 m (E/W), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a possible prehistoric sandstone feature (cairn or possible hearth). One possible quartzite scraper was recorded approximately one-meter south of the feature. There is a higher abundance of dark red and possibly heat-impacted rhyolite in proximity to the feature. The rhyolite was of a type that was unobserved elsewhere in the vicinity, so may be a prehistoric import. Survey visibility was 99% and vegetation consisted of creosote bush scrub. The site boundary will be avoided by vibroseis paths and source points by at minimum 18.2 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 134: CA-IMP-12921 (S-04-002)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 16 m (N/S) by 11 m (E/W), with unspecified depth
Jurisdiction: California State Lands Commission
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site consists of a single quartzite hammerstone and five quartzite flakes located in a very dispersed area adjacent to an ephemeral wash. The site has been heavily eroded and impacted due to natural weathering. The wash is directly to the northwest and the lake flat upon which the site rests bears rare creosote and saltbush. No features were observed, and survey visibility was 99%. The site boundary will be avoided by vibroseis paths and source points by at minimum 21.2 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 135: CA-IMP-12922 (S-04-003)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 16 m (N/S) by 11 m (E/W), with unspecified depth
Jurisdiction: California State Lands Commission
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is lithic reduction site located on a very slight rise amongst rills and washes. Observed tools include one basalt core, one "Stage 4 preform" (a possible Cottonwood projectile point preform), and two massive quartzite cores. Debitage consisted of four quartzite primary flakes, two secondary quartzite flakes, and one quartz core. The creosote bush scrub is very sparse and there are some mesquite and saltbush in the area, affording 95% ground surface visibility. The site boundary will be avoided by vibroseis paths and source points by at minimum 14.6 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 136: CA-IMP-12923 (S-04-004)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions:100 m (NW/SE) by 45 m (NE/SW), with unspecified depth
Jurisdiction: California State Lands Commission
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a widely dispersed lithic scatter [redacted]. Fifty-one pieces of quartzite debitage, possible cores, hammerstones, and one or two stone tools were observed in the site boundary. There are also a few possible hammerstones present; each were difficult to discern compared to the naturally occurring quartzite cobble outcrops that little this site. There does not appear to be any fire-treated lithics or thermal features. No ceramics were identified. The site appears to represent a local cobble testing area. It is a highly disturbed area due to natural erosion and some bulldozing, as evidenced by push piles. Survey visibility was 100% and vegetation consisted of but a few creosote bushes. The site boundary will be avoided by vibroseis paths and source points by at minimum 14.2 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield

information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 137: CA-IMP-12924 (S-04-005)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 76 m (N/S) by 48 m (E/W), with unspecified depth
Jurisdiction: California State Lands Commission
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a lithic scatter including 18 pieces of mostly quartzite debitage, and three stone tools including one rhyolite projectile point, one black metavolcanic biface, and one hammerstone. One red chert flake and a quartz crystal were also identified. The site is located on a desiccated lake flat with washes trending to the northeast. The vegetation consists of a very sparse creosote bush scrub. Survey visibility neared 100%. The site boundary will be avoided by vibroseis paths and source points by at minimum 9.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 138: CA-IMP-12925 (S-04-006)
Description: Short term encampment
Period: Likely Late Prehistoric era
Dimensions: 18 m (N/S) by 27 m (E/W), with unspecified depth
Jurisdiction: Private/California State Lands Commission
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small lithic reduction site located on a sandstone-slab-covered flat. One activity locus (Locus A) was recorded in the southeast portion of the site. Locus A contains five quartzite core fragments, three brownware potsherds including one rimsherd, and 21 core reduction flakes. Outside of Locus A, the site bears an additional 14 pieces of quartzite debitage. Primary flakes dominate the total lithic assemblage with several secondary and a few tertiary flakes observed. Survey visibility was 99%, as there are many sandstone slabs present, and sparse creosote bush scrub is in the vicinity. A few pieces of modern trash are present on site with the main impacts consisting of possible alluvial movement of artifacts and wind erosion (sand-blasting). The wind abrasion has burnished and dulled most of the stone artifacts on the site. The site boundary will be avoided by vibroseis paths and source points by at minimum 21.1 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 139: CA-IMP-12926 (S-04-007)
Description: Short-term encampment
Period: Possibly Late Prehistoric era
Dimensions: 80 m (N/S) by 72 m (E/W), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site bears a large sparse lithic, ground stone and ceramic scatter with one possible thermal feature. Heavily weathered tabular sandstone and quartzite cobbles are common throughout the site. Quartzite debitage consists primarily of early stage reduction flakes and the many hammerstones on this site suggested that primary flakes and perhaps flaked tools produced from the observed cobbles. Two choppers, one scraper, one exhausted core and four hammerstones were point-plotted. Ground stone artifacts observed at the site include eight manos and one sandstone metate. Three potsherds (two brownware and one buffware), were observed. The artifact density is somewhat higher in the east portion of the site where Feature 1, a possible thermal feature, is located. A charcoal stain observed 10 meters east of this site was observed, although no artifacts nor rocks were observed in association with the stain. The area is flat with low washes and a healthy creosote bush scrub biota. The survey exhibited 97% visibility. The site boundary will be avoided by vibroseis paths and source points by at minimum 30.5 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 140: CA-IMP-12927 (S-04-010)
Description: Ceramic and stone tool scatter
Period: Likely Late Prehistoric era
Dimensions: 96 m (N/S) by 141 m (E/W), with unspecified depth
Jurisdiction: California State Lands Commission
NRHP/CRHR Eligibility Recommendation: Considered Eligible

This site is a prehistoric artifact scatter [redacted]. Late 1960's trash (cans and miscellaneous machine parts), and modern trash are scattered through the site due to its near proximity to State Route 86. A total of 51 fragments of ceramics were identified; 40 buffware and 11 brownware body sherds, including two buffware rim fragments. Stone tools included a quartzite chopper, two secondary quartzite flakes, one granitic hammerstone, one sandstone metate fragment. Vegetation consists of an extremely sparse creosote bush scrub and survey visibility was 100%. The site boundary will be avoided by vibroseis paths and source points by at minimum 9.6 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 141: CA-IMP-12928 (S-04-012)
Description: Small ceramic scatter
Period: Late Prehistoric era
Dimensions: 23 m (N/S) by 20 m (E/W), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small scatter of five buffware potsherds [redacted]. Disturbance in this area is extreme, resulting from modifications for [redacted] ditches, changes to natural channels, dirt road construction, and off-roading use. Vegetation is nonexistent within the site boundary and the site and survey visibility was 100%. The site boundary will be avoided by vibroseis paths and source points by at minimum 5 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 142: CA-IMP-12929 (S-04-013)
Description: Short-term encampment
Period: Likely Late Prehistoric era
Dimensions: 80 m (N/S) by 120 m (E/W), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a short-term encampment located in a dunal area [redacted]. A small deflated hearth and many fragments of pumice were observed at the site, as well as a few ceramics sherds, debitage, and various stone tools. Some of the pumice has likely eroded out of the deflated hearth and re-scattered throughout small drainages leading downstream from the hearth. The site is subject to severe wind erosion. Off-road vehicle use in this area is common. Visibility during the survey was 95% amid creosote bush scrub vegetation. The site boundary will be avoided by vibroseis paths and source points by at minimum 12.2 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 143: CA-IMP-10140 (P13-11134 or TW-1)
Description: Abandoned well and Prehistoric artifact scatter
Period: Multi-component: historic development era/likely Late Prehistoric era
Dimensions: 60 m (N/S) by 130 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This resource is a multi-component site consisting of a small prehistoric artifact scatter and a previously recorded historic water well feature (P#13-11134) with a decomposing concrete slab and water pipe/valve exposed to view. The prehistoric component of the site consists of a scatter of artifacts containing four chert flakes, one Wonderstone scraper, and ten potsherds (two of which retrofit). The site located is at the edge of a dissected bench that is eroding toward the east [redacted]. Many off-roading trails cross the site and have impacted the ground surface. A spring occurs in this area, and the well is at the southern edge of a small wash in that area. [redacted] The site boundary will be avoided by vibroseis paths and source points by at minimum 18.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 144: CA-IMP-12930 (TW-2)
Description: Artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 31 m (N/S) by 30 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This prehistoric site contains 15 potsherds, a mano, and a single quartzite flake near a large burned tamarisk. The site is situated on a bench with a series of washes merging [redacted] to the east. The tamarisk burn is within the northern portion of the site and no features were observed. Arroyo Salada is 60 to 75 m to the north, and an unnamed north to south trending wash is 15 meters to the east. The site is heavily disturbed by machinery and off-road tracks, as evidenced by push piles and tire tracks throughout. The site boundary will be avoided by vibroseis paths and source points by at minimum 42.5 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 145: CA-IMP-12931 (TW-3)
Description: Artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 40 m (NW/SE) by 26 m (NE/SW), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site contains a small prehistoric ceramic scatter near the northwest edge of the site boundary, and one quartzite scraper about 30 meters to the south-southeast of the ceramics. No features were observed. The site is on a cobbly flat with gently rolling sand dunes amidst sparse brush. An unnamed

off-road vehicle trail within a wash is approximately five meters north of the site. Survey visibility was 99% and the site bears creosote bush scrub with saltbush and sand dunes. The site boundary will be avoided by vibroseis paths and source points by at minimum 15.8 meters.

Eligibility Recommendation

This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 146: CA-IMP-12932 (TW-4)
Description: Abandoned well and small artifact scatter
Period: Historic development era / unspecified Prehistoric era
Dimensions: 30 m (N/S) by 58 m (E/W), with unspecified depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This resource is a multi-component site on a bench overlooking an unnamed wash used as an off-road vehicle trail. A natural spring is located about 110 meters to the southeast. The historic component consists of an iron (well head) pipe punched into the ground, fragmentary concrete slabs, and milled lumber. The prehistoric component consists of a nearly complete leaf-shaped projectile point and a thumbnail scraper, both of which are made of black basalt. Off-road traffic in this area has disturbed the topsoil and a dirt road was bladed to the well from the wash to the east. Survey visibility was 100% and almost no vegetation exists inside the site except a few saltbushes. The site boundary will be avoided by vibroseis paths and source points by at minimum 11.9 meters.

Eligibility Recommendation

This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed

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Site 147: CA-IMP-12933 (TW-5)
Description: Large artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 110 m (N/S) by 60 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This large artifact scatter is located on a relatively flat, cobble covered bench just south of a bladed road and approximately 150 meters north of a spring. Cultural components of the site include at least 150 brownware and buffware potsherds, including six rimsherds. The site holds at least 18 pieces of debitage, mostly quartzite. Individually plotted tools include one edge-modified flake, two scrapers, one hammerstone, one biface, one core, one chopper, and two manos. There are no features. Small, braided ephemeral washes and drainages intertwine throughout the site and off-road tracks impact the topsoil. Natural sandstone outcroppings and cobbly alluvium are also located throughout the site. Ground visibility during the survey was 99%, and the creosote and saltbush vegetation was very

sparse. The site boundary will be avoided by vibroseis paths and source points by at minimum 35.8 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 148: CA-IMP-12934 (TW-8)
Description: Artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 110 m (N/S) by 60 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small artifact scatter on a sandy/sily flat located [redacted] in very slightly rolling rills and sand dunes covered in very sparse creosote and salt bush. Seven brownware potsherds, eleven pieces of debitage, one mano and one tested cobble were recorded at the site. Ground visibility was 99% during the survey. Sparse creosote is located in this area. The site boundary will be avoided by vibroseis paths and source points by at minimum 40.3 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 149: CA-IMP-12935 (TW-9)
Description: Lithic scatter
Period: Likely Late Prehistoric era
Dimensions: 110 m (N/S) by 60 m (E/W), with unspecified depth
Jurisdiction: California State Parks/BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

The site is a scatter of 24 pieces of debitage, two wind-burnished basalt projectile points, two pieces of ground stone, and eight tested cobbles. A small looters pile and a modern sandstone cairn are 25 meters north of the site boundary; a few artifacts may have been moved from the site to this spot. This site is on an open flat with gently rolling sand dune hills and low-lying sandstone outcrops. A shallow unnamed wash trends north-to-south along the eastern side of the site, and ephemeral washes cross the site, draining into the wash. A well-used off-road trail runs north-to-south along the western side of the site and additional off-road impacts were observed. Ground visibility during the survey was 99% due to low dunes, sparse creosote and other types of low-lying desert vegetation. The site boundary will be avoided by vibroseis paths and source points by at minimum 4.2 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 150: CA-IMP-12936 (TW-10)
Description: Artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 70 m (N/S) by 50 m (E/W), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This small artifact scatter is located on a bench and slope north of a narrow arroyo. The site contains a sparse scatter of 11 flakes, eight ceramic brownware potsherds, and six individually recorded artifacts including one unmodified crystal. Ground visibility during the survey was 99%, and only slightly obscured due to creosote. An unnamed off-road trail runs north to south along the eastern site boundary, and another ephemeral wash trends north-to-south, bisecting the site. The terrain includes sandstone outcrops and creosote throughout. No features were observed. Site TW-11 is due south across the arroyo, which separates the sites topographically. The site boundary will be avoided by vibroseis paths and source points by at minimum 5.8 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 151: CA-IMP-12937 (TW-11)
Description: Artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 25 m (N/S) by 43 m (E/W), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small lithic and ceramic scatter located on a heavily cobbled and eroding granitic and sandstone bench overlooking a 10-foot-deep slot wash to the north. Identified cultural constituents include three potsherds, three pieces of debitage, and one mano fragment. Ground visibility was 100%, with very sparse creosote in the vicinity. Small ephemeral washes drain into the large wash, and eroding finger ridges separate all the artifacts at the site. A second slot wash is to the south. An east-to-west running off-road vehicle trail is five meters south of the southern site boundary and off-road use in this area is heavy. The site boundary will be avoided by vibroseis paths and source points by at minimum 4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield

information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 152: CA-IMP-12938 (TW-12)
Description: Artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 40 m (N/S) by 45 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This artifact scatter is located on a bench approximately 30 m south of the edge of a slot wash. The site boundary contains ephemeral braided drainages leading to the wash and the identified cultural constituents consist of six buffware potsherds, one quartzite bi-facially worked mano, and a Wonderstone edge-modified flake. Ground visibility during the survey was 100%, with very sparse creosote and salt bush in the vicinity. The site boundary will be avoided by vibroseis paths and source points by at minimum 20 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 153: CA-IMP-12939 (TW-13)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 95 m (NW/SE) by 50 m (NE/SW), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

The site is a small lithic scatter located on a flat covered with cobbles and blow sand with low ephemeral drainages alongside the north, east, and southern edges of the site boundary. Three pieces of debitage, one quartzite scraper, and one quartzite core were recorded at the site. A faint off-road vehicle trail runs through the middle of the site and other off-roading damage was observed in the area. Ground visibility during the survey was 100%, as virtually no vegetation is growing within the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 37.1 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 154: CA-IMP-12940 (TW-14)
Description: Artifact scatter
Period: Unspecified Prehistoric era artifacts plus historic-era metal trash
Dimensions: 95 m (NW/SE) by 50 m (NE/SW), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This small artifact scatter is located on a sandstone outcrop surrounded by relatively flat terrain and gently rolling sand dunes. The site is bisected by an ephemeral wash trending north-to-south. The prehistoric component consists of four primary quartzite flakes, one fragmented chert scraper, and one quartzite tested cobble/core. The prehistoric artifacts are heavily wind-abraded. The historic components include four church-key-opened cans and seven pieces of milled lumber of varying sizes. Ground visibility during the survey was 100%, with sparse creosote in the vicinity. The site boundary will be avoided by vibroseis paths and source points by at minimum 31.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 155: CA-IMP-12941 (TW-15)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 47 m (N/S) by 30 m (E/W), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

The site is a small lithic scatter in a highly disturbed area [redacted]. Three quartzite core tools and one quartzite flake were observed and there are no features. The terrain is flat and gravelly, with very shallow ephemeral drainages throughout, mostly trending north to south. The area appears to be used for backing up and/or turning around of automobiles and off-road vehicles. Ground visibility during the survey was 100%, as there is no vegetation is in the area. A modern fire pit is near the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 11.4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site, therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 156: CA-IMP-12942 (TW-16)
Description: Artifact scatter and metal debris
Period: Likely Prehistoric era / World War II era metal debris
Dimensions: 150 m (N/S) by 75 m (E/W), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This artifact scatter may represent a small temporary encampment. Seventeen potsherds, 25 pieces of debitage, and 15 lithic and ground stone point-located artifacts were recorded at the site. The site is located on an exposed sandstone outcrop on a gravelly, cobbled flat, with scattered low-lying sandstone outcrops, gently rolling sand dunes and rills, and an east-to-west trending ephemeral wash running through the site. A variety of World War II-era metal debris is also present and is probably related to the nearby Winona I practice range. Ground visibility during the survey was 99%, with very sparse creosote, saltbush, and desert scrub and grasses visible. The site boundary will be avoided by vibroseis paths and source points by at minimum 36.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 157: CA-IMP-12943 (TW-17)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 60 m (NW/SE) by 18 m (NE/SW), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This small site is a lithic scatter located on a gravelly, cobbled flat, with very gently rolling sand dunes and sandstone outcrops. Three secondary quartzite flakes and two tested cobbles were identified at the site. A lightly used off-road vehicle trail runs north-to-south through the site, and a small ephemeral wash runs along the eastern, western, and southern boundaries. Ground visibility during the survey was 99%, and sparse creosote comprises the only vegetation in the area. The site boundary will be avoided by vibroseis paths and source points by at minimum 50.4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 158: CA-IMP-12944 (TW-18)
Description: Prehistoric artifact scatter and likely military metal debris
Period: Late Prehistoric era / World War II era
Dimensions: 41 m (N/S) by 55 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site consists of one potsherd, six pieces of debitage, and one granitic mano located on a heavily cobbled, gravelly flat with sandstone outcroppings. Use of the area for military activity during World War II is evident as there were three pieces of historic-era metal observed. Low lying sand dunes and rills are present throughout the site, as well as a northeast-to-southwest trending ephemeral wash that crosses the southeastern edge of the site. Ground visibility during the survey was 95% due to sand

and the occasional creosote bush. The site boundary will be avoided by vibroseis paths and source points by at minimum 51.4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 159: CA-IMP-12945 (TW-20)
Description: Artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 63 m (NE/SW) by 18 m (SE/NW), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site includes two manos, one primary quartzite flake, and three potsherds that can be retrofit located on the banks of and within the junction of an enlarging wash that generally runs from west to east. The former Lake Cahuilla flat in this area has been dissected by a series of washes with eroding finger ridges and low-lying sand dunes between them. Vegetation is very sparse; two creosote bushes are within the site boundary, and ground visibility was 100% during the survey. Artifacts in the site occur in a linear fashion and were probably transported during a flooding event. The site boundary will be avoided by vibroseis paths and source points by at minimum 24.9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 160: CA-IMP-12946 (TW-21)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 37 m (NW/SE) by 18 m (NE/SW), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site consists is a small lithic scatter located on the banks of and within a northwest to southeast trending ephemeral wash. Identified artifacts include one large quartzite tested cobble, one quartzite scraper, and one gray primary quartzite flake. An off-road vehicle track crosses the site. The cobbled, gravelly terrain is characterized by gently rolling sand dunes, sandstone outcrops, and eroding finger ridges. Survey visibility was 99% and rare creosote bushes were on the site. The site boundary will be avoided by vibroseis paths and source points by at minimum 21.4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield

information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 161: CA-IMP-12947 (TW-22)
Description: Artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 100 m (NW/SE) by 43 m (NE/SW), with unspecified depth
Jurisdiction: BLM/California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

Several survey discoveries were merged into site TW-22 in the lab due to their proximity to each other on a relatively flat but cobbly mesa bearing scattered sandstone outcrops. The site consists of a sparse artifact scatter including 14 pieces of debitage and at least 24 buffware potsherds, including several large sherds in a "pot drop" tucked beneath a sandstone outcrop. The potdrop was not removed from the area of discovery. Two individually recorded stone tools were also identified. Two off-road vehicle trails run through the site: one running northwest to southeast and another bisecting the site, trending generally north to south. Several shallow ephemeral drainages run through the site. Ground visibility during the survey was 99%, and the site surface is slightly obscured by sand and sparse creosote. The site boundary will be avoided by vibroseis paths and source points by at minimum 21.2 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 162: CA-IMP-12948 (TW-23)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 50 m (W/S) by 30 m (N/S), with unspecified depth
Jurisdiction: BLM
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a lithic scatter located on a heavily cobbled, gravelly flat with low sandstone outcrop exposures. An east to west trending drainage flows through the site and into a nearby wash. Artifacts observed include seven point-located tools: four manos, two cores, and one edge-modified flake. Three of the manos and the flake appear to have been placed on top of the sandstone outcrop by a visitor. Fifteen pieces of debitage were also observed. An east to west trending drainage flows through the site and into a nearby wash. Ground visibility is 98%, obscured by sparse creosote and sand, and numerous large and repeated off-road vehicle tracks cross the resource. The site boundary will be avoided by vibroseis paths and source points by at minimum 56.8 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 163: CA-IMP-12505 (TW-25)
Description: Lithic scatter and metal debris
Period: Unspecified Prehistoric era / possible World War II bombing debris
Dimensions: 78 m (N/S) by 57 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

The site is a sparse lithic scatter consisting of 17 pieces of debitage and three point-located stone tools. A few fragments of historic (likely military) metal are scattered across the site boundary in a north-to-south depositional pattern. The site is located on a cobbly and gravelly dissected flat within alignments of tabular sandstone outcroppings. An unnamed drainage runs east-to-west along the southern site boundary. Ground visibility during the survey was 100%, with no vegetation within the site boundary. Previously recorded isolated artifacts P13-12505, P13-12506 and P13-12507 were added to the southeast margin of this site due to proximity, but these specific items were not identified. The site boundary will be avoided by vibroseis paths and source points by at minimum 57.7 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 164: CA-IMP-12950 (TW-26)
Description: Lithic scatter and historic metal debris
Period: Unspecified Prehistoric era / possible World War II bombing debris
Dimensions: 137 m (N/S) by 58 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a lithic scatter and historic-era scatter located on a dissected lake flat within a cobbled, gravelly tabular sandstone outcrop that rises slightly above the surrounding plain. A short-term temporary encampment, this site contained 39 pieces of debitage and eight point-located stone tools. A few sparsely scattered historic military metal artifacts were also observed. Previously recorded isolated artifacts P13-12491 and P13-12503 were added to the southeast margin of this site due to their proximity. These were likely observed by the crew. The location includes rounded sandstone boulders and low-lying oddly shaped sandstone formations. The site is surrounded by gently eroding sand dunes and an ephemeral wash bisecting the site and trending east-to-west. Ground visibility during the survey was 100%, and a very few creosote and ambrosia bushes are in the vicinity. The site boundary will be avoided by vibroseis paths and source points by at minimum 9 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 165: CA-IMP-12951 (TW-27)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 120 m (N/S) by 50 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site consists of a sparse lithic scatter located on a silt flat with a sandstone outcrop in the eastern portion of the site. Twelve pieces of debitage and 11 point-located stone tools were identified at the site. Most of the artifacts are within a shallow basin or swale on the very flat, gravelly desert pavement. This site encompasses much smaller and previously recorded sites P-13-012498 and P-13-012499 and previously recorded isolate P-13-012492. An ephemeral drainage trends north-to-south along the western site boundary. A few faint off-road vehicle tracks are visible running through the site. Ground visibility during the survey was 100% and only one creosote bush grows within the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 10.6 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 166: CA-IMP-12952 (TW-28)
Description: Prehistoric lithic scatter and minor historic-era trash
Period: Unspecified Prehistoric era / likely historic-era trash
Dimensions: 100 m (N/S) by 70 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

The site is a very sparse lithic scatter consisting of six debitage pieces and five point-located stone tools. Three cone-top beer cans were also observed, one with an attached lid. This site is located on a flat containing small clusters of sandstone outcrops and very low washes. A fenced-in area, [redacted] to the south. Ground visibility during the survey was 100% and sparse creosote grows along the western boundary of the site in the nearby wash only. The site boundary will be avoided by vibroseis paths and source points by at minimum 53 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 167: CA-IMP-12953 (TW-30)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 55 m (N/S) by 80 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This lithic scatter is located on a silty flat with low-lying, eroding sand dunes east of a tabular sandstone outcropping. Ten pieces of debitage and five point-located artifacts including two scrapers, one tested cobble, one basalt biface with desert varnish, and one core, were identified. Cobbles and gravels are found across the site. Two small rills run east-to-west through the middle of the site, and an unnamed off-road vehicle trail and other off-road damage runs north-to-south along the western section of the site. Ground visibility during the survey was 100%, with scattered sparse creosote and white bursage. Previously recorded isolate P-13-012477 (a Wonderstone core) was relocated, is now inside this site boundary 18 meters from its originally plotted position. The site boundary will be avoided by vibroseis paths and source points by at minimum 42.7 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 168: CA-IMP-12954 (TW-31)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 39 m (N/S) by 12 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a small, sparse lithic scatter including two primary quartzite flakes and three point located stone tools on a silty flat. The tools recorded at the site include one edge-modified flake, one scraper, and one tested cobble. Unnamed off-road vehicle trails cross over most of the site. Small rills and drainages tend east-to-west into an unnamed wash along the eastern boundary. Ground visibility during the survey was 100%, and no vegetation occurred in the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 35.1 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 169: CA-IMP-12955 (TW-32)
Description: Artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 95 m (N/S) by 84 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This is prehistoric site contains a concentration of potsherds (potdrop interpreted by the designated MLD Carmen Lucas as a ceremonial sacrifice), a concentration of largely fire-altered portable millingstone implements, cobble cores, debitage, and a calcite crystal was designated as Activity Locus A. A sparse scatter of lithic and ceramic artifacts is located between Feature 1 and Locus A. The site is located on lacustrine silt deposits (lake bottom) ranging from minimally incised to deeply incised by rills and deeper gullying activity adjacent to the south bank of a large arroyo. Site condition ranges from relatively intact to considerably impacted by off-road vehicle travel. On site lithology consists of granitic, sandstone, basalt, and quartzite angular to well-rounded gravels and cobbles. Visibility during the survey was 100% and there is no vegetation in the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 7.1 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 170: CA-IMP-17633 (TW-33)
Description: Artifact scatter
Period: Likely Late Prehistoric era
Dimensions: 40 m (N/S) by 50 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site consists of three pieces of quartzite debitage, one small buff potsherd and several point-located tools including two cores (one with a tufa encrustation), and one edge modified flake. No features were identified. This site is located on a desiccated lake flat with low north-trending washes, cobbles and coarse gravels on the ground surface. Off-road vehicle tracks cross the site. Ground visibility during the survey was 100%, with a few scattered plants such as creosote and white bursage. The site boundary will be avoided by vibroseis paths and source points by at minimum 158.4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 171: CA-IMP-12953 (TW-34)
Description: Small village or long-term encampment
Period: Late Prehistoric era
Dimensions: 210 m (N/S) by 160 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This village or long-term encampment is located south of and overlooks [redacted]. The site bears many sandstone bedrock exposures and little vegetation. Five features and one Locus were recorded at the site. Feature 1 is a thermal feature in the north-central portion of the site. Feature 2 is thermal feature and Feature 4 are deflated hearths about 40 meters west of activity Locus A. Feature 3 is a deflated thermal feature and associated use area near the western edge of the site, while Feature 5 is a large carbonaceous stain located in an arroyo in the northernmost portion of the site. Most of these features contained fire-altered rock, carbon-stained soil, debitage and potsherds. Activity Locus A is a dense artifact scatter consisting of ceramics and flakes between two shallow drainages. Thirty-four point-located artifacts were plotted within the full site boundary including rimsherds, numerous ground stones, stone tools and a Desert side-notched projectile point. Off-road disturbance seemed minimal even though numerous tracks can be observed in aerial photos. The site boundary will be avoided by vibroseis paths and source points by at minimum 49.1 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 172: CA-IMP-12954 (TW-36)
Description: Small village or habitation site
Period: Late Prehistoric era
Dimensions: 680 m (N/S) by 225 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a large prehistoric probable habitation site located on a large north-to-south trending sandstone outcrop upon which possible hearths, loci exhibiting artifact scatters, and stacked/upright tabular sandstone features are situated. There are total of six activity loci, some of which contain multiple rock features. The site also contains 29 circular and curved rock alignments at the six-foot to 25-foot bsl mark. Hundreds of stone artifacts, pieces of debitage, and potsherds were identified. Fish bones were observed inside and eroding out of the rock alignments. The site rests on a bench east of a narrow south to north flowing wash [redacted] Ground visibility during the survey was 95% and was slightly obscured by creosote bush vegetation, sandstone outcrops and very low sand dunes. Some off-road vehicle trails were observed throughout the site but, other than the occasional visitor picking up and stacking artifacts, these roads had minor direct effect on the cultural elements observed. A main north-to-south trending dirt road bisects the eastern portion of the site from the west. Eroding sandstone outcrops are very common in this area, and the rock alignment structures seem to have been built from them. The site boundary will be avoided by vibroseis paths and source points by at minimum 12.4 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 173: CA-IMP-12955 (TW-37)
Description: Lithic scatter.
Period: Unspecified Prehistoric era.
Dimensions: 24 m (N/S) by 12 m (E/W), with unspecified depth
Jurisdiction: California State Parks.
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This very small lithic scatter located on a silty flat. One primary white quartzite flake, two bluish secondary quartzite flakes, and one primary black basalt flake were identified on the banks of a north-south trending ephemeral drainage that dissects the flat with low-lying eroding sand dunes and sandstone outcrops nearby. Visibility was 100% and little vegetation grows nearby. There is some minor off-road vehicle damage crossing the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 8.8 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 174: CA_IMP-12956 (TW-38)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 26 m (N/S) by 20 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This small lithic scatter is located on a sandstone outcrop within a relatively flat, cobble-strewn area. Four gray quartzite flakes that likely represent expedient cobble testing were observed at the site. A north to south trending ephemeral drainage lies approximately 20 meters to the west. Visibility was 100% and little vegetation grows nearby. There is some minor off-road vehicle damage inside the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 10.2 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site 175: CA-IMP-13045 (TW-39)
Description: Lithic scatter
Period: Unspecified Prehistoric era
Dimensions: 160 m (N/S) by 315 m (E/W), with unspecified depth
Jurisdiction: California State Parks
NRHP/CRHR Eligibility Recommendation: Considered Potentially Eligible

This site is a sparse prehistoric lithic scatter originally recorded in 2016 as a prehistoric isolate with what was felt to be elements of the Winona I bombing range overlain. Upon revisit, additional lithic resources were recorded plus hundreds of additional World War II-era metal fragments. The metal fragments were ultimately associated with the Winona I site (P13-13675) and a decision was made to separate the historic resources from the prehistoric for the purposes of recording. Site TW-36 is now a prehistoric lithic scatter overlain with bombing debris. The site contains thirteen formal stone tools and 24 pieces of quartzite debitage including eight tested cobbles. A few of the cobbles are metavolcanic or chert. These artifacts lie on a flat [redacted] with a few exposures of sandstone bedrock in the area. Visibility during the survey and recordation periods was 98%; a few low dunes were observed, the topsoil is very gravelly, and little vegetation save for a few creosote bushes and saltbush was seen inside the site boundary. Several off-road vehicle tracks cross the site boundary. The site boundary will be avoided by vibroseis paths and source points by at minimum 31.6 meters.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore, should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

6.3 Review of Potential Effects to Historic Properties in the Proposed APE

As noted above, attempts were made before any fieldwork began to move projected pathways for the vibroseis buggies into locations where no sites had been previously located per the SCIC Class I data set. Nonetheless, the inventory encountered 175 archaeological resources and 91 isolated artifacts. The crews moved the proposed pathways to positions that would avoid the recorded site boundaries. Save for crossings on P13-14306, the vibroseis pathways avoid all sites encountered.

With reference to the Project Descripton in Section 1.1 above, the 3-D Study could potentially impact surface and subsurface components of historic properties located in the APE, but it is preferred by all parties that all site boundaries be avoided during project staging and use of the proposed seismic drive pathways by vibroseis buggy tandems. The vibrating event could possibly cause harm to nearby sensitive resources that lie some distance from the vibroseis buggy plate. Placement of geophones must take place by hand, but it is also possible that sensitive features inside site boundaries could be harmed by geophone insertion. Indirect impacts are also possible if the 3-D Study causes the off-roading public in the SVRA to follow vibroseis buggy tracks to areas where historic properties are located.

Since the Class III inventory found that many wash channels and dirt roads that could be navigated by the vibroseis buggies lack historic properties, much of the seismic travel and seismic energy generation has been proposed for these areas. Finally, because the 3-D Study will not result in a permanent project-related change to the landscape, one where off-road vehicle use is ubiquitous, we believe that any potential indirect impacts can be mitigated for during and after the 3-D Study concludes. In sum, certain impacts could potentially occur during the following 3-D study activities, while others could occur if the Project Description is modified:

1. Salton Sea Airport base of operations temporary use.
2. Travel to source points by vibroseis buggy tandems.
3. Generation of seismic energy at source points by vibroseis buggy tandems.
4. Vibroseis buggy use of SVRA-approved and managed off-road vehicle trails.
5. Helicopter drops of geophone equipment inside cache bags.
6. Geophone placement by 3-D Study technicians.
7. Field technician inadvertent trampling inside site boundaries.

6.4 Potential Adverse Impact Avoidance Recommendations

POWER has concluded that, except for the case of site P13-14306, all known direct impacts to historic properties will be avoided during the 3-D Study. With treatment in the form of proposed avoidance mitigation for site P13-14306 and a mitigation/monitoring plan developed prior to the vibroseis test, a *no historic properties affected* finding is appropriate for this project.

In order to ensure that any direct impacts to historic properties can be avoided, we recommend the following:

1. The 3-D Study requires a central location that would allow the Proponent to store necessary equipment. This is the primary staging area and must be accessible from paved roads so that equipment can be trucked in from supplier sources. Certain portions of the Salton Sea Airport grounds were proposed by the Proponent as the base of operations and were cleared of any historic properties by Class III inventory crews in 2016. Since the main staging area consists of paved and graveled areas with no possibility of impacting

subsurface and unrecorded historic properties, POWER recommends that the area can be utilized without any cultural resource-related limitation.

2. A historic property could be affected by a vibroseis buggy travelling through a site boundary on its way to a source point, or, stopping inside a delineated site boundary and generating seismic energy. If vibroseis buggy travel causes the site to lose historic elements during the action, the resource may become ineligible for the NRHP/CRHR and therefore, the event would be considered adverse. The potential seismic drive pathways were cleared of all but one site (P13-14306) during the 2016 and 2018 inventories, but it is very possible that the vibroseis buggy tandem could travel off-course. To prevent inadvertent travel, the buggy teams will be guided by an archaeologist monitor on foot with a submeter GPS (Trimble).
3. Seismic wave energy may impact certain sensitive elements of the historic properties at a distance; this is considered a potential direct impact. The energies generated are very short term. The 2017 demonstration for Parks, BLM and tribal partners showed that PPV rises above the normal PPV background reading for the same amount of time the energies are generated, 15 to 20 seconds. In addition, the intensity of the seismic wave generation and resultant PPV at a distance can be adjusted by the vibroseis operator with reference to the medium upon which the vibroseis plate is pressed. POWER recommends that the Proponent require their geophysical consultant to generate the minimum PPV necessary for the shortest time possible to gain the highest quality receiving data. This will reduce the potential for indirect impacts to sensitive resources located beyond the area of direct impact.
4. Since travel to and generation of seismic waves could result in an adverse impact to nearby historic properties, POWER recommends that a certain distance be kept from sensitive site elements within the site boundaries and the seismic generation location. This distance should be developed as part of a mitigation-monitoring plan.
5. Helicopter drop pads for receiver equipment, 4 x 4 meters (13 feet by 13 feet) in size, will be sited on paved and graveled roads or areas with no sensitive environmental resources. As noted in the BLM and Parks survey permit work plans (2016 and 2018), this requirement shall be made part of the Project's avoidance measures. Given this requirement, the archaeologically cleared seismic drive pathways can serve as the basis for establishing appropriate drop pads once all other environmental constraints are considered.
6. The Proponent's geophysical team shall place the geophone arrays into the ground and predesigned receiver points by moving the equipment from the drop zones by hand. The technicians shall hike from the drop zone location to the receiver point and place the equipment into the ground, then move to the next receiver point. No vehicles will be used during this process. The Proponent shall provide qualified archaeological monitors to ensure that no historic properties are impacted by this event.
7. To avoid any inadvertent impacts to historic properties, all technicians involved with the Project will undergo worker sensitivity training prior to being allowed to work in the 3-D Study area. When SVRA lands are accessed, SVRA staff or their authorized representatives will provide the worker training. When non-SVRA lands are accessed, BLM staff or their authorized representatives will provide the worker training.
8. Potential impacts to site P13-14306, a historic-era roadway complex, can be reduced to less than significant by the use of a protective temporary cover placed over the track of the roadway in the three different places the Applicant would like the vibroseis buggies to cross. Once the vibroseis work has concluded, the temporary cover can be removed.
9. A mitigation/monitoring plan should be developed as part of the Environmental Assessment/Mitigated Negative Declaration documents currently being prepared in support of this Project.

7.0 REFERENCES

Alles, D.L. 2011. *Geology of the Salton Trough*. Paper edited by D.L. Alles, Western Washington University. Downloaded April 2017: http://fire.biol.wwu.edu/trent/alles/GeologySaltonTrough.pdf

Barbour, M.G., T Keeler-Wolf and A.A. Schoenherr. 2007. *Terrestrial Vegetation of California*, 3rd Edition. University of California Press, Berkeley.

Barker, C. 1995. "Salton Trough Province (016)." U.S. Geological Survey Digital Data Series DDS-30, Release 2. http://certmapper.cr.usgs.gov/data/noga95/prov16/text/prov16.pdf. Accessed October 2016.

Bauman, J. "BLM Field Office Draws Fire Over Seismic Project Findings". Deseret News. November 4, 2003. http://www.deseretnews.com/article/525035587/BLM-field-office-draws-fire-over-seismic-project-findings.html?pg=all. Accessed October 2016.

Bean, L.J. 1978. "Cahuilla." In *Handbook of North American Indians*, Vol 8: California. pp 575-587. R.F. Heizer, Ed. Washington D.C.: Smithsonian Institution.

_____. 1972. *Mukat's People: the Cahuilla Indians of Southern California*. Berkeley: University of California Press.

Blake, W.P. 1853. "Preliminary Geological Report of the U.S. Pacific Railroad Survey, under the command of Lieut. R.S. Williamson, Corps of Top. Eng." *American Journal of Science*, 2nd Series. v 19, pp 433-434.

_____. 1854. "An Ancient Lake in the Colorado Desert." American Journal of Science (Abstract) 2nd Series. Vol 21 pp270-272. Washington D.C.

Bureau of Land Management, U.S. Dept. of the Interior (BLM). 2003. Stone Cabin 3D Seismic Project. BLM Price Field Office.

_____. 2004. Handbook 8110 – Identifying and Evaluation Cultural Resources, Public version. December 2004. BLM, Washington D.C. https://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.23101.File.dat/8110.pdf. Accessed October 2016.

_____. 2006. Environmental Assessment for the Proposed Anadarko/Veritas Salt Creek 3D Vibroseis Project. DOE EA No. EA-1544. BLM Case No. WYW-163071. BLM EA No. WY- 060-EA05-95. WOGCC Permit No. 025-05-015G. BLM Casper Field Office. http://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/EA-1544-FEA-2005.pdf. Accessed October 2016.

_____. 2007. Subject H-3150-1 – Onshore Oil and Gas Geophysical Exploration Surface Management Requirements, Public version. January 2007. BLM, Washington D.C. https://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.23101.File.dat/8110.pdf. Accessed October 2016.

_____. 2010. Programmatic Agreement Between the USDI Bureau of Land Management, Utah, the Utah State Historic Preservation Officer, the Advisory Council on Historic Preservation, the State of Utah School and Trust Lands Administration, Carbon and Duschene Counties and Bill Barrett Corporation Regarding the West Tavaputs Plateau Natural Gas Full Field

Development Plan in Carbon and Duchesne Counties, Utah. BLM Price Field Office. http://www.blm.gov/style/medialib/blm/ut/price_fo/oil_and_gas_2.Par.17787.File.dat/Attachment%204%20-%20WTP%20Record%20of%20Decision%5b1%5d.pdf. Accessed October 2016.

_____. 2011a. West Tavaputs Plateau Natural Gas Full Field Development Plan. Final Environmental Impact Statement UT-070-05-055. BLM Price Field Office. http://www.blm.gov/ut/st/en/fo/price/energy/Oil_Gas/wtp_final_eis.html. Accessed October 2014.

_____. 2011b. Environmental Assessment DOI-BLM-WY-020-EA11-3. August 2011. West Oregon Basin 3D Seismic Project. BLM Cody Field Office. http://www.blm.gov/style/medialib/blm/wy/information/NEPA/cyfodocs/WestOregonBasin3D.Par.75608.File.dat/EA.pdf. Accessed October 2016.

_____. 2012. Categorical Exclusion. Number DOI-BLM-LLCON02000-2012-0022-CX; Project Name Culver 3D Seismic Survey. BLM Kremmling Field Office. http://www.blm.gov/style/medialib/blm/co/information/nepa/kremmling_field_office/2012CompletedNEPA.Par.7392.File.dat/DOI-BLM-LLCON02000-2012-022_CX%20Culver%203D%20Seismic%20Survey.pdf. Accessed October 2012.

_____. 2016. Programmatic Agreement Among The Bureau Of Land Management – California, The California Office Of Historic Preservation, And The Advisory Council On Historic Preservation, Regarding Renewable Energy Development On A Portion Of Public Lands Administered By The Bureau Of Land Managament - California. https://www.drecp.org/section106/documents/DRECP_Final_Programmatic_Agreement.pdf

Burgus, M.L. 2014. Special Report: Geophysical Survey Standoff Recommendations. Denver Geophysical Society: The Record. Vol 39 No 10 pp 4-8. Downloaded May 2017: http://www.denvergeo.org/files/The%20Record/2014/2014%20OCTOBER%20RECORD%20FINAL.pdf

California Department of Parks and Recreation (Parks). 2011-2012. Ocotillo Wells SVRA Visitors Guide 2011-2012. Available on-line: http://ohv.parks.ca.gov/pages/1170/files/ow_visitors_guide-2011-12.pdf.

_____. 1981. Unit 439 Ocotillo Wells State Vehicular Recreation Area (Preliminary) General Plan. December 1981. Sacramento. Downloaded April 2017 from http://www.parks.ca.gov/pages/21299/files/439.pdf.

California Department of Transportation (Caltrans). 2013. Transportation and Construction Vibration Guidance Manual. California Department of Transportation. Sacramento, CA. Downloaded May 2017: http://www.dot.ca.gov/hq/env/noise/pub/TCVGM_Sep13_FINAL.pdf

Chalfant, W.E. 1947. *Gold, Guns and Ghost Towns*. Palo Alto: Stanford University press.

Cutter, D.C. and I.W. Engstrand. 1996. *Quest for Empire: Spanish Settlement in the Southwest.* Golden, CO.: Fulcrum Publications.

Dice, M.H., R. Knierim, D. Schubert and D. Barrackman. 2018. *Possible Lake Cahuilla Shorelines Identified With Archaeological Features. A GoogleEarth Desktop and Ground-Truth Study. Imperial and Riverside Counties, California.* Paper presented at the 2018 Society for American Archaeology Meetings, April 2018, Washington, D.C.

Doody, L.P. and B.K. Meltzer. 2012. *Losing Ground: The Displacement of San Gorgonio Pass Cahuilla Peoples in the 19th Century* (paperback edition). Morongo, CA. Malki-Ballena Press.

Federal Transportation Administration (FTA). 2006. Transit Noise and Vibration Impact Assessment, 2nd Edition. Report #FTA-VA-90-1003-06. Dated May 2006. Downloaded June 1, 2016 from https://www.transit.dot.gov/regulations-and-guidance/environmental-programs/noise-and-vibration.

Finley, B. 2016. "Seismic Surveying Rattles Colorado Homeowners." *Denver Post*. March 15, 2013 and updated May 13, 2016. http://www.denverpost.com/2013/03/15/seismic-surveying-rattles-colorado-homeowners-2/. Accessed October 2016.

Forbes, J.D. 1965. *Warriors of the Colorado: The Yumas of the Quechan Nation and their Neighbors*. Norman, OK: University of Oklahoma Press.

Frisch, W., M. Meschede, and R.C. Blakey. 2010. *Plate Tectonics: Continental Drift and Mountain Building*. New York: Springer Heidelberg Dordrecht.

Gifford, E.W. 1931. "The Kamia of Imperial Valley." *Bureau of American Ethnology* Bulletin 97: 29-94.

Heizer, R.F. (ed). 1978. Handbook of North American Indians, Volume 8: California. pp 99-127. Washington D.C.: Smithsonian Institution.

ICF International (ICF). 2011. Findings of Fact: Salton City Landfill Expansion Environmental Impact Report (SCH #2010071072). Imperial County Planning and Development Services. http://imperial.granicus.com/MetaViewer.php?view_id=2&clip_id=368&meta_id=45788. Accessed October 2016.

Jones, T.L. and K.A. Klar. 2007. *California Prehistory: Colonization, Culture and Complexity*. Altamira Press, New York.

Kalinskie, M.E. and S.T. Taluskie. 2013. "Probabilistic Analysis of Ground Vibrations Produced by Vibroseis Arrays." *Journal of Environmental & Engineering Geophysics* Vol 18(2):147-154.

King, K., D. Carver and B. Winslow. 1991. Bonito Vibration Tests, Chaco Culture Historical Park. U.S. Geological Survey Open-File Report #91-444. https://pubs.usgs.gov/of/1991/0444/report.pdf. Accessed October 2016.

King, K.W. and S.T. Algermissen. 1987. *A Vibration Study of the Archeological Ruins*, Hovenweep National Monument, Utah-Colorado. U.S. Geological Survey Open-File Report #87-181. https://pubs.usgs.gov/of/1987/0181/report.pdf. Accessed October 2016.

Kroeber, A.L. 1925. *Handbook of the Indians of California*. (Dover edition reprint 1978). New York: Dover Publications, Inc.

Laylander, D. 1994. Phase III Data Recovery at the Elmore Site (CA-IMP-6427) Imperial County. California, 11-IMP¬ 88, P.M.33.6/43.2, 11221-19486, 11221-100710. San Diego: Caltrans District 11.

_____. 2006. "The Regional Consequences of Lake Cahuilla." San Diego State University Occasional Archaeological Papers (SOAP) Vol. 1. http://soap.sdsu.edu/Volume1/LakeCahuilla/cahuilla.htm. Accessed October 2016.

Laylander, D.L., A.P. Michelini and J.B. Patterson. 2016. "Lake Cahuilla's Little Sister: Exploring the Role of Laguna Macuata in Colorado Desert Prehistory." *Pacific Coast Archaeological Society Quarterly* v 52 no 1. pp 28-45. http://www.pcas.org/documents/LaylanderLagunaMacuataweb.pdf. Accessed October 2016.

Leggett, L.P and B.A. Sumner. 2004. "Federal Court Upholds Oil And Gas Exploration On Leased Public Lands". *Legal Opinion Letter* v14 n23. Washington Legal Foundation, downloaded August 2017. https://s3.us-east-2.amazonaws.com/washlegal-uploads/upload/102904LOLLeggette.pdf

MacDougal, D.T. and collaborators. 1914. Review: *The Salton Sea: A Study of the Geography, the Geology, the Floristics, and the Ecology of a Desert Basin*. Carnegie Institution Publication No. 193. Washington D.C.

Marti-Cardona, B., T.E. Streissberg, S.G. Schladow, and S.J. Hook. 2008. "Relating fish kills to upwellings and wind patterns in the Salton Sea." *Hydrobiologia* 604:85-95.

McGinnis, P. and H. Murphy. 2008. Cultural Resource Survey for the 320-Acre Salton Landfill Project. Imperial County, California. San Diego: Tierra Environmental Services, Inc.

_____. 2010. Draft Cultural Resources Testing, Evaluation and Data Recovery for the 320-Acre Salton City Landfill. County of Imperial, California. San Diego: Tierra Environmental Services, Inc.

Mealey, M. 2012. Archaeological Site Reexamination and Reconnaissance at Ocotillo Wells State Vehicular Recreation Area 2008 through 2011. California State Parks Southern Service Center and Ocotillo Wells District, Borrego Springs.

National Park Service (NPS). 1990. How to Apply the National Register Criteria for Evaluation. National Register Bulletin 15. NPS, Washington D.C. https://www.nps.gov/Nr/publications/bulletins/nrb15/nrb15_5.htm. Accessed October 2016.

_____. 1994. *Draft Comprehensive Management and Use Plan and Environmental Impact Statement: Juan Bautista de Anza. Juan Bautista de Anza National Historic Trail, Arizona and California.* Provided to POWER Engineers by El Centro-BLM Field Office, July 2019.

National Trust for Historic Preservation (NTFHP). 2008. Re: Comments on the West Tavaputs Plateau Natural Gas Field Development Plan Draft Environmental Impact Statement. http://action.suwa.org/site/DocServer/NTHP__Comments_on_the_Draft_EIS_for_the_West_Tavaputs_Pr.pdf?docID=3884. Accessed October 2016.

Norris, R.M. and K.S. Norris. 1961. "Algodones Dunes of Southeastern California." *Geological Society of America* Bulletin 72(4): 605–619.

Oriard, L.L. 1994. "Vibroseis Operations in an Urban Environment." *Bulletin of the Association of Engineering Geologists* Vol 31 No 3 pp 343-366.

Pourade, R.F. 1962. *The History of San Diego: The Early Explorers.* The Union-Tribune Publishing Company: San Diego.

POWER Engineers, Inc. (POWER). 2016. *Draft Class III Archaeological Survey of the Truckhaven 3-D Seismic Project*. POWER Engineers, Inc., Anaheim, CA. Prepared for the Bureau of

Land Management, El Centro Field Office. Draft version submitted to BLM December 2016. Initial DPR 523 form sets submitted to BLM August 2016.

____. 2018. Class III Cultural Resources Survey of the Truckhaven Geothermal Project: Test Well Pads and Access Roads. Imperial County, California. Final, revision 1. Prepared for the Bureau of Land Management, El Centro Field Office. Submitted August 2018.

Reidel, R., D. Schlenk, D. Frank, B. Costa-Pierce. 2002. Analyses of organic and inorganic contaminants in Salton Sea fish. Marine Pollution Bulletin 44:403-411.

Rice, R.B., W.A. Bullough, and R.J. Orsi. 2011 (4th Edition). *The Elusive Eden: A New History of California.* McGraw-Hill Companies, Inc.: New York.

Rogers, M. 1939. "Early Lithic Industries of the Lower Basin of the Colorado River and Adjacent Desert Areas." San Diego Museum Papers No. 3. San Diego: San Diego Museum of Man.

_____. 1966. Ancient Hunters of the Far West. Union-Tribune Publishing, San Diego, CA.

Rose, S. and C. Bowden-Renna. 1998. Sandstone Features Adjacent to Lake Cahuilla. San Diego: KEA Environmental, Inc. https://www.scahome.org/publications/proceedings/Proceedings.12Rose.pdf. Accessed October 2016.

Sagahun, C. 2016. Personal Communication. M. Dice, POWER Engineers, Inc. BLM report needs in fieldwork authorization (permit).

Sapozhnikova, Y., O. Bawardi, D. Schlenk. 2004. Pesticides and PCBs in sediments and fish from the Salton Sea, California, USA. Chemosphere 55(6):797-809.

Schaefer, J. 2006. A Class I Cultural Resources Inventory of the Truckhaven Geothermal Leasing Area, Imperial County, California. Carlsbad, CA: ASM Affiliates, Inc.

Schaefer, J. and D. Laylander. 2007. "The Colorado Desert: Ancient Adaptations to Wetlands and Wastelands." in California Prehistory: Colonization, Culture, and Complexity, edited by Terry L. Jones and Kathryn A. Klar, pp. 247-258. Walnut Creek, CA: Altamira Press.

Streitfeld, D. 2007. Salton City: A Land of Dreams and Dead Fish. Los Angeles Times dated July 1, 2007. http://articles.latimes.com/2007/jul/01/business/fi-salton1/2. Accessed June 2017.

Time (Magazine). 1959. http://content.time.com/time/magazine/0,9263,7601590302,00.html.

Topping, D.J., D.M. Rubin, and L.E. Vierra, Jr. 2000. "Colorado River Sediment Transport 1: Natural Sediment Supply Limitation and the Influence of Glen Canyon Dam." *Water Resources Research* v36 n2 pp 515-542. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.418.261&rep=rep1&type=pdf. Accessed October 2016.

Treganza, A.E. 1945. "The Ancient Stone Fish Traps of the Coachella Valley, Southern California." *American Antiquity* 3:285- 294.

van de Vrugt, H. 2018. Vibration Monitoring, Vibroseis Demo Project, Salton City, California. Prepared for POWER Engineers, Inc. Anaheim California. (see Appendix G).

von Werlhof, J. 1996. *Archaeological Investigation of Aggregate Products, Inc. Gravel Pit, Imperial County*. Desert Museum Research Center, Imperial Valley College, Ocotillo, CA.

Waters, M.R. 1993. "Late Holocene Lacustrine Chronology and the Archaeology of Ancient Lake Cahuilla, California." *Quaternary Research* 19(3):373-387.

Whiffin, A.C. and Leonard D.R. 1971. *A Survey of Traffic Induced Vibrations*. Road Research Laboratory Dept. of the Environment, RRL Report LR 418. Crowthorne, Berkshire, G.B.

White, E.S. and B. Roth. 2011. "Fish Traps on Ancient Shores: Exploring the Function of Lake Cahuilla Fish Traps." *Journal of California and Great Basin Anthropology* 29(2): 183-193.

Wilke, P.J. 1978. "Late Prehistoric Human Ecology at Lake Cahuilla, Coachella Valley, California." Contributions of the University of California Archaeological Research Facility No. 38. Berkeley, CA.

_____. 1980. "Prehistoric Weir Fishing on Recessional Shorelines of Lake Cahuilla, Salton Basin, Southeastern California." Desert Fishes Council Proceedings XI:101-103.

Wilke, P.J. and H.W. Lawton. 1975. "Early Observations on the Cultural Geography of Coachella Valley." Ballena Press Anthropological Papers 3(1):1-43.

Williams, B. 2014. *Archeological Research Analysis at SDI-7074 within San Diego Gas & Electric Company's East County Substation Project (ECSP), San Diego County, California*. Report prepared by ASM Affiliates, submitted to the Bureau of Land Management, El Centro, CA, and SDG&E, Alpine, CA.

Williamson, R.S. 1856. Volume V, Part 1. Report. Explorations in California for Railroad Routes, to Connect with the Routes near the 35th and 32nd Parallels of North Latitude. Washington. U.S. Gov. Printing Office.

APPENDIX A – INITAL 3-D STUDY GRIDS. 2016 AND 2018 (CONFIDENTIAL)

EEC ORIGINAL PKG

APPENDIX B – PROPOSED APE MAPBOOK, SPECIFIC (CONFIDENTIAL)

APPENDIX C – PROPOSED SEISMIC DRIVE PATHWAY CENTERLINES (CONFIDENTIAL)

APPENDIX D OWNERSHIP OF PARCELS IN THE 3-D STUDY BLOCK

BLM

14

Private

13

Private

State Lands:
Parks and
Recreation

Tule Wash ATV trail

18

BLM

Ergonomum Wash ATV trail

State Lands:
Parks and
Recreation

17

ATV trail

Private

Powerline Rd

23

State Lands:
Parks and
Recreation

BLM

24

Private

19

BLM

20

LEGEND

SURVEY BOUNDARY
STAGING AREA
DUMP AREA

NAMED TRAIL
SECTION LINE

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SOUTHWEST CORNER

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3D SEISMIC
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IMPERIAL COUNTY, CA

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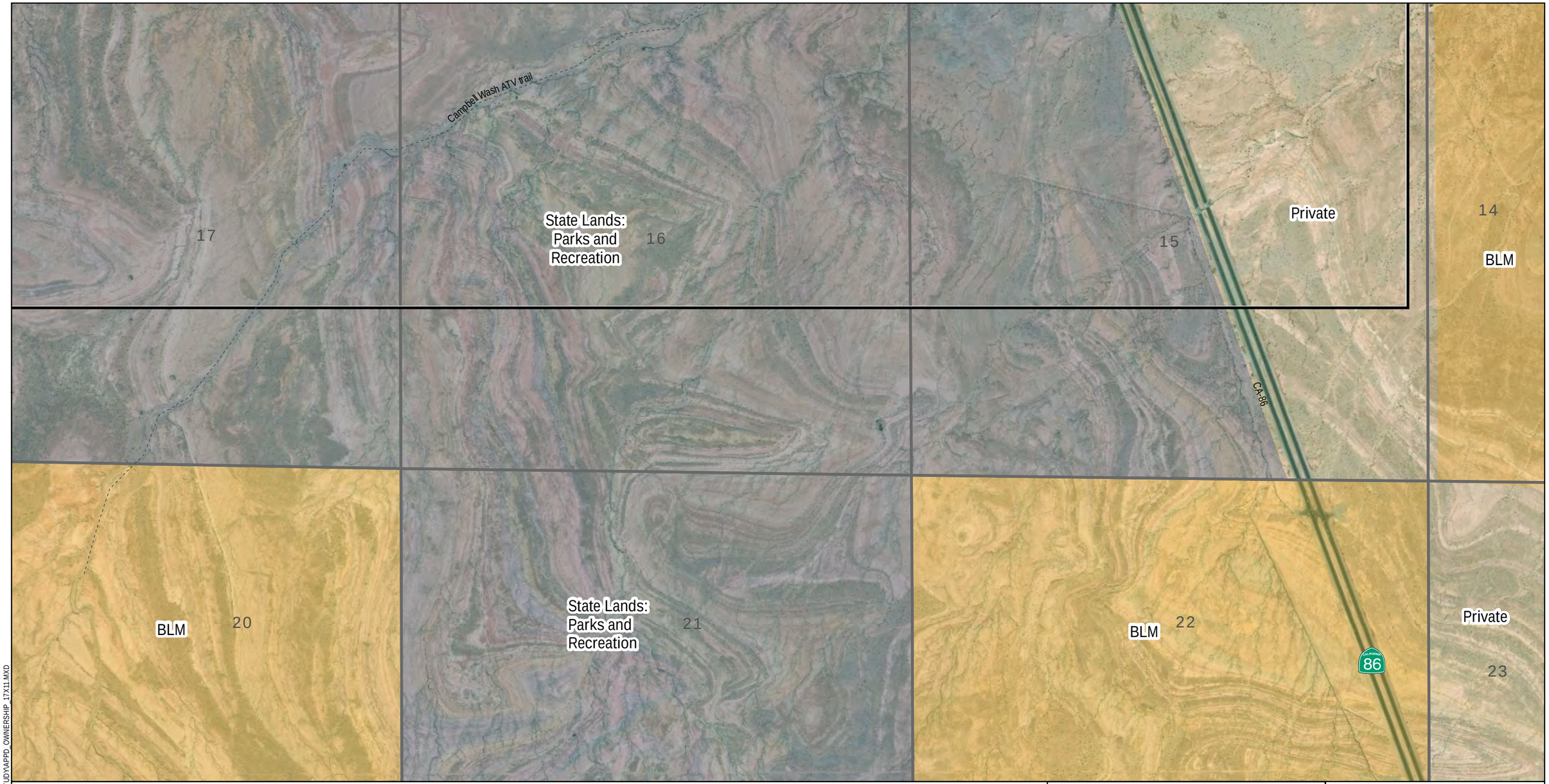

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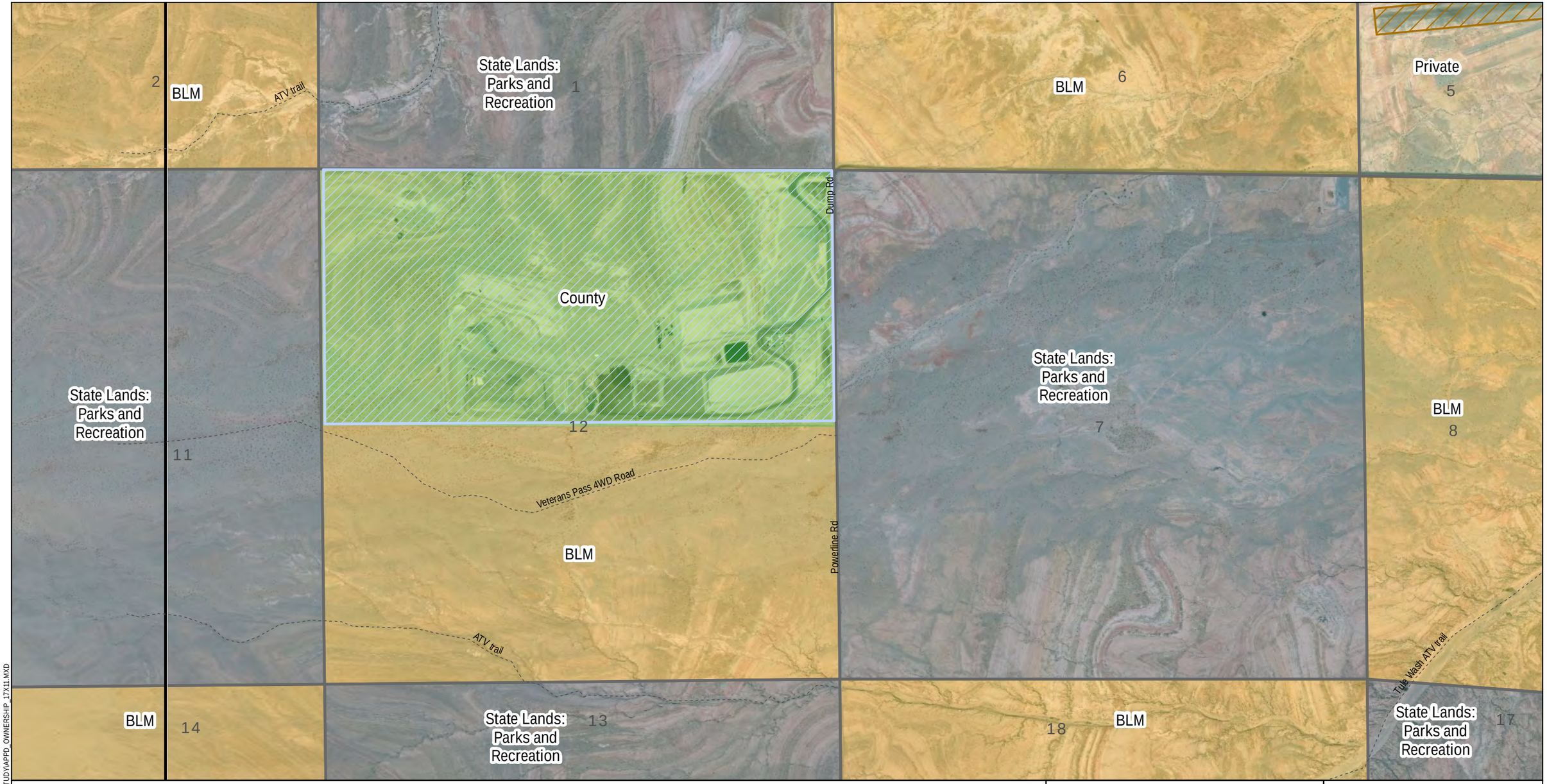

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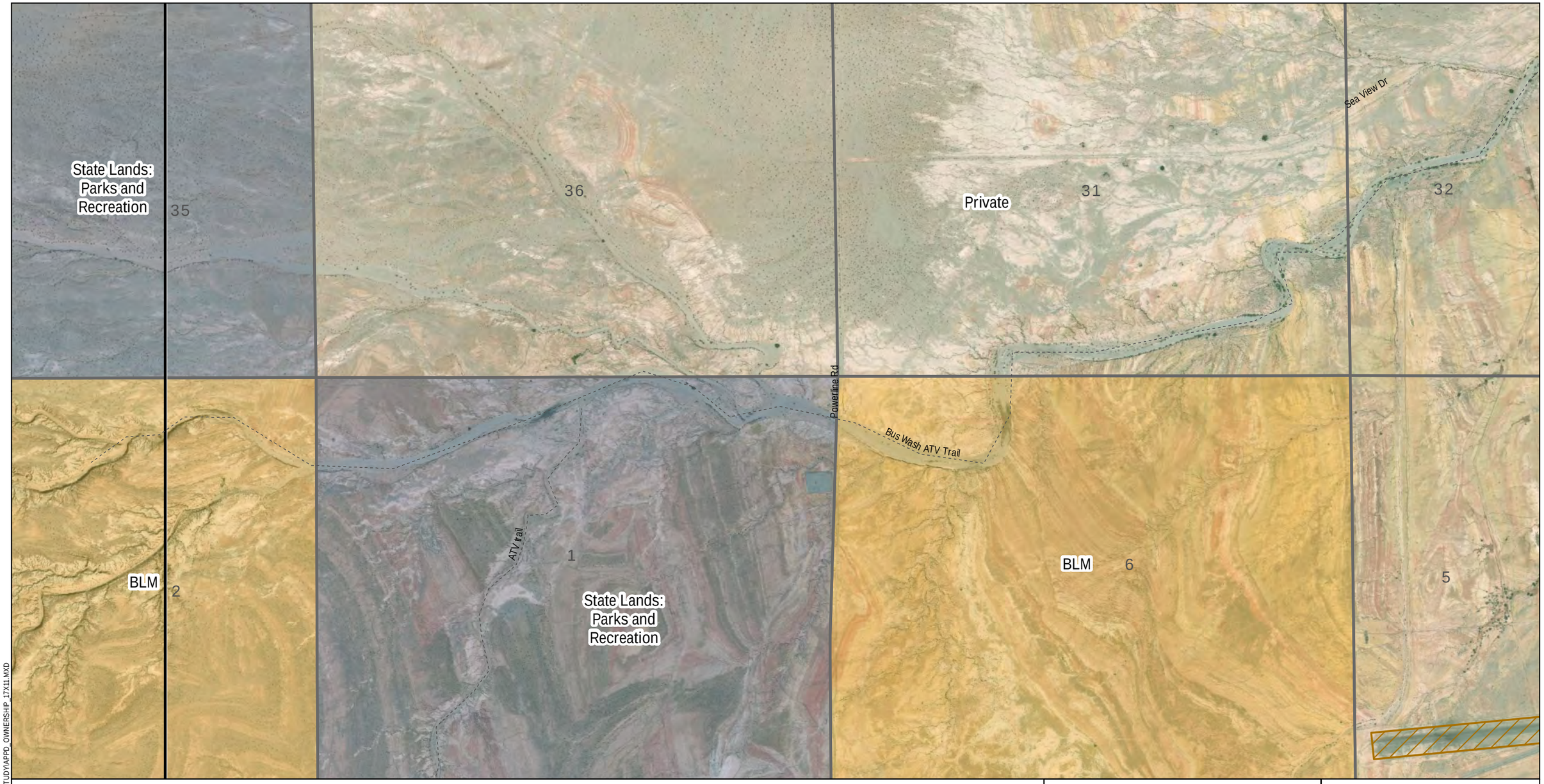

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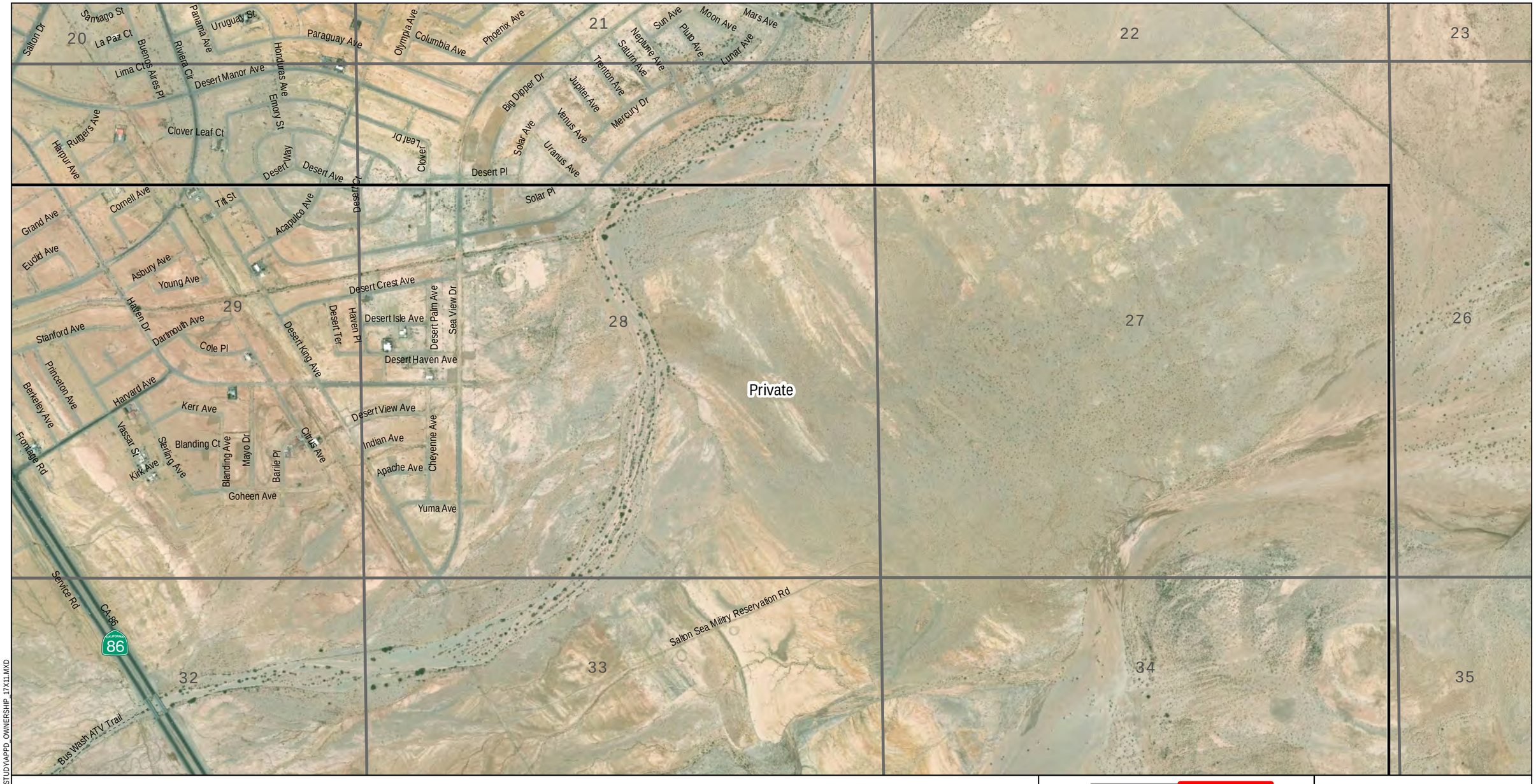

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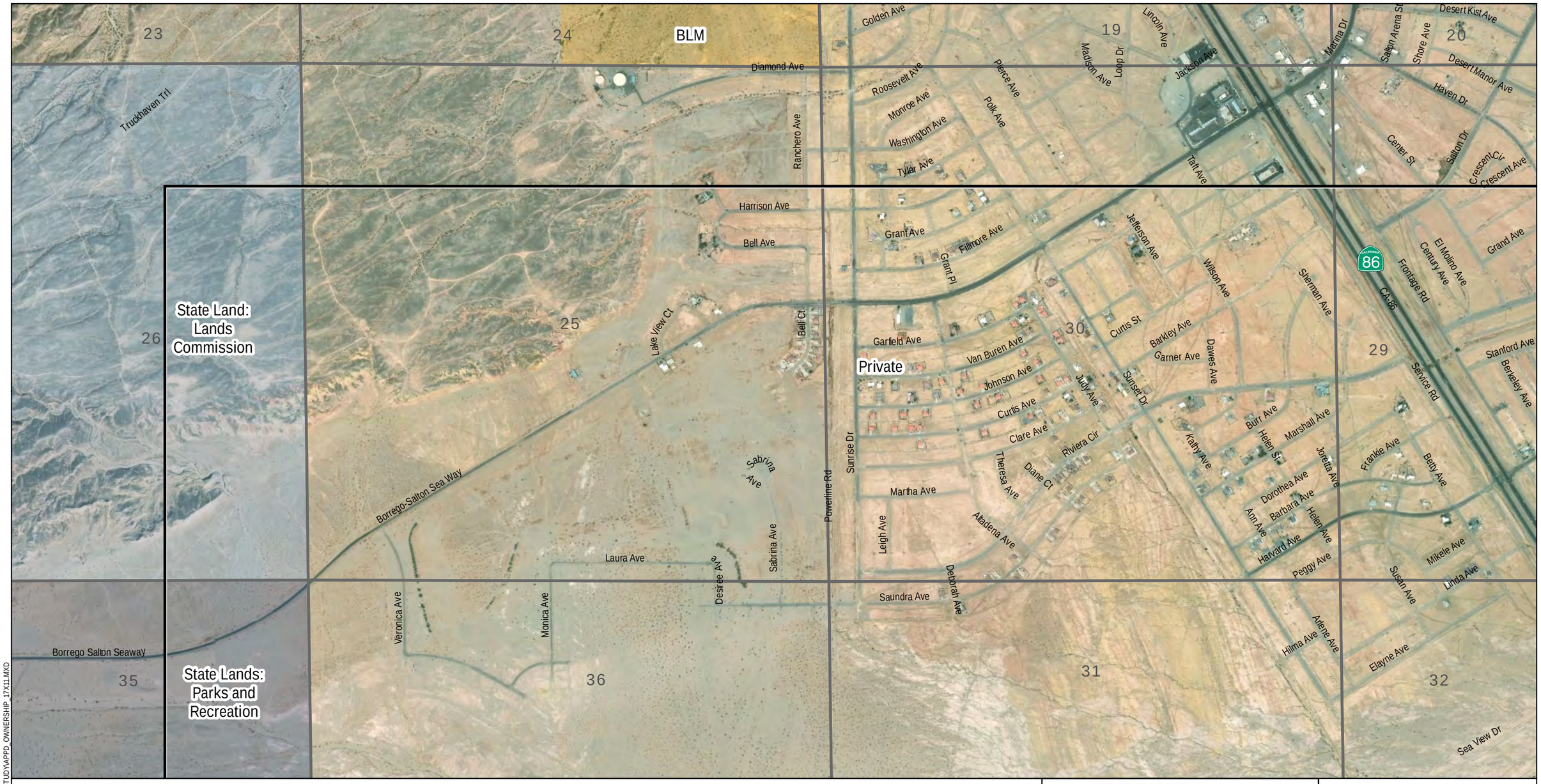

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APPENDIX E APPROVED 2016 ARCHAEOLOGICAL WORK PLAN

2016 CLASS III ARCHAEOLOGICAL SURVEY WORK PLAN FOR THE ORMAT NEVADA, INC. TRUCKHAVEN THREE-DIMENSIONAL SEISMIC PROJECT

1.0 Introduction

Ormat Nevada, Inc. (Ormat) is proposing to conduct a three-dimensional (3D) geophysical data acquisition seismic project on a block of land located just southwest of Salton City in Imperial County, California. The data acquisition seismic project will be conducted by a specialized contractor retained by Ormat after all permits are received. The purpose of the seismic project is to evaluate potential subsurface geothermal resources located at the north end of the U.S. Department of the Interior, Bureau of Land Management (BLM) Truckhaven Geothermal Lease Area (TGLA), and to allow Ormat to locate geothermal test wells at the most ideal locations.

In advance of the seismic project, various environmental pre-planning surveys are required. POWER Engineers, Inc. (POWER) has been retained by Ormat to gather cultural resource information following processes approved by federal and state agencies who shall oversee the environmental components of the seismic project. A records search and literature review has been acquired by POWER staff and a Class III analysis will be subsequently required before permits to conduct the seismic project can be provided to Ormat[1].

This work plan, a necessary component of the Class III analysis, will be attached to POWER's BLM Fieldwork Authorization (FWA) request and POWER's California Department of Parks and Recreation (DPR) Permit 412a application. This work plan informs Ormat, BLM, and DPR as to the specific process POWER cultural resource staff must take during the pre-planning archaeological survey. All cultural resources will be avoided during the seismic project.

Land within the seismic survey footprint consists of a block about 26 miles square (see Figure 1), and these lands are managed by public (state and federal) agencies or are owned privately. Certain public lands are managed by the BLM and DPR as part of the Ocotillo Wells State Vehicular Recreation Area (SVRA). Private land is located within unincorporated portions of the County of Imperial, and there are some lands managed by the California State Lands Commission (SLC). Three hundred and twenty acres of land inside the boundary of the Ocotillo Wells SVRA are managed by the County of Imperial as a landfill and Ormat holds a BLM mineral lease beneath the landfill (for a land list see Exhibit 1).

Previously published specific cultural resource stipulations associated with the TGLA can

[1] BLM Handbook 8110 defines the Class III analysis as an "intensive field survey" with a series of required elements. The Class III report must include complete records of all resources identified during the survey, specific locations of those resources in relation to the proposed project and APE, and include a synthesis of the prehistoric and history of the region written to professional documentation standards found in the Secretary of the Interiors Guidelines for Archaeology and Historic Preservation. Avoidance (or impact) statements must also be made.

be found in a Documentation of Land Use Plan Conformance and National Environmental Policy Act (NEPA) Adequacy (DNA) document issued by the El Centro Field Office (Tracking Number D070-2014-0035). The DNA stipulations must be fulfilled by the Class III analysis. A concomitant information notice for same was issued September 11, 2014. The BLM Record of Decision (ROD) for the TGLA was issued July 2008. The Class III analysis shall also fulfill the ROD's approved cultural resource measures. Quoted below, the ROD cites the following requirements:

Cultural Resources

- Before any specific permits are issued under leases, treatment of cultural resources would follow the procedures established by the Advisory Council on Historic Preservation for compliance with Section 106 of the National Historic Preservation Act.
- A pedestrian inventory would be undertaken of all portions that have not been previously surveyed or are identified by BLM as requiring inventory to identify properties that are eligible for the National Register of Historic Places.
- Those sites not already evaluated for National Register of Historic Places eligibility would be evaluated based on surface remains, subsurface testing, archival, and/or ethnographic sources. Subsurface testing would be kept to a minimum whenever possible if sufficient information is available to evaluate the site or if avoidance is an expected mitigation outcome.
- Recommendations regarding the eligibility of sites would be submitted to the BLM, and a treatment plan would be prepared to detail methods for avoidance of impacts or mitigation of effects. The BLM would make determinations of eligibility and effect and consult with the State Historic Preservation Office as necessary based on each proposed lease application and project plans.
- Avoidance of impacts through project design would be given priority over data recovery as the preferred mitigation measure. Avoidance measures include moving project elements away from site locations or to areas of previous impacts, restricting travel to existing roads, and maintaining barriers and signs in areas of cultural sensitivity. Any data recovery will be preceded by approval of a detailed research design, Native American consultation, and other requirements for BLM issuance of a permit under the Archaeological Resources Protection Act.

DPR has not published specific requirements for allowing geothermal studies on Park lands. The need to use lands within the SVRA during the seismic study is recommended to be permitted on a case-by-case basis, including applying for a Permit to Conduct Archaeological Investigations/Collections (DPR412a) to investigate the existence of cultural resources in those areas of the Park ultimately requiring seismic project use. BLM will serve as the lead federal agency for Section 106 compliance and BLM must provide Ormat with a permit to undertake the seismic project on BLM-managed lands. BLM considers the seismic project an undertaking per 36CFR §800.16(y) and is thus subject to Section 106 review. With regard to the spirit of the Section 106 process,

Ormat is attempting to provide BLM with a project design that, in part, avoids adverse effects on historic properties[2] in advance of the seismic test.

Mitigation measures found in the BLM ROD above state that avoidance of impacts through project design would be given priority over data recovery as the preferred mitigation measure. For this reason, the pre-planning archaeological survey is needed to establish baseline data associated with cultural resources that have, or have not yet, been identified in the project footprint, as well as establish an appropriate area of potential effect (APE) that allows for full avoidance of adverse effects to historic properties during the seismic test and geothermal well design. Given this need, a description of how the seismic test will occur is found in Section 3.0 below.

Development-related projects that occur on DPR-managed lands are subject to the California Environmental Quality Act (CEQA). The County of Imperial Planning & Development Services Department (County) is the lead agency for the State. Public Resource Code 5024.5(b) requires that the County account for potential adverse effects for any listed, unevaluated, or eligible historical resources[3]. For the purposes of the pre-planning survey and the DPR412a permit, it is assumed that all archaeological sites in the Project footprint are eligible for listing in the National Register of Historic Places as well as the California Register of Historical Resources. Therefore, the Class III archaeological survey report shall provide BLM, the County, and DPR with data demonstrating that historic properties and historical resources have been avoided.

Figure 1 shows the survey footprint at a regional scale, while Figure 2 provides an index of Figure 3 through 10. Figures 3 through 10 reveal the locations where the proposed survey shall take place as indicated on the magnified scale map, with the preliminary APE indicated on each page of this figure set. Figures 3 through 10 also show Confidential shapefile locations of previously recorded archaeological sites and isolated artifacts per a literature review undertaken for POWER by the South Coastal Information Center (SCIC) of the California Historic Resources Information System (CHRIS), located at the Department of Anthropology at San Diego State University. The preliminary APE includes the grid of seismic source locations and includes proposed alternative paths for the Vibroseis buggy's use. The APE also includes the locations of geothermal wells, staging areas, geophone cache bag drop zones, and mandated survey buffer zones.

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[2] As defined by in 36 CFR §800.16, a 'historic property' means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. The term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian Tribe and Native Hawaiian organization and that must meet the National Register criteria.

[3] CEQA Guidelines §15064.5 establishes the term "historical resources", and this includes a resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the California Register of Historical Resources. The fact that a resource is not listed in, or determined to be eligible for listing in the California Register of Historical Resources, not included in a local register of historical resources (pursuant to section 5020.1(k) of the Public Resources Code), or identified in an historical resources survey (meeting the criteria in section 5024.1(g) of the Public Resources Code) does not preclude a lead agency from determining that the resource may be an historical resource as defined in Public Resources Code sections 5020.1(j) or 5024.

Proposed modifications to the preliminary APE shown in Figures 3 through 10 shall be made in the field during the Class III survey as a response to environmental concerns that would prevent the seismic vehicles from following the intended APE or the specific placement of each seismic source point or well. The formalized set of changes to the proposed APE, which would include the preferred path of travel plus proposed alternatives, would occur only after BLM and DPR have vetted the results of the pre-planning archaeological survey and examined the purpose for modifying the APE and proposing alternative paths of travel. Once the project related pre-planning survey is completed and potential impacts have been identified, the final APE map will be included in the Class III report. The Class III report will be submitted to and approved by both BLM and DPR before stage 2 work is approved by BLM and DPR.

The results of the Class III survey will provide BLM and DPR the means to evaluate potential impacts to historic properties and historical resources which lie near the project footprint prior to issuing a Notice of Intent to Conduct Geothermal Resource Exploration Operations for the seismic data collection or well drilling on the BLM portion of the SVRA. DPR would issue a Right of Entry for the seismic project.

The archaeological pre-planning survey proposed herein is a "no-collection" survey, which is defined as:

- Artifacts and isolated finds will be recorded in place, photographed with a scale for measurement purposes, and plotted with the Global Position System (GPS) coordinates to sub-meter accuracy
- In-field analysis will be conducted in cases of chronologically diagnostic finds or where artifacts or isolated finds are threatened by potential removal or disturbance due to their proximity to areas of high use or visibility.
- Isolated finds are two or less artifacts that are identified during the survey that are not found in association with other cultural constituents.
- For the purposes of this project, a site is defined as containing at least three or more artifacts and/or a feature within at minimum a 50 meter radius.

2.0 Background Information Associated With Survey Planning

Geophysical exploration utilizing 3D seismic recording techniques includes an extensive field data acquisition operation combined with complex computer assisted seismic data processing and interpretation to characterize and three dimensionally depict subsurface geologic structure and stratigraphy in three dimensions. Data obtained from the proposed seismic recordation, when combined with preexisting subsurface data, will enable geothermal wells to be drilled with a much higher probability of locating developable geothermal reserves than is attainable from alternative methods (for example, using relatively sparse two dimensional seismic data and/or limited well control to infer drillable locations). Seismic waves must be created at "source points" and recorded at "receiver points" within the limits of a large and ideally uniform horizontal grid, (Figure 1-Project footprint), using devices specially designed to undertake this task.

The Ormat team has considered various designs for placement of source locations and receiver locations in the Project area to maximize seismic data quality, while minimizing environmental impact. Ormat is proposing that receiver points and source points be placed generally 200 feet apart along parallel lines spaced approximately 1,200 feet apart (see Figure 11 and Figure 12). The Project would include approximately 3,168 receiver points distributed over approximately 119.09 linear miles of receiver lines (24 receiver transects) and 3,243 source points distributed over approximately 121.97 linear miles of source lines (23 source transects). Changes to the shape of the ideal seismic project grid shown in the attached Figures have been made at the desktop level; the location of each individual point and Vibroseis drive paths may be altered in response to obstacles[4] as they are encountered in the field during the pre-planning surveys, but the number of source and receiver points should ideally remain the same.

The locations of test wells have been identified and are included in the preliminary APE. Only the source points and paths needed to reach them will be evaluated by the archaeologists for stage one. Receiver point placement and use will not. In response to the detection of obstacles during the Class III survey, the source points and paths the Vibroseis buggies must take to reach them may be moved to new positions that will, among other things, avoid potential adverse effects to historic properties, including archaeological sites.

The survey crew will be divided into four teams, each working in different areas. Each crew performing the survey in the SVRA will include five state-qualified archaeologists[5], , a paleontologist, two biologists, an ordnance hazards

[4] The term 'obstacle' includes existing deep washes, structures, fences, ditches or other environmentally sensitive areas that lie in the paths the Vibroseis buggies must take to arrive at a seismic source point for the purpose of delivering seismic energy. An archaeological site is considered an obstacle that must be avoided during the seismic test. A safety issue (old ordnance) and/or a biological or paleontological resource may also be classified as an obstacle that must be avoided by the Vibroseis buggy drivers.

[5] A "state qualified archaeologist" is defined as a person having the following minimum qualities and/or qualifications: Equivalent to graduation from college with major course work in archeology or anthropology and one year of

specialist, and a member of the Geokinetics USA, Inc. (Geokinetics) team who understands the limitations of the Vibroseis buggies paths of travel in a desert environment such as Ocotillo Wells SVRA. A Native American monitor will be assigned from the AB 52 contact list of local tribes provided by the Native American Heritage Commission and identified as a Most Likely Descendant (MLD) to accompany each crew. If a proposed source point path must be altered, or if an alternate path is added, consensus on the least environmentally damaging paths of travel will be developed in the field by the crew members as the work moves forward. The source point locations and the best paths to reach them would then be defined in the various environmental reports issued after the fieldwork concludes and ultimately approved by BLM and DPR staff. Should conflicts arise between various environmental reviewers, any conflicts can be resolved during Ormat's regularly scheduled project meetings.

For stage two, the seismic project requires that a grid of wireless receiving devices (geophones) be ~~i~~nserted into the ground for approximately one week before beginning the seismic test at a series of regularly spaced points: Figure 11 shows the proposed location of those points. The geophone locations will be located during the seismic test by Geokinetics staff using a Trimble or similar hand-held GPS device with an archaeological monitor and a Native American monitor present. Figure 13 provides a series of photographs showing the geophone arrays, their placement, and the use of them during a previous 3D seismic study performed by Geokinetics. The geophone arrays record reflected energy that bounces back from subsurface geological layers deep below the surface. During seismic study, the geophone locations will be approached on foot by Geokinetics technicians, and the geophone arrays will be planted in the ground by hand. An archaeologist will be present during travel to and placement of the geophones to ensure avoidance of cultural resources. No geophones will be placed inside archaeological sites. Helicopters will be used to move sets of geophones in cache bags from the Salton Sea airport staging area to areas in the APE that had been previously surveyed by the archaeological team. Placement of cache bags every 1200 feet along each of the 23 source lines is proposed pending pedestrian survey results, and none shall be placed inside archaeological sites.

The source of the seismic energy will be created by vibration-creating equipment mounted on the undersides of Vibroseis buggies. The buggies measure approximately 12 feet wide and 35 feet in length. Each buggy bears an approximately 60,000 pound peak force vibrator equipped with hydraulically lowered pads and rubber sand tires. Geokinetics plans to provide Ormat with two sets of two buggies when the seismic test begins. Where the buggies will be positioned during any one day's seismic test work is not known as this time. A fifth buggy will be stored at the Salton Sea Airport staging area in case one machine breaks down.

Two sets of two Vibroseis buggies will drive in tandem along a source transect or path,

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increasingly responsible professional experience in research, writing, or project supervision in archeological investigation or cultural resource management and protection programs. BLM considers this person to be a "field director" (FWA permit phrase) or a "crew chief" (BLM Archaeology Handbooks).

with the group stopping at each source point, then each buggy group will lower vibration equipment from the belly of the buggy to the ground, then both buggies will vibrate at the same time for approximately 60 seconds. Figure 14 provides a series of photographs showing Vibroseis buggies in use during a recent 3D seismic studies in California. Figure 14 top is from a project that took place in Taft, CA, while the lower photo was taken from a project located in Mandalay County Park, Ventura, CA. The sand tires have 6 pounds per square inch gauge (psig) of pressure to minimize impacts of the buggy on the ground surface.

3.0 Class III Archaeological Survey Procedures

Archaeological surveys will be conducted by state-qualified survey archaeologists (BLM crew chiefs) , as well as Native American monitors. The Native American monitors must be from the AB 52 contact list from the NAHC and ultimately be approved by BLM and DPR. POWER Principal Investigator (PI), Michael H. Dice, is a state-qualified[6] PI and meets the Secretary of the Interior's Standards as an archaeologist (see attached resume). To develop consensus on proposed changes to the source points and the paths needed to allow a Vibroseis buggy to access them, two biologists, a paleontologist, a Geokinetics Vibroseis expert, a Native American monitor from the AB 52 contact list of local tribes from the project area, and an ordnance hazards specialist will accompany the archaeological crews during survey of the source locations.

Field data forms (see Exhibit 2, 3 and 4) will be managed only by archaeologists in the field: raw field data that describes the physical nature of the sites and isolates will not be viewed by non-archaeologists. The archaeological crew leads will carry a large format cellular phone tablet (Galaxy Tab A or Kindle) to store technical forms and allow daily forms to be completed. DPR 523 forms will be completed by POWER archaeologists for all newly discovered sites and isolates. Site updates on DPR 523 forms will be completed by POWER archaeologists for previously recorded sites. All 523 forms must be approved by DPR before final submittal from POWER to the SCIC and DPR. Completed DPR 523 site/isolate records will not be disclosed to non-archaeologists. All archaeologists and non-archaeologists working in the field as well as those managing any subsequent archaeological data will sign a confidentiality agreement during the field kick-off meeting: the information or location of cultural resources will only be disclosed on an "as needed" basis at the discretion of BLM and State Parks to select individuals. Workers will refrain from discussing the location or information of any cultural resources with others whether they are associated with the project or not.

POWER has recently obtained a literature review of the Project footprint from the SCIC and these records will be forwarded to BLM/DPR staff. Figure 3 through 10 shows the relationship between the source point grid, proposed access paths, the receiver points and archaeological site shapefiles. All previously identified archaeological sites delineated

[6] Mr. Dice meets qualifications as a Principal Investigator following Society for California Archaeology recommendations. See https://scahome.org/about-sca/society-for-california-archaeology-professional-qualifications-for-principal-investigator/.

by the SCIC literature review, and any identified informally by BLM or DPR, will be avoided during the seismic project; however, those site boundaries could change upon field review and additional sites could be detected once the survey begins. During the Class III survey, the location of previously identified archaeological sites will be verified following guidelines found in the BLM 8110 Handbook. As required by BLM and DPR, all previously identified archaeological sites will be visited by Power archaeologists if the source points, the proposed Vibroseis travel paths, or the survey buffer zones intersect with them. Previously identified sites will have 523 form records updated by POWER archaeologists to be approved by DPR before final submittal to the SCIC. Copies of all final DPR 523 forms will be supplied to BLM and DPR.

3.1) Archaeological Field Procedure

POWER plans to employ four archaeological crews in the field with non-archaeologists accompanying the crews during the source point surveys. These crews will be divided into teams: two crews will work in the SVRA, while two crews will work on non-SVRA lands. Although the paths the Vibroseis buggies are required to take are generally east-west, in some places, additional connecting paths are required because the desktop work showed that many of the source points needed by the seismic project, especially in the southwest quadrant of the project area, are isolated by washes and fences. In general, however, there are currently 23 east-west transects that must be surveyed. Shapefiles associated with each transect and path shall be numbered so that the archaeological crews can track them as they are surveyed. Because the Vibroseis buggies have wide turning radiuses and require 45 degree angle turns to reverse their direction of travel with minimal impact to the soil surface, all of the project footprint perimeter shall be surveyed so that a new run of east-west source points and paths can occur after the project perimeter is reached by the Vibroseis buggies.

All work on the SVRA will follow Class III survey procedures outlined in the BLM 8110 Handbook, which shall be made available to each member of the survey crew (see Appendix 2). Archaeological survey crews will examine all source and receiver points in each of the proposed transects, as well as all proposed access routes, work areas, staging areas, and test well pads. Buffer zone distance is described below. Individual crews will carry hand –held sub-meter GPS devices (Trimbles) so that each specific point can be found with great accuracy and so that proposed paths can be followed. Should it be required that source or receiver points must be moved to avoid sensitive resources or hazards at the final discretion of BLM and DPR, the Trimble operator will record the new points and/or new drive paths. Any archaeological sites will be treated as historic properties/historical resources whether they have been evaluated or not and will be avoided by the Vibroseis buggies and during geophone placements. BLM and DPR will have the final determination that a source or receiver point must be moved to avoid cultural resources within the confines of the SVRA. At the discretion of the BLM and DPR archaeologists, additional cultural resources will also reviewed and avoided, if considered eligible for listing in the National Register of Historic Places or if unevaluated.

After each day's work, POWER's Principal Archaeological Investigator will report the

results of the day's survey to POWER GIS lead staff, Geokinetics lead staff, and BLM and DPR archaeologists for an assessment of the obstacles, hazards and new archaeological sites or isolates (if any) found during that day's work. Daily statements on the results shall be emailed from Mr. Dice to BLM/DPR archaeologists the morning after the data has been received. If an archaeological crew member cannot perform during any one day, Mr. Dice will serve as the backup in the field.

3.2 Archaeological Buffer Zones

Archaeological survey buffers will be different on SVRA land compared to non-SVRA land due to BLM's requested expectations.. BLM/DPR has indicated to Ormat that the source line transects in the SVRA must be no less than 50 meters/164 feet wide and the archaeologists must be placed no more than 10 meters/33 feet apart from each other during transects, which requires a total of five state-qualified archaeologists on the SVRA source line survey teams per survey swath.

Archaeological transects in the non-SVRA portion of the Project do not require DPR archaeological approval, but the survey process itself must be vetted by BLM following the BLM Handbook 8110 procedure. BLM recommended and Imperial County Planning & Development Services agreed that all non-SVRA lands to be surveyed for source point impacts require a 50 feet/15.25 meters wide transect. Therefore, the source point location and Vibroseis path survey transects on non-SVRA land will be no more than 50 feet/15.25 meters wide and two qualified archaeologists will be spaced no more than 10 meters apart to cover this ground. The transect survey and block survey buffer zones, and the locations of all previously identified and new archaeological sites/isolates found during the survey, will be shown in the APE figure that shall be placed in the final Class III survey report.

Each survey crew will bear a Trimble Geo7 XT submeter GPS unit which, after recorded points and paths are processed, will provide a sensitivity variance of less than 50 centimeter per point or path. The Geo7 XT units accurately locate pre-determined receiver and source points within the Project grounds and to manage revised locations of Vibroseis paths and survey buffer zones. If the source point and source drive path requires change due to an obstacle, the route change will be recorded on the Trimble by the lead archaeologist on the crew. On SVRA land, and as noted previously, the route change must be approved by the BLM and DPR archaeologists during the Class III survey review period. Two survey crews working on non-SVRA land will include that same class of crew members except the hazards specialist. For a list of staff required on each team, see Exhibit 5 below.

3.3 Area of Potential Impact

All ground identified as a potential location for use during the seismic study must be surveyed by archaeologists except those areas that are paved or graveled, which will be surveyed 25 meters/82 feet on all sides of the pavement or gravel bed. Ten-meter spacing between archaeologists must be utilized in each area. Figure 3 through 10 includes each group of locations discussed below that must be surveyed with the appropriate buffer zone. The whole of these areas constitutes the preliminary APE for the Class III study.

The anticipated areas of impact, which are shown on these Figures, include the following:

A) Seismic source points located inside a grid of Vibroseis buggy paths plus the paths themselves (50 meters/164 feet SVRA, 50 feet/15.25meters non SVRA), subject to change.

B) Vibroseis buggy paths that may be needed to reach source points as a result of the discovery of environmental limitations and obstacles as the survey takes place (50 meters/164 feet SVRA, 50 feet/15.25 metrers non SVRA), subject to change.

C) Four geothermal well pads 5 acres in size on SVRA lands (25 meters/82 feet buffer completely surrounding the test well pad perimeter plus the complete area of the pad itself)

D) Six geothermal well pads 5 acres in size on non-SVRA lands (25 meters/82 feet buffer completely surrounding the test well pad perimeter plus the complete area of the pad itself)

E) Helicopter drop pads, 4 m x 4 m (13 feet by 13 feet) in size, on SVRA lands (25 meters/82 feet buffer completely surrounding the pad perimeter plus the complete area of the pad itself)

F) Helicopter drop pads 4 m x 4 m in size on non-SVRA lands (25 feet/7.6 meters buffer completely surrounding the pad perimeter plus the complete area of the pad itself)[7]

G) Unpaved access trails in deep washes leading into the various parts of the SVRA that are allowed for public use (see Figure 3 through 10). These trails are named on SVRA maps available to the public, and include "Tule Wash", "Arroyo Salado/Bus Wash", "Campbell Wash" and "Eriogonum Wash" (bank to bank wash surveys with a maximum of 10 meter spacing). No other trails will be used by the Vibroseis buggies unless they were surveyed by the teams and cleared of obstacles.

H) Salton Airport (a staging area) will be surveyed using a 25 meter/82 feet buffer extending outside the paved perimeter.

Any areas not defined herein will not be considered part of the Class III survey unless BLM and DPR approves a change. If additional areas are required to be surveyed before the pre-planned survey begins, BLM and DPR will be contacted within 24 hours of identification of the area to determine the most efficient means to include the additional work required. If additional areas are required after the Class III survey concludes and the final APE has been submitted to BLM and DPR, a new APE and additional survey will need to be planned and scheduled with both agencies' approval.

3.4 Identification of Cultural Resources during the Survey

Archaeological sites are defined as locations that bear potential nodes of historic or prehistoric activity that may have occurred 45 years ago or more, and *historic properties* are defined above. On State land, *historical resources* are essentially the State equivalent

[7] We note that all helicopter drop points may be moved inside the Seismic source point drive paths. If so, the archaeological crews will ensure that the appropriate buffer zone will be surveyed around the drop pads if moved to points inside the Vibroseis buggy paths. Notification of any such changes will be made to BLM and DPR before drop points are utilized.

of the historic property and may be treated as a historic property by BLM. Finally, on non-federal land, tribal cultural resources are defined by newly enacted PRC Section 21074 (a) through (d)[8]. Each type may be identified during the Class III survey. For the purposes of this Class III survey, it is assumed that all archaeological sites are historic properties/historical resources unless previous formal evaluation has proven otherwise. To meet minimum criteria as an archaeological site during the Class III survey, the site must contain at least three or more artifacts within at minimum a 50 meter radius, or a feature (such as a slabbed fish-trap feature or possible hearth) that may or may not lack any nearby artifacts. Fire-affected rock (FAR) clusters may represent a prehistoric, protohistoric, or historic hearth. All features that include fire-affected rock will be identified and recorded, unless they can be positively identified as being more recent than 45 years of age (post 1971). Trails observed in desert pavement, but not on bare soil, will be considered linear sites, and recorded as a linear feature and plotted on site maps. Linear features will be recorded to a distance 50 meters beyond the Project boundary, and will be noted as extending beyond the Project area on site records and all other records of the survey. Isolated finds are defined as those finds that consist of two or fewer artifacts within a 50 meter radius, or a cluster of artifacts that may be retrofitted in a 50 meter radius (such as a pot-drop or broken historic bottle). Any resource that extends outside the Project footprint will be recorded up to 50 meters beyond the Project footprint. Resources that are determined to extend beyond 50 meters of the Project footprint will be recorded to the 50-meter boundary and will be noted on the site record form (DPR-523), which will be completed by POWER archaeologists and approved by DPR for all sites and isolates before the start of stage two.

BLM has indicated that previously identified sites observed during the fieldwork must be re-recorded using at minimum an updated Primary and archaeological site record for sites (DPR 523) and a new shapefile showing the re-defined site boundary. Such data will be collected by flagging the revised site boundary with pin flags, recording the data and changes since the last known site identification, noting the current condition of the site and any observed disturbances, generating a shapefile, completing all applicable DPR-523 site record forms, and removing the pin flags when finished. If previously unidentified archaeological sites are encountered in the APE, they will be recorded, and corresponding DPR 523 forms will be completed by POWER archaeologists. Previously unidentified isolated finds will be recorded with a 523 form completed by POWER archaeologists. Previously identified isolated finds need not be re-recorded unless they are identified as a new site or if the condition of the artifact has changed since it was last identified. If a previously identified isolate is relocated but not identified as a new site or if its condition does not change, this will be documented.This standard shall be applied to

[8] 'Tribal cultural resources' is a term recently defined by the California Office of Planning and Research (see https://www.opr.ca.gov/docs/OPR_AB_52_Presentation_Discussion_Draft.pdf). Also see Public Resource Code 21074 (a)(1)(A)-(B). By definition, the resource is:
--a site feature, place, cultural landscape, sacred place or object, which is of cultural value to a Tribe
-- AND is either: on or eligible for the CRHR or a local historic register
-- OR the lead agency, at its discretion, chooses to treat the resources as a TCR.

all portions of the Project footprint. All new sites and isolates will be recorded on DPR 523 forms completed by POWER archaeologists, and these forms will be approved by BLM/DPR before final submittal. Final DPR 523 forms will be submitted to BLM, DPR, and SCIC prior to the start of stage two work. If any previously recorded sites or isolates cannot be re-identifed, the resources will be documented as such.

4.0 Class III Survey Report Submission

BLM has agreed that the Class III survey report can include a chapter associated with CEQA-related results so that cultural resource findings on Project land located outside the SVRA can be used to support the CEQA compliance process the County must undertake. POWER shall submit a draft report to BLM and DPR archaeologists with all exhibits finalized. New cultural resource identifications will result in temporary numbers in the submitted draft report to substitute for primary and trinomial numbers issued by the SCIC when the final report is generated. The PI will submit the final report and site records to the SCIC and additional copies to BLM and DPR archaeologists. All GIS shapefile data,photographs or drawings, or any other information obtained will be submitted to BLM and DPR archaeologists.

The Class III report shall be submitted to BLM and DPR for review with an amended APE that reflects all field and records search findings. All recommendations are subject to final approval from BLM and DPR. The revised APE will show the paths the archaeological surveyors established to review the source points, the receiver points, the paths the Vibroseis buggies are recommended to take to reach the source points, the exploration wells, the paths the drill rigs must take to reach their targets, all staging areas, and all historic properties to be avoided during the seismic study.

Once the project related survey is complete and all potential impacts have been defined, the final APE map would be included in the Class III report for approval by BLM and DPR archaeologists.

BLM-requested reporting stipulations.

According to the Special Permit Conditions Continuation sheet on the FWA permit application, the following requirements must be met during this project:

1. Permittee shall not release any reports, site records, or any other documents or materials that result from the work authorized by this Fieldwork Authorization to any person or entity, including, but not limited to the Applicant seeking authorization from the BLM (i.e., right-of-way grant) which requires that cultural resources activities be conducted, any third party individual or entity, any governmental agency (except the BLM), a non-governmental organization, or Indian tribe, unless otherwise directed in writing by the BLM.
2. Any agreement that is executed by and between the Permittee and the Applicant or any other person or entity that requires the Permittee to release any reports, site records, or any other documents or materials that result from the work authorized by this Fieldwork Authorization to the Applicant or any other person or entity without BLM written approval are inconsistent with Stipulation f of the BLM California supplemental State Permit Conditions and section 1, above.
    a. Permittee shall disclose that such an agreement has been executed.
    b. BLM may suspend, terminate, or refuse to issue a Fieldwork Authorization where an agreement has been executed between the Permittee and the Applicant or any other person or entity that requires the Permittee to release the reports, site records, or any other documents or materials as noted in section 2, above.
3. The Permittee shall refer to the BLM any and all requests by an Applicant, any third

party individual or entity, any governmental agency (except the BLM), a non-governmental organization, or Indian tribe for any reports, site records, or any other documents or materials that result from the work authorized by this Fieldwork Authorization. The BLM will determine whether, to what extent and in what manner, if any, the report, site records, or any other documents or materials will be released.

a. Permittee must request and receive permission from BLM to submit site records to the California Historical Resources Information System for the purposes of obtaining permanent site numbers.

4. All reports, site records, and any other documents or materials that result from the work authorized by this Fieldwork Authorization is and remains the sole property of the United States of America and any release without the written approval of the BLM may be determined to be a violation of federal law.

According to the Supplemental Stipulations and Guidance page on the FWA permit application, the following requirements must be met during this project:

3. If applicable, final site numbers issued by the appropriate California Historical Resources Information System Center (IC) should be included in the final report. Consultants/applicants are responsible for providing copies of the final report to the California Historical Resources Information System once they have the permission of the BLM. The draft report and draft records shall be submitted to the BLM for review and approval prior to submitting them to the IC.

4. Three copies of the final report, including site forms with final site numbers assigned by the appropriate IC, shall be provided to the authorizing BLM field office after completion of fieldwork. A copy of the report and any associated documents, site forms, and maps also be provided in the PDF electronic document format. We also require any digital files created using GIS/GPS, including survey area and locations of sites, as well as associated metadata. As a general GIS standard, BLM utilizes GIS base maps with the 1983 North American Datum (NAD 83, UTM Projection). We request that this information be submitted on CD-ROM. Depending upon the size of the project, use of the BLM's archaeological geodatabase may be required. Please inquire with the local Field Office prior to beginning fieldwork.

5. BLM requests that you provide summary statistics about this project as an addition/supplement to the executive summary or abstract of your report. BLM is required to compile these statistics on an annual basis as part of our responsibilities under the National Historic Preservation Act and the Archaeological Resources Protection Act. Please see the tabular questionnaire attached [on the FWA] for more information.

Assembly Bill 52

Assembly Bill 52 (September 25, 2014) amended the California Environmental Quality Act (CEQA) to address California Native American tribal concerns regarding how cultural resources of importance to tribes are treated under CEQA.

CEQA now specifies that a project that may cause a substantial adverse change in the significance of a tribal cultural resource [as defined in PRC 21074(a)] is a project that may have a significant effect on the environment. PRC 21074 (a) defines "tribal cultural

resources" as either of the following:

(1) Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following:

(A) Included or determined to be eligible for inclusion in the California Register of Historical Resources.

(B) Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1.

(2) 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) of Section 5024.1. In applying the criteria set forth in subdivision (c) of Section 5024.1 for the purposes of this paragraph, the lead agency shall consider the significance of the resource to a California Native American tribe.

Here, the CEQA lead agency (in this case the County of Imperial) must begin consultation with all California Native American tribes that are traditionally and culturally affiliated with the geographic area of the proposed project, if the tribe requested to the lead agency, in writing, to be informed by the lead agency of proposed projects in that geographic area and the tribe requests consultation or if the tribe is listed on the AB 52 contact list from the NAHC for the project area.

These recent revisions to the CEQA process are applicable to projects that will file a Notice of Preparation for an Environmental Impact Report or Notice of Intent to Adopt a Negative Declaration or Mitigated Negative Declaration on or after July 1, 2015.

5.0 Inadvertent Discovery of Human Skeletal Remains

If human skeletal remains are encountered within Ocotillo Wells SVRA boundary during the project, then all activity will cease that may cause further disturbance to those remains. The area of the find will be secured and protected from further disturbance. The finding of human skeletal remains will be reported to the County medical examiner/coroner, local law enforcement, the BLM and DPR in the most expeditious manner possible. The remains will not be touched, moved, or further disturbed. The County medical examiner/coroner will assume jurisdiction over the human skeletal remains and make a determination of whether those remains are forensic or non-forensic.

- If the County medical examiner/coroner determines that the remains are non-forensic and they are located on BLM owned parcels, then they will report that finding to the Native American Heritage Commission and the El Centro Field Office archaeologist for determination of future actions which may include consultation under the Native American Graves Protection and Repatriation Act (NAGPRA,) should preservation in place of the remains not be possible., Tricia Dodds, DPR archaeologist, will also be notified.
- If the county medical examiner/coroner determines the remains are non-forensic, and located on DPR owned parcels, then they will report that finding to the Native American Heritage Commission and Tricia Dodds, DPR Archaeologist, who will then take jurisdiction over the remains. Tricia Dodds, DPR Archaeologist, will notify the MLD. Tricia Dodds, DPR Archaeologist, will then handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains. Thomas James, BLM Archaeologist, shall also be notified.

If human remains are detected on lands not under the jurisdiction of either the BLM or DPR, CEQA Guidelines (Section 15064.5[e]) state the following:

> "If human remains are discovered in any location other than a dedicated cemetery, the following steps should be taken:
>
> There shall be no further [excavation or] disturbance of the site or any nearby area [100' buffer] reasonably suspected to overlie adjacent human remains until
>
> A) The coroner of the County has determined that no investigation of the cause of death is required, and;
> B) If the coroner determines the remains to be Native American:
> 1. The coroner shall contact the Native American Heritage Commission (NAHC or Commission) within 24 hours.
> 2. The NAHC shall identify the person or persons it believes to be the most likely descended from the deceased Native American.
> 3. The [California] most likely descendent may make recommendations to the landowner or person responsible for the [excavation] work, for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave

goods as provided in Public Resources Code (PRC) Sec. 5097.98.

With reference to PRC Sec. 5097.98 noted above, the law currently reads as follows:
5097.98. (a)

Whenever the commission receives notification of a discovery of Native American human remains from a county coroner pursuant to subdivision (c) of Section 7050.5 of the Health and Safety Code, it shall immediately notify those persons it believes to be most likely descended from the deceased Native American. The descendants may, with the permission of the owner of the land, or his or her authorized representative, inspect the site of the discovery of the Native American human remains and may recommend to the owner or the person responsible for the excavation work means for treatment or disposition, with appropriate dignity, of the human remains and any associated grave goods. The descendants shall complete their inspection and make recommendations or preferences for treatment within 48 hours of being granted access to the site.

(b) Upon the discovery of Native American remains, the landowner shall ensure that the immediate vicinity, according to generally accepted cultural or archaeological standards or practices, where the Native American human remains are located, is not damaged or disturbed by further development activity until the landowner has discussed and conferred, as prescribed in this section, with the most likely descendants regarding their recommendations, if applicable, taking into account the possibility of multiple human remains. The landowner shall discuss and confer with the descendants all reasonable options regarding the descendants' preferences for treatment.

(1) The descendants' preferences for treatment may include the following:

(A) The nondestructive removal and analysis of human remains and items associated with Native American human remains.

(B) Preservation of Native American human remains and associated items in place.

(C) Relinquishment of Native American human remains and associated items to the descendants for treatment.

(D) Other culturally appropriate treatment.

(2) The parties may also mutually agree to extend discussions, taking into account the possibility that additional or multiple Native American human remains, as defined in this section, are located in the project area, providing a basis for additional treatment measures.

(c) For the purposes of this section, "conferral" or "discuss and confer" means the meaningful and timely discussion and careful consideration of the views of each party, in a manner that is cognizant of all parties' cultural values, and where feasible, seeking agreement. Each party shall recognize the other's needs and concerns for confidentiality of information provided to the other.

(d) (1) Human remains of a Native American may be an inhumation or cremation, and in any state of decomposition or skeletal completeness.

(2) Any items associated with the human remains that are placed or buried with the Native American human remains are to be treated in the same manner as the remains, but do not by themselves constitute human remains.

(e) Whenever the commission is unable to identify a descendant, or the descendants identified fail to make a recommendation, or the landowner or his or her authorized representative rejects the recommendation of the descendants and the mediation provided for in subdivision (k) of Section 5097.94, if invoked, fails to provide measures acceptable to the landowner, the landowner or his or her authorized representative shall reinter the human remains and items associated with Native American human remains with appropriate dignity on the property in a location not subject to further and future subsurface disturbance. To protect these sites, the landowner shall do one or more of the following:

(1) Record the site with the commission or the appropriate Information Center.

(2) Utilize an open-space or conservation zoning designation or easement.

(3) Record a document with the county in which the property is located. The document shall be titled "Notice of Reinterment of Native American Remains" and shall include a legal description of the property, the name of the owner of the property, and the owner's acknowledged signature, in addition to any other information required by this section. The document shall be indexed as a notice under the name of the owner.

(f) Upon the discovery of multiple Native American human remains during a ground disturbing land development activity, the landowner may agree that additional conferral with the descendants is necessary to consider culturally appropriate treatment of multiple Native American human remains. Culturally appropriate treatment of the discovery may be ascertained from a review of the site utilizing cultural and archaeological standards. Where the parties are unable to agree on the appropriate treatment measures the human remains and items associated and buried with Native American human remains shall be reinterred with appropriate dignity, pursuant to subdivision (e).

(g) Notwithstanding Section 5097.9, this section, including those actions taken by the landowner or his or her authorized representative to implement this section and any action taken to implement an agreement developed pursuant to subdivision (l) of Section 5097.94, shall be exempt from the requirements of the California Environmental Quality Act (Division 13 (commencing with Section 21000)).

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APPENDIX F APPROVED 2018 ARCHAEOLOGICAL WORK PLAN

FINAL

2018 CLASS III ARCHAEOLOGICAL SURVEY WORK PLAN FOR THE ORMAT NEVADA, INC. TRUCKHAVEN THREE-DIMENSIONAL SEISMIC PROJECT

Section 1.0 Introduction

Ormat Nevada, Inc. (Ormat) is proposing to conduct a three-dimensional (3D) geophysical data acquisition project (Project) near the Salton City Airport in Imperial County, California (Figure 1). Geophysical seismic data acquisition will be conducted between November 2018 and January 2019 by Geokinetics USA, Inc. of Houston, Texas (Geokinetics) who retained by Ormat after all permits to conduct the seismic work are received. The purpose of the Project is to evaluate potential subsurface geothermal resources located near the north end of the U.S. Department of the Interior, Bureau of Land Management (BLM) Truckhaven Geothermal Lease Area (TGLA). Lands impacted by the Project will include property managed by California State Parks (Parks), BLM, and the California State Lands Commission (SLC). Some of the land is held privately.

Geophysical exploration utilizing 3D seismic recording techniques includes an extensive field data acquisition operation combined with complex computer assisted seismic data processing and interpretation to characterize and three-dimensionally depict subsurface geologic structures and stratigraphy. When combined with preexisting subsurface data, the acquired geophysical data will enable geothermal test wells to be drilled with a much higher probability of locating developable geothermal reserves than is attainable from alternative methods (for example, using relatively sparse two dimensional seismic data and/or limited well control to infer drillable locations). 3D seismic waves will be created at "source points" and recorded at "receiver points" using devices specially designed to undertake this task. Generation of vibrational waves at source points typically requires the use of heavy equipment that must be driven on paved, graveled or dirt pathways (see Appendix 1). Equipment will be ferried to non-environmentally sensitive areas and the Salton Sea Airport shall serve as the staging area.

In advance of the Project, various environmental clearance surveys are required. POWER Engineers, Inc. (POWER) has been retained by Ormat to gather cultural resource information using a BLM Class III intensive archaeological survey format (Class III). As a part of our Class III analysis, a museum records check, a historical background review, Class III field data, and a formal statement of potential adverse effects are required. The Class III must be submitted to BLM before permits to conduct the Project can be provided to Ormat[1]. The Class III will be prepared to fulfill National Environmental Policy Act (NEPA) and, with BLM pre-approval, California Environmental Quality Act (CEQA) requirements. Our proposed survey project is considered a restart of the 2016 "Truckhaven Project", which was halted mid-stream in May 2016 due to the existence of unexpectedly large archaeological deposits.

This Work Plan, a necessary component of the pre-survey phase of the Class III, will be attached

[1] BLM Handbook 8110 defines the Class III analysis as an "intensive field survey" with a series of required elements. The Class III report must include complete records of all resources identified during the survey, specific locations of those resources in relation to the proposed project and APE, and include a synthesis of the prehistoric and history of the region written to professional documentation standards found in the Secretary of the Interiors Guidelines for Archaeology and Historic Preservation. Avoidance (or impact) statements must also be made.

to POWER's BLM Fieldwork Authorization (FWA) request and our Parks 412a application. This Work Plan for both agencies is identical. Its purpose is to inform Ormat, BLM, and Parks as to the specific processes POWER cultural resource staff must utilize in the field, and is similar to the work plan prepared for the 2016 field season. Cultural resources that are encountered during the survey will be formally recorded and California Department of Parks and Recreation (DPR) 523 form sets provided to both the BLM and Parks. POWER's Principal Investigator (PI), Michael H. Dice, is a BLM and state-qualified[2] PI and meets the Secretary of the Interior's Standards as a professional archaeologist.

A portion of the Project area was surveyed by POWER staff under BLM/Parks permits in the spring of 2016 as the 'Truckhaven Project'. Subsequently, Ormat reduced the Project footprint in size and extracted the geothermal test well pad and road portion of the Truckhaven Project from the original Truckhaven Plan of Operation submittal to BLM. The Project footprint now consists of a rectangular block 5.3 miles (east- west) by 4.3 miles (north-south) in size. Certain public lands in the new Project footprint are managed by the BLM and DPR as part of the Ocotillo Wells State Vehicular Recreation Area (SVRA). Private land in the Project footprint is located within unincorporated portions of the County of Imperial, and there are some lands managed by the California SLC. Lastly, 320 acres of land inside the boundary of the Ocotillo Wells SVRA are managed by the County of Imperial as a landfill and Ormat holds a BLM mineral lease beneath the landfill.

Section 1.1 Regulatory Background

Previously published specific cultural resource stipulations associated with the TGLA can be found in a *Documentation of Land Use Plan Conformance and NEPA Adequacy (DNA)* document issued by the BLM El Centro Field Office (Tracking Number D070-2014-0035). The DNA stipulations must be fulfilled by our Class III analysis. A concomitant information notice for same was issued September 11, 2014. The BLM Record of Decision (ROD) for the TGLA was issued in July 2008. The Class III analysis shall also fulfill the ROD's approved cultural resource measures. Quoted below, the ROD cites the following requirements:

Cultural Resources

- *Before any specific permits are issued under leases, treatment of cultural resources would follow the procedures established by the Advisory Council on Historic Preservation for compliance with Section 106 of the National Historic Preservation Act.*
- *A pedestrian inventory would be undertaken of all portions that have not been previously surveyed or are identified by BLM as requiring inventory to identify properties that are eligible for the National Register of Historic Places.*
    - *Those sites not already evaluated for National Register of Historic Places eligibility would be evaluated based on surface remains, subsurface testing, archival, and/or ethnographic sources. Subsurface testing would be kept to a minimum whenever possible if sufficient information is available to evaluate the site or if avoidance is an expected mitigation outcome.* [*NOTE: Avoidance is an expected mitigation outcome for this*

[2] Mr. Dice meets qualifications as a Principal Investigator following Society for California Archaeology recommendations. See https://scahome.org/about-sca/society-for-california-archaeology-professional-qualifications-for-principal-investigator/.

project and subsurface testing has not been approved. Ormat need not test because all resources will be avoided.]

- *Recommendations regarding the eligibility of sites would be submitted to the BLM, and a treatment plan would be prepared to detail methods for avoidance of impacts or mitigation of effects. The BLM would make determinations of eligibility and effect and consult with the State Historic Preservation Office as necessary based on each proposed lease application and project plans.*

The Project also lies within the Truckhaven Development Focus Area (DFA) as defined by the BLM's Desert Renewable Energy Conservation Plan (DRECP). To streamline the Section 106 process for a specific project taking place inside any one DRECP DFA, all cultural resource background research should conform to stipulations associated with the DRECP Programmatic Agreement (PA). The PA has numerous associated stakeholders, including Parks and local tribal organizations, and the PA defines the procedures archaeologists must undertake to produce technical reports acceptable to BLM land managers. The PA states that the BLM will encourage (PA II.E.4) all energy-development Applicants to provide Tribes and tribal organizations the opportunity to participate in archaeological surveys for proposed projects. The PA also states that the BLM may require certain cultural resource studies for elements of proposed or anticipated energy development projects (PA IV.B). The fieldwork we propose herein will help BLM fulfill many of the requirements of the DRECP PA, including development of a proposed area of potential effect (APE), as well as appropriate and respectful Tribal involvement.

Section 1.2 Tribal Monitoring

With regard to tribal monitoring, our understanding is that the BLM and Imperial County are the lead agencies responsible for tribal consultation and active tribal monitoring. Per a memo written by Parks to Richard Cabanilla of Imperial County PDS, formal "consultation" is not yet required and that informal notice to tribes about the Project is appropriate. (Since AB52 has not yet been triggered, the County is not yet mandated to engage in a formal manner.) At the request of BLM at a meeting on November 13, 2017, BLM asked POWER to set up a monitoring rotation that is more diverse than in 2016 and we are in the last stages of doing so. POWER has contacted 17 different tribal groups shown on the February 10, 2016 Imperial County tribal consultation list that had been provided to the County from the Native American Heritage Commission. An on-going monitoring tracker, dated December 21, 2017, has been provided in the permit application packages. Where possible, members from these groups will be included as part of the survey teams. We also contacted two tribal groups found on a list BLM provided to POWER in 2016 and both have indicated that they are interested in joining the rotation.

The final list of tribal groups POWER contacted as part of the 2016 fieldwork were made available to local Parks representatives about a week in advance of the 2016 survey start. In 2016, SVRA staff reviewed the list of tribal monitors and, when able, SVRA staff checked our crews and made sure the named monitors were in the field. The same process will be used for the 2018 field season: Due to the difficultly of ensuring that all specific tribal members will actually be available weeks away from a scheduled appearance, the rotation may be subject to change: Parks and BLM staff will be provided changes as soon as we can confirm them. For 2018, the tribal rotation will be set about one week before the survey begins. The rotation list will be made available to BLM and Parks only after each individual monitor or the subcontracting tribal group

is contacted and allowed to review their schedules.

As far as we are aware, Parks has not published specific requirements for allowing geothermal studies on Park lands. The need to use certain lands within the SVRA must be permitted on a case-by-case basis, including applying for a Parks DPR412a permit to investigate the existence of cultural resources in those areas of the SVRA ultimately requiring Project use. Similarly, the County of Imperial has no specific cultural resources requirements associated with geothermal surveys. No County permits are required to conduct archaeological fieldwork on private land and Ormat has fulfilled County requests as to trespassing notices.

Development-related projects that occur on Parks-managed lands are subject to CEQA compliance. For this project, the County of Imperial Planning & Development Services Department (County) is the lead CEQA agency. For the purposes of the cultural survey and the Parks DPR412a permit, it is assumed that all archaeological sites in the Project footprint are eligible for listing in the National Register of Historic Places as a *historic property*[3], as well as on the California Register of Historical Resources. Public Resource Code 5024.5(b) requires that the County account for potential adverse effects for any listed, unevaluated, or eligible *historical resources*[4].

Section 2.0 Recap of 2016 Fieldwork

The 2016 Class III survey began on April 26, 2016 but was halted on May 25, 2016 by Ormat due to an unexpectedly large number of archaeological resources restricting certain Project areas. A total of 1,400 acres were surveyed using four crews; 81 new sites, 68 new isolates and eight previously recorded sites were encountered and recorded. The 2016 survey examined the footprints of various well pads as well as Vibroseis pathways. Our crews revised the planned pathways as the survey was undertaken to avoid sensitive environmental resources and physical obstacles. Archaeological crews demobilized in May 2016 when it was recognized that an even larger number of archaeological sites in the remaining survey footprint could have been encountered.

Ormat has revised the Project by 1) undertaking the geothermal test well archaeological survey as a separated Project, and 2) reducing the size of the Project footprint so that lands along the southern border of the Project would not be used. Ormat then requested that BLM process separate use permits: one for geothermal test well construction and another for the seismic

[3] As defined by in 36 CFR §800.16, a 'historic property' means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. The term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian Tribe and Native Hawaiian organization and that must meet the National Register criteria.

[4] CEQA Guidelines §15064.5 establishes the term "historical resources", and this includes a resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the California Register of Historical Resources. The fact that a resource is not listed in, or determined to be eligible for listing in the California Register of Historical Resources, not included in a local register of historical resources (pursuant to section 5020.1(k) of the Public Resources Code), or identified in an historical resources survey (meeting the criteria in section 5024.1(g) of the Public Resources Code) does not preclude a lead agency from determining that the resource may be an historical resource as defined in Public Resources Code sections 5020.1(j) or 5024.

Project.

Consequently, POWER extracted the archaeological data associated with the geothermal test well portion of the 2016 Truckhaven Project draft Class III survey database and applied that data to a new Class III prepared for the geothermal test wells and well pad access roads. POWER submitted the geothermal test well Class III survey report, known as the *Truckhaven Wells Project* (BLM Permit #FA CA-670-16-077FA02) to BLM in July 2017. Our Class III Truckhaven Project draft archaeological report that was submitted to both BLM and Parks in December 2016 is no longer valid because of the substantive Project redesign. The sites and isolates discussed in the 2016 report as part of the Project phase will be applied to the Class III prepared to fulfill the terms of this Work Plan.

Section 3.0 Proposed 2017 Archaeological Survey Procedure in the Project Study Area

For the purposes of this permit application, POWER intends on using those data collected during the 2016 field season as part of our Project analysis but, as noted, the test well pads and associated access road data has been placed in a new Class III report. We shall augment our 2016 archaeological data with new data collected under the terms of this 2018 permit and, once complete, prepare a new Class III report for the proposed Project. It must be noted that after 2016 demobilization, DPR recommended some changes in the procedures the field archaeologists would be allowed to use to gather data (e.g., the survey corridor was reduced from 50 meters to 25 meters for Vibroseis pathways in the SVRA). Other differences in planned procedures are described below.

POWER proposes to survey planned Vibroseis travel pathways using corridors within which qualified archaeologists scan for deposits using BLM and Parks-approved methodologies. Figure 1 shows the Project footprint at a regional scale, while Figure 2 provides an overview index of the entire Project. Figures 3 - 10 is an archaeological "mapbook" revealing the locations of the 2016 completed survey corridors plus the proposed 2017 Class III linear survey alignments. The mapbook shows 2016 corridors in pale red with individual (black dot) seismic generation points confirmed by Geokinetics. Geokinetics serves as Ormat's geophysical consultant in the field and will accompany our cultural survey crews. Blue corridors are those proposed for the 2017 Class III survey and the seismic generation points (black dots) that lie therein will be confirmed or moved by the survey crews as the survey is undertaken. Orange and brown polygons are sites POWER recorded in 2016. Purple polygons are previously recorded sites identified during the South Coastal Information Center (SCIC) records search. POWER advised Geokinetics to design the Vibroseis grid to avoid all previously recorded sites. Isolated artifacts are shown as yellow dots. During the survey, the location of each individual source point and travel pathway may be moved in response to obstacles[5] as they are encountered in the field during the survey.

The survey crews will be divided into two teams, one working in the SVRA (Crew #1) and the

[5] The term 'obstacle' includes existing deep washes, structures, fences, ditches or other environmentally sensitive areas located in the paths the Vibroseis buggies must take to arrive at a seismic source point for the purpose of delivering seismic energy. An archaeological site is considered an obstacle that must be avoided during the seismic test. A safety issue (old ordnance) and/or a biological or paleontological resource may also be classified as an obstacle that must be avoided by the Vibroseis buggy drivers.

other outside the SVRA (Crew #2). The SVRA crew will include a BLM-qualified Field Director/State-qualified archaeologist[6] (FD), two archaeological field technicians[7], and a member of the Geokinetics team who understands the limitations of the Vibroseis vehicle paths of travel in a desert environment such as the SVRA. An ordnance hazards specialist will join the crew when the World War II-era "Winona I" practice bombing test area is traversed (see Appendix 2). The non-Park Crew #2 will consist of an FD, one archaeological field technician, and a member of the Geokinetics team. On the initial survey start date, staff assigned to Crew #1 and Crew #2 plus the Project PI will have a kickoff meeting at the corner of Betty and Service Road roughly 1 mile southeast of the Salton City ARCO Travel Center. All archaeological crew working within the SVRA will be expected to attend a site visit in the Park prior to beginning work. Parks and POWER will determine scheduling.

The archaeological clearance survey proposed herein is a "no-collection" survey, which is defined under the following terms:

- The survey corridor in the SVRA is 25 meters wide. Survey width outside the SVRA is approximately 15 meters wide.
- Archaeologists shall be spaced no greater than ten meters apart while the linear survey takes place.
- Sites, tools within sites, unique and sensitive artifacts, and isolated finds will be recorded in place, photographed with a scale for measurement purposes, and mapped using a Trimble Global Positioning System (GPS) at sub-meter accuracy. All tools, cores and other unique archaeological resources, such as pot bases and flakes bearing use wear will be individually recorded. These occurrences will be found in our field records for DPR523 form set preparation.
- A representative sample and diagnostic count of non-tool artifacts will be recorded for all sites. For the recording process, an estimated number of each type of artifact and a complete list of types of artifacts observed should be included. For large sites with a large number of artifacts, a count of each artifact type in the densest area of the site would be appropriate. Analysis will be conducted by the Crew, where possible, if and when chronologically diagnostic finds are detected (see POWER field forms attached to the pdf) or where artifacts or isolated finds are believed by the crews' Field Directors to be

[6] A "state qualified archaeologist" is defined as a person having the following minimum qualities and/or qualifications: Equivalent to graduation from college with major course work in archeology or anthropology and one year of increasingly responsible professional experience in research, writing, or project supervision in archeological investigation or cultural resource management and protection programs. BLM considers this person to be a "field director" (FWA permit phrase) or a "crew chief" (BLM Archaeology Handbooks).

[7] As far as we are aware, there are no *minimum* qualification standards for archaeological field technicians at the BLM, State or County levels. POWER had chosen to retain archaeological field technicians for this Project who bear the following qualities: at least one year of fieldwork in California preferably in the desert portions of the State, plus a college degree with archaeological emphasis. Some of the archaeological field technicians we will use during the Project could be considered "state-qualified archaeologists".

We note that the 2016 Work Plan included the following definition byState Parks Archaeological Staff, which was provided to POWER in her March 2016 technical review: A "state qualified archaeologist" is defined as a person having the following minimum qualities and/or qualifications: Equivalent to graduation from college with major course work in archeology or anthropology and one year of increasingly responsible professional experience in research, writing, or project supervision in archeological investigation or cultural resource management and protection programs. Since this definition cannot be found on any official State of California website we have reviewed, POWER must assume that is it internal to State Parks. Parks' definition above does not exclude field techs or senior staff we plan to bring to this Project.

threatened by potential removal or disturbance due to their proximity to areas of high off-road use, regular vehicle travel, or visibility. These data will be added to all DPR523 form sets.

- Isolated finds are defined as two or less artifacts that are identified during the survey and are not found in association with other cultural constituents. Sites are defined as containing at least three or more artifacts within a minimum 50-meter radius.

Archaeological sites are defined as physical locations suggestive of historic or prehistoric activity that may have occurred 45 years ago or more; the term *historic properties* is defined above. On State and private land, *historical resources* are essentially the State equivalent of the historic property and may be treated as a historic property by BLM. Finally, on non-federal land, tribal cultural resources are defined by newly enacted Public Resources Code (PRC) Section 21074 (a) through (d)[8]. Tribal cultural resource types named by this regulation may be identified during the Class III survey. Constrained to CEQA documents, POWER will nevertheless include Sacred Lands search results in the body of the draft and final Class III report.

It is assumed that all archaeological sites are historic properties/historical resources unless previous formal evaluation has proven otherwise. To meet minimum criteria as an archaeological site during the Class III fieldwork, the site must contain at least three or more artifacts within a minimum 50 meter radius, or a feature (such as a slabbed fish-trap feature or possible hearth) that may or may not lack any nearby artifacts. Fire-affected rock (FAR) clusters may represent a prehistoric, protohistoric, or historic hearth. All features that include fire-affected rock will be identified and recorded, unless they can be positively identified as being more recent than 45 years of age (post-1972) by the Field Director of each survey crew with notes added to the finds on POWER field forms.

The museum records search showed that prehistoric trails[9] are not known in the Project area, but that several previously recorded historic roads (jeep trails or two-tracks) are known. These will be re-recorded during the survey. If a new trail, either historic or prehistoric, is observed as a pathway in desert pavement by the Crew or by tribal monitors, these potential trails will be considered linear sites, and recorded as a linear feature and plotted as such in the DPR 523 form set. Linear features will be recorded up to a distance of 50 meters beyond the Project boundary, and will be noted as extending beyond the Project area on site records and all other records of the survey. Isolated finds are defined as those finds that consist of two or fewer artifacts within a 50 meter radius, or a cluster of artifacts that may be retrofitted in a 50 meter radius (such as a broken historic bottle).

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[8] 'Tribal cultural resources' is a term recently defined by the California Office of Planning and Research (see https://www.opr.ca.gov/docs/OPR_AB_52_Presentation_Discussion_Draft.pdf). Also see Public Resource Code 21074 (a)(1)(A)-(B). By definition, the resource is:
--a site feature, place, cultural landscape, sacred place or object, which is of cultural value to a Tribe
-- AND is either: on or eligible for the CRHR or a local historic register
-- OR the lead agency, at its discretion, chooses to treat the resources as a TCR.

[9] A "trail" is defined as a track created by human foot traffic. The actual age of a trail is intuitive, but POWER staff will take a conservative stance of this issue and record any 'possibles' that are observed except those that bear modern imprints or clearly associated modern trash deposits. Historic jeep trails are known either as a previously recorded site or as a track on an archival topographic map. Repeatedly reused historic trails may be identified as ruts that still retain aged integrity even though recent off-road vehicle travel may have obscured them.

If previously unidentified archaeological sites are encountered in the 2018 survey areas, they will be fully recorded, and corresponding DPR 523 forms will be completed by POWER archaeologists. Previously unidentified isolated finds will be recorded with a DPR 523 form completed by POWER archaeologists. Previously identified isolated finds need not be re-recorded unless they are identified as a new site or if the condition of the artifact has changed since it was last identified. This standard shall be applied to all portions of the Project footprint. All new sites and isolates will be recorded on DPR 523 forms completed by POWER archaeologists, and these forms will be approved by BLM/DPR before final submittal. Final DPR 523 forms will be submitted to BLM, DPR, and SCIC as part of the Final Class III study. If any previously recorded sites or isolates cannot be re-identified, the resources will be documented as such. Forms completed in 2016 are considered Drafts, and will be finalized before the Draft Class III survey report is submitted for review. No further stages of this project will be approved by State Parks prior to the submittal and approval of all reports and records associated with the Class III study.

Both POWER FDs (Knierim and Nordal) appear on our BLM Statewide Permit (Appendix 3) and both were pre-qualified to work inside the SVRA in 2016. We believe that all POWER archaeologists, including those who may work outside the Park, have the educational and experience-related qualifications to work in the SVRA as a state-qualified archaeologist. In 2016, State Parks Archaeological staff defined this term for us and approved staff to work in the Park by reviewing the submitted resumes. Those resumes will be resubmitted plus any new POWER staff to local Parks staff for the 2018 field season. The FDs will be responsible for handling the Trimble GPS, recording site boundaries, site features, isolate locations and tracking the survey centerline. The FDs must ensure that all forms (see Appendix 4 in the previously submitted .pdf) are completed by the crews, and ensure that the archaeological team keeps proper linear spacing during the survey. Field technicians will take on particular roles and although Crew #1 will likely undertake all work in the SVRA, Crew #2 may finish the non-Park portion of the survey area first then move into the SVRA to help complete the remainder of the survey. Local Parks staff must approve the move of Crew #2 into the SVRA for survey or site recording.

BLM has indicated that sites revealed during the SCIC record search (purple polygons in Figures 3 through 10) must be re-recorded using at minimum an updated Primary and archaeological site record and a new shapefile showing the re-defined site boundary. All SCIC sites will be re-recorded by flagging the revised site boundary with pin flags, recording the data and changes since the last known site identification, noting the current condition of the site and any observed disturbances, generating a shapefile, gathering enough data to complete all applicable DPR 523 site record forms, and removing the pin flags when finished. This same procedure will be used when new sites are encountered and recorded.

The system for updating GIS information is a crucial part of the fieldwork and in 2016, POWER GIS coordinated with Ocotillo Wells SVRA GIS staff to ensure data catalogs would be compatible. This coordination will again take place. All GPS data recorded by the field crews will be uploaded to Dropbox for management by POWER's GIS specialist at the end of each survey day. The data will be processed and supplied to the PI by internal email, and the PI will send these data the FDs, Geokinetics staff and appropriate local Park and BLM representatives

the following morning. Data updates are crucial to the survey in that it must be used to refresh the day to day activity status so that areas previously surveyed are not repeated.

The system for delivering Daily Field Narratives (Daily or Dailies) as the survey takes place is straightforward. The FDs will use the "CamScanner" app on their smart phones to photograph each Daily and the image will be emailed to the PI as a pdf. The PI will email the .pdf's to approved BLM/Parks recipients the follow day. Non-confidential versions of Dailies will be provided to Ormat's Project Manager, Scott Kessler, who has received a copy of the communication transmittal to POWER from State Parks.

Raw field data that describes the physical nature of the sites and isolates (see Appendix 4 in our original pdf submittal) will be managed only by archaeologists in the field: raw and will not be viewed by non-archaeologists. The archaeological crew will carry all necessary equipment to record encountered resources. DPR 523 forms will be completed by POWER archaeologists for all new sites and isolates plus updates to existing sites in the lab. All DPR 523 forms must be approved by BLM and DPR before finals are submitted to the SCIC, Parks and BLM. Completed DPR 523 site/isolate records will not be disclosed to non-archaeologists. All archaeologists and non-archaeologists working in the field as well as those managing any subsequent archaeological data must sign a 2017 BLM confidentiality agreement before fieldwork begins: the information or location of cultural resources will only be disclosed on an "as needed" basis at the discretion of BLM and Parks to select individuals. Workers will not discuss the location or information of any cultural resources with others whether they are associated with the project or not.

Section 3.1 In-field Changes to the 2017 Proposed Vibroseis Pathway Grid

The 2016 archaeological teams were allowed to adjust their linear survey corridors in response to encountered physical challenges, such as washes too deep for Vibroseis vehicles to drive across, and to avoid archaeological sites encountered. All encountered sites were recorded in 2016 even if the Vibroseis pathways were moved. This policy is a required part of this 2017 Work Plan.

As provided for in the 2016 Work Plan:

> *If a proposed source point path must be altered, or if an alternate path is added, consensus on the least environmentally damaging paths of travel will be developed in the field by the crew members as the work moves forward. The source point locations and the best paths to reach them would then be defined in the various environmental reports issued after the fieldwork concludes and ultimately approved by BLM and DPR staff.*

This is slightly altered to read as follows: If a proposed source point or drive pathway must be altered, or if an alternate path is added to the Project plan, consensus on the least archaeologically damaging path of travel will be developed in the field by the crew members as the work moves forward. Information regarding this consensus should be included in field notes, to aid in the review of drive paths. Again, the source point locations and the best paths to reach them would then be defined in the various environmental reports submitted to and ultimately approved by BLM and Parks staff.

We again propose that any modifications to the grid shall be made in the field during the Class III survey as a response to encountered obstacles, and in order to avoid archaeological sites.

Changes to the initially proposed survey grid will be identified in the draft Class III report, and would also include the preferred path of the Vibroseis vehicle travel plus any travel path alternatives. Approval to use the defined pathways would occur only after BLM and Parks have vetted the results of the Class III survey and associated environmental analyses associated with the EA/MND which will be prepared for BLM and the County.

The 2016 Vibroseis pathways and source points were vetted by BLM and Parks-approved biologists and paleontologists. To develop consensus on the 2017 source points and the needed pathways, other environmental specialists (e.g. biologists, botanists) will follow the archaeological crews' proposed paths in early 2018. Should changes to the pathways and source points be required, supplemental surveys by POWER archaeological staff may have to be undertaken following the terms of the 2017 BLM/Parks archaeological permits.

Section 3.2 Bypassing and Recording Very Large Sites

As the 2016 fieldwork was taking place, POWER staff was allowed by both Parks and BLM staff archaeologists to delay recording large archaeological sites until the Vibroseis pathway surveys could be completed. Some of the sites encountered were so large that a crew of 5 to 6 archaeologists and two full crew days was needed to fully record the site. To gain approval, Native American monitors were consulted and agreed that bypassing large sites for later recording was a reasonable idea. We again propose that this technique be allowed for the 2017 fieldwork. If the FD determines that his or her crew will not be able to record an encountered site in half a day's time (5 hours), the site boundary will be recorded, and the site bypassed for recording until all pathway surveys have been completed in one or both Crew areas. The crew members will return and record the entire site following recordation protocols. BLM and Parks will be notified of this event within the body of our Dailies. The survey will not be considered complete until all large archaeological sites that were bypassed have been fully recorded.

Section 3.4 Areas of Potential Project Impact

All ground identified as a potential location for use during the Project must be surveyed by archaeologists except those areas that are paved or graveled. Paved or graveled areas will be surveyed on all sides of the pavement or gravel bed. Areas that have been surveyed and cleared of archaeological constraints could be impacted temporarily while geophysical data collection is taking place, unless other environmental constraints are discovered.

The anticipated areas of Project impact include the following. These locations are subject to mitigation measures that must be included in the effects analysis of the Class III report:

- Seismic source points
- Vibroseis drive paths[10]
- Helicopter drop pads for receiver equipment, 4 m x 4 m (13 feet by 13 feet) in size will be sited on paved and graveled roads or areas with no sensitive environmental

[10] Meeting notes dated February 24, 2016 exist and have been attached to this Memo as *Memo Attachment #3*. Line 2 therein shows that the geophone receiver issue was discussed with Parks staff and that survey of those points was approved as unnecessary. Parks suggested a mitigation measure to allow avoidance of any resource that the receiver team may encounter. This measure shall be placed in the Class III impacts analysis.

resources[11]. To be more specific, helicopter drop pads, 4 m x 4 m (13 feet by 13 feet) in size, on SVRA lands (25 meters/82 feet buffer completely surrounding the pad perimeter plus the complete area of the pad itself) and helicopter drop pads 4 m x 4 m in size on non-SVRA lands (25 feet/7.6 meters buffer completely surrounding the pad perimeter plus the complete area of the pad itself) will undergo survey if they do not lie within a cleared and archaeological surveyed area. This requirement shall be made part of the Project's Environmental Assessment/Mitigated Negative Declaration (EA/MND mitigation measures.

- Geophone placement
- Unpaved access trails in deep washes leading into the various parts of the SVRA that are currently allowed for public use. These trails are named on SVRA maps available to the public, and include "Tule Wash", "Arroyo Salado/Bus Wash", "Campbell Wash", "Surprise Wash" and "Eriogonum Wash". Named washes will be surveyed with a maximum of 10 meter spacing by the archaeological crew(s) bank edge to bank edge. No other existing washes will be used during the 3D seismic work unless they were surveyed by the archaeological crews and cleared of obstacles.
- The Salton Sea Airport, which is the primary staging area, was surveyed in 2016 using a 25 meter/82 feet survey corridor extending outside the paved perimeter.

If additional areas of potential impact are defined by Ormat and required to be surveyed after the crews leave the field, BLM and Parks will be contacted within 24 hours of identification of the area to determine the most efficient means to include the additional work required. Approval to grant this request will be considered by BLM and Parks within a reasonable time frame. If additional survey is needed, an addendum report to be attached to the Class III report will be produced and provided to the agencies.

Section 4.0 Class III Survey Report Submittal

POWER shall submit a Draft Class III report to BLM and Park archaeologists with all associated exhibits finalized. All GIS shapefile data, photographs and drawings, or any other information obtained will also be submitted with the Final version of the report. The PI will submit the final report and site records to the SCIC and additional copies to BLM and Park archaeologists once the reports have been vetted and approved by BLM and State Parks. BLM has agreed that the Class III survey report can include a chapter associated with CEQA-related results so that cultural resource findings on Project land located outside federal jurisdiction can be used to support the CEQA compliance process the County must undertake. Temporary identification numbers for sites and isolates in the submitted draft report will be a substitute for primary and trinomial numbers issued by the SCIC when the final version of the report is approved by the agencies.

The draft Class III report will include an amended proposed APE that reflects all field and

[11] Within the body of the 2016 Work plan, the following caveat was added and will be followed for the 2017-2018 survey continuation: *We note that all helicopter drop points may be moved inside the Seismic source point drive paths. If so, the archaeological crews will ensure that the appropriate buffer zone will be surveyed around the drop pads if moved to points inside the Vibroseis buggy paths. Notification of any such changes will be made to BLM and DPR before drop points are utilized.*

records search findings. All recommendations are subject to final approval from BLM and Parks. The proposed APE submitted will show the paths the archaeological crews established to review each proposed and confirmed source point, Vibroseis pathways recommended to reach the source points, field-rejected pathways, staging areas, and all historic properties encountered. Once the cultural survey is complete and all potential impacts have been delineated, the final APE map would be included in the Class III report for approval by BLM and Park archaeologists.

Section 4.1 - BLM-requested (2016) reporting stipulations[12].
According to the Special Permit Conditions Continuation sheet on the BLM FWA permit application, the following requirements must be met during the Project:

> 1. Permittee shall not release any reports, site records, or any other documents or materials that result from the work authorized by this Fieldwork Authorization to any person or entity, including, but not limited to the Applicant seeking authorization from the BLM (i.e., right-of-way grant) which requires that cultural resources activities be conducted, any third party individual or entity, any governmental agency (except the BLM), a non-governmental organization, or Indian tribe, unless otherwise directed in writing by the BLM.
> 2. Any agreement that is executed by and between the Permittee and the Applicant or any other person or entity that requires the Permittee to release any reports, site records, or any other documents or materials that result from the work authorized by this Fieldwork Authorization to the Applicant or any other person or entity without BLM written approval are inconsistent with Stipulation f of the BLM California supplemental State Permit Conditions and section 1, above.
>
> a. Permittee shall disclose that such an agreement has been executed.
>
> b. BLM may suspend, terminate, or refuse to issue a Fieldwork Authorization where an agreement has been executed between the Permittee and the Applicant or any other person or entity that requires the Permittee to release the reports, site records, or any other documents or materials as noted in section 2, above.
>
> 3. The Permittee shall refer to the BLM any and all requests by an Applicant, any third party individual or entity, any governmental agency (except the BLM), a non-governmental organization, or Indian tribe for any reports, site records, or any other documents or materials that result from the work authorized by this Fieldwork Authorization. The BLM will determine whether, to what extent and in what manner, if any, the report, site records, or any other documents or materials will be released.
>
> a. Permittee must request and receive permission from BLM to submit site records to the California Historical Resources Information System for the purposes of obtaining permanent site numbers.
>
> 4. All reports, site records, and any other documents or materials that result from the work authorized by this Fieldwork Authorization is and remains the sole property of the United States of America and any release without the written approval of the BLM may be determined to be a violation of federal law.

According to the Supplemental Stipulations and Guidance page on the FWA permit application, the following requirements must be met during the Project:

[12] Tom James (2016 BLM archaeologist) asked that BLM reporting stips be added to the 2016 Work Plan as a subsection. These stips were added to this 2017 Work Plan verbatim.

3. If applicable, final site numbers issued by the appropriate California Historical Resources Information System Center (IC) should be included in the final report. Consultants/applicants are responsible for providing copies of the final report to the California Historical Resources Information System once they have the permission of the BLM. The draft report and draft records shall be submitted to the BLM for review and approval prior to submitting them to the IC.

4. Three copies of the final report, including site forms with final site numbers assigned by the appropriate IC, shall be provided to the authorizing BLM field office after completion of fieldwork. A copy of the report and any associated documents, site forms, and maps also be provided in the PDF electronic document format. We also require any digital files created using GIS/GPS, including survey area and locations of sites, as well as associated metadata. As a general GIS standard, BLM utilizes GIS base maps with the 1983 North American Datum (NAD 83, UTM Projection). We request that this information be submitted on CD-ROM. Depending upon the size of the project, use of the BLM's archaeological geodatabase may be required. Please inquire with the local Field Office prior to beginning fieldwork.

5. BLM requests that you provide summary statistics about this project as an addition/supplement to the executive summary or abstract of your report. BLM is required to compile these statistics on an annual basis as part of our responsibilities under the National Historic Preservation Act and the Archaeological Resources Protection Act. Please see the tabular questionnaire attached [on the FWA] for more information.

Section 4.2 - Assembly Bill 52 (2016)[13]

Assembly Bill 52 (September 25, 2014) amended the California Environmental Quality Act (CEQA) to address California Native American tribal concerns regarding how cultural resources of importance to tribes are treated under CEQA.

CEQA now specifies that a project that may cause a substantial adverse change in the significance of a tribal cultural resource [as defined in PRC 21074(a)] is a project that may have a significant effect on the environment. PRC 21074 (a) defines "tribal cultural resources" as either of the following:

(1) Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following:

(A) Included or determined to be eligible for inclusion in the California Register of Historical Resources.

(B) Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1.

(2) 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) of Section 5024.1. In applying the criteria set forth in subdivision (c) of Section 5024.1 for the purposes of this paragraph, the lead agency shall consider the significance of the resource to a California Native American tribe.

The CEQA lead agency (County of Imperial) for the project must begin consultation with all

[13] State Parks Archaeological Staff (Parks 2016) wanted AB 52 language added. These stips were added to this 2017 Work Plan verbatim

California Native American tribes that are traditionally and culturally affiliated with the geographic area of the proposed project, if the tribe requested to the lead agency, in writing, to be informed by the lead agency of proposed projects in that geographic area and the tribe requests consultation or if the tribe is listed on the AB 52 contact list from the Native American Heritage Commission (NAHC) for the project area.

These recent revisions to the CEQA process are applicable to projects that will file a Notice of Preparation for an Environmental Impact Report or Notice of Intent to Adopt a Negative Declaration or Mitigated Negative Declaration on or after July 1, 2015.

Section 4.3 - Inadvertent Discovery of Human Skeletal Remains[14]
If human skeletal remains are encountered within the Ocotillo Wells SVRA boundary during the project, then all activity will cease that may cause further disturbance to those remains. The area of the find will be secured and protected from further disturbance. The finding of human skeletal remains will be reported to the County medical examiner/coroner, local law enforcement, the BLM, and DPR in the most expeditious manner possible. The remains will not be touched, moved, or further disturbed. The County medical examiner/coroner will assume jurisdiction over the human skeletal remains and make a determination of whether those remains are forensic or non-forensic.

- If the County medical examiner/coroner determines that the remains are non-forensic and they are located on BLM owned parcels, then they will report that finding to the Native American Heritage Commission and the El Centro Field Office archaeologist for determination of future actions.
- Actions may include consultation under the Native American Graves Protection and Repatriation Act (NAGPRA) should preservation in place of the remains not be possible. Designated State Parks contacts (Steve Quartieri and Steve Hilton), will also be notified.
- If the county medical examiner/coroner determines the remains are non-forensic, and located on DPR owned parcels, then they will report that finding to the Native American Heritage Commission and Designated State Parks contacts (Steve Quartieri and Steve Hilton, who will then take jurisdiction over the remains. Designated State Parks contacts (Steve Quartieri and Steve Hilton will notify the Most Likely Descendent (MLD) and handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains. Carrie Sahagun, BLM Assistant Field Manager – Resources and Planning, shall also be notified.

If human remains are detected on lands not under the jurisdiction of either the BLM or DPR, CEQA Guidelines (Section 15064.5[e]) state the following:

> "If human remains are discovered in any location other than a dedicated cemetery, the following steps should be taken:
>
> There shall be no further [excavation or] disturbance of the site or any nearby area [survey

[14] Section added at the request of BLM in 2016.

corridor] reasonably suspected to overlie adjacent human remains until

A) The coroner of the County has determined that no investigation of the cause of death is required, and;

B) If the coroner determines the remains to be Native American:

1. The coroner shall contact the Native American Heritage Commission (NAHC or Commission) within 24 hours.

2. The NAHC shall identify the person or persons it believes to be the most likely descended from the deceased Native American.

3. The [California] Most Likely Descendent may make recommendations to the landowner or person responsible for the [excavation] work, for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods as provided in Public Resources Code (PRC) Sec. 5097.98.

With reference to PRC Sec. 5097.98 noted above, the law currently reads as follows:
5097.98. (a)

Whenever the Commission receives notification of a discovery of Native American human remains from a county coroner pursuant to subdivision (c) of Section 7050.5 of the Health and Safety Code, it shall immediately notify those persons it believes to be most likely descended from the deceased Native American. The descendants may, with the permission of the owner of the land, or his or her authorized representative, inspect the site of the discovery of the Native American human remains and may recommend to the owner or the person responsible for the excavation work means for treatment or disposition, with appropriate dignity, of the human remains and any associated grave goods. The descendants shall complete their inspection and make recommendations or preferences for treatment within 48 hours of being granted access to the site.

(b) Upon the discovery of Native American remains, the landowner shall ensure that the immediate vicinity, according to generally accepted cultural or archaeological standards or practices, where the Native American human remains are located, is not damaged or disturbed by further development activity until the landowner has discussed and conferred, as prescribed in this section, with the most likely descendants regarding their recommendations, if applicable, taking into account the possibility of multiple human remains. The landowner shall discuss and confer with the descendants all reasonable options regarding the descendants' preferences for treatment.

(1) The descendants' preferences for treatment may include the following:

(A) The nondestructive removal and analysis of human remains and items associated with Native American human remains.

(B) Preservation of Native American human remains and associated items in place.

(C) Relinquishment of Native American human remains and associated items to the descendants for treatment.

(D) Other culturally appropriate treatment.

(2) The parties may also mutually agree to extend discussions, taking into account the possibility that additional or multiple Native American human remains, as defined in this section, are located in the project area, providing a basis for additional treatment measures.

(c) For the purposes of this section, "conferral" or "discuss and confer" means the

meaningful and timely discussion and careful consideration of the views of each party, in a manner that is cognizant of all parties' cultural values, and where feasible, seeking agreement. Each party shall recognize the other's needs and concerns for confidentiality of information provided to the other.

(d) (1) Human remains of a Native American may be an inhumation or cremation, and in any state of decomposition or skeletal completeness.

(2) Any items associated with the human remains that are placed or buried with the Native American human remains are to be treated in the same manner as the remains, but do not by themselves constitute human remains.

(e) Whenever the commission is unable to identify a descendant, or the descendants identified fail to make a recommendation, or the landowner or his or her authorized representative rejects the recommendation of the descendants and the mediation provided for in subdivision (k) of Section 5097.94, if invoked, fails to provide measures acceptable to the landowner, the landowner or his or her authorized representative shall reinter the human remains and items associated with Native American human remains with appropriate dignity on the property in a location not subject to further and future subsurface disturbance. To protect these sites, the landowner shall do one or more of the following:

(1) Record the site with the commission or the appropriate Information Center.

(2) Utilize an open-space or conservation zoning designation or easement.

(3) Record a document with the county in which the property is located. The document shall be titled "Notice of Reinterment of Native American Remains" and shall include a legal description of the property, the name of the owner of the property, and the owner's acknowledged signature, in addition to any other information required by this section. The document shall be indexed as a notice under the name of the owner.

(f) Upon the discovery of multiple Native American human remains during a ground disturbing land development activity, the landowner may agree that additional conferral with the descendants is necessary to consider culturally appropriate treatment of multiple Native American human remains. Culturally appropriate treatment of the discovery may be ascertained from a review of the site utilizing cultural and archaeological standards. Where the parties are unable to agree on the appropriate treatment measures the human remains and items associated and buried with Native American human remains shall be reinterred with appropriate dignity, pursuant to subdivision (e).

(g) Notwithstanding Section 5097.9, this section, including those actions taken by the landowner or his or her authorized representative to implement this section and any action taken to implement an agreement developed pursuant to subdivision (l) of Section 5097.94, shall be exempt from the requirements of the California Environmental Quality Act (Division 13 (commencing with Section 21000)).

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APPENDIX G VIBROSEIS DEMONSTRATION PROJECT REPORT

SOUTHWEST GEOPHYSICS, INC.
YOUR SUBSURFACE SOLUTION

January 17, 2018
Project No. 117710

Mr. Michael Dice, M.A., RPA
POWER Engineers, Inc.
731 East Ball Road, Suite 100
Anaheim, CA 92805

Subject: Vibration Monitoring
Vibroseis Demo Project
Salton City, California

Dear Mr. Dice:

In accordance with your authorization, we have performed geophysical consulting services pertaining to the Vibroseis Demo Project located near Salton City, California (Figure 1). Specifically, we conducted vibration monitoring services at two test areas during the operation of a Vibroseis truck (see Figures 1 and 2). The purpose of our services was to collect peak particle velocity (PPV) measurements while a Vibroseis truck was vibrating the ground surface (referred to as a "sweep"). Our services were conducted on December 19, 2017. This data report presents the survey methodology, equipment used, and results.

Our evaluation included the use of a Blastmate III vibration monitor (data logger) with a tri-component (transverse, longitudinal, and vertical) sensor. The sensor was installed at two locations in each test area: 25 feet and 50 feet from the Vibroseis truck vibration pad (see Figure 2). The sensor was secured to the ground surface with 3-inch long pins and leveled. The longitudinal axis was oriented toward the Vibroseis truck (parallel to the length of the truck). Two different operating capacities of the Vibroseis truck were tested; Stations 1 and 2a were tested with the Vibroseis truck operating at 70% capacity and Station 2b was tested with the truck operating at 35% capacity. This allowed for a PPV comparison relative to operating capacities of the Vibroseis truck. Several Vibroseis sweeps, which spanned approximately 12 seconds with a frequency bandwidth of 6 to 96 Hertz (Hz), were conducted and monitored.

The vibration monitor was programmed to monitor, record, and save the data internally. The collected data were later downloaded to a laptop computer. Several roughly 12-second long sweeps were monitored at each station location. The PPV and corresponding frequency were stored and the peak vector sum (PVS) was calculated. The PVS is the resultant magnitude of the peak particle velocity for the three sensor components (calculated by squaring and adding the magnitudes of the individual components and taking the square root).

Table 1 presents the maximum PPV measured for the three components (transverse, vertical and longitudinal) during the multiple sweeps and the corresponding frequency, as well as the PVS. It should be noted that prior to conducting the sweeps, a sample of the background vibrations was performed. The results are shown in Table 1. As expected for a remote location, the background value is very low.

Figure 3 presents the results from all the measurements collected at Station 1. Included in the figure are ground vibration limits presented in the Blasting Guidance Manual (March, 1987) published by the United States Bureau of Mines (USBM) Office of Surface Reclamation and Enforcement (OSMRE). These limits are a commonly used guideline, and for this study they provide a general comparison for the measurements collected during our evaluation.

As illustrated in Figure 3 and Table 1, there is a significant drop-off of roughly 50 to 60 percent in the peak particle velocity between the 25-foot station location and the 50-foot station location. As expected there is an additional reduction in the PPV when the Vibroseis truck reduced its capacity from 70% to 35%. Also notable is that for all station locations the longitudinal and vertical components produced the largest PPV (the longitudinal component being slightly larger than the vertical component). The measured PPV frequencies were 10 to 100Hz, which is consistent with the reported Vibroseis truck operating frequency.

The Caltrans (California Department of Transportation) Transportation and Construction Vibration Manual (September, 2013) and the USBM OSMRE Blasting Guidance Manual (March, 1987) provide velocity attenuation relationships that can be used to estimate PPV at various dis-

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tances and site conditions. Also included in these Manuals are vibration criteria and standards related to potential impacts from vibrations on structures and people.

The field services and geophysical analyses presented in this report have been conducted in general accordance with current practice and the standard of care exercised by consultants performing similar tasks in the project area. No warranty, express or implied, is made regarding the conclusions presented in this report. Please also note that our evaluation was limited to monitoring background vibrations at two test sites. Southwest Geophysics, Inc. should be contacted if the reader has questions regarding the content, interpretations presented, or completeness of this document. This report is intended exclusively for use by the client. Any use or reuse of this report by parties other than the client is undertaken at said parties' sole risk.

We appreciate the opportunity to be of service on this project. Should you have any questions related to this report, please contact the undersigned at your convenience.

Sincerely,

SOUTHWEST GEOPHYSICS, INC.

Hans van de Vrugt

Hans van de Vrugt, C.E.G., P.Gp.
Principal Geologist/Geophysicist

HV/hv

Distribution: Addressee (electronic)

Attachments: Figure 1 – Site Location Map
Figure 2 – Site Photographs
Figure 3 – Peak Particle Velocity, Station 1
Table 1 - Vibration Monitoring Results

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SITE LOCATION MAP

N

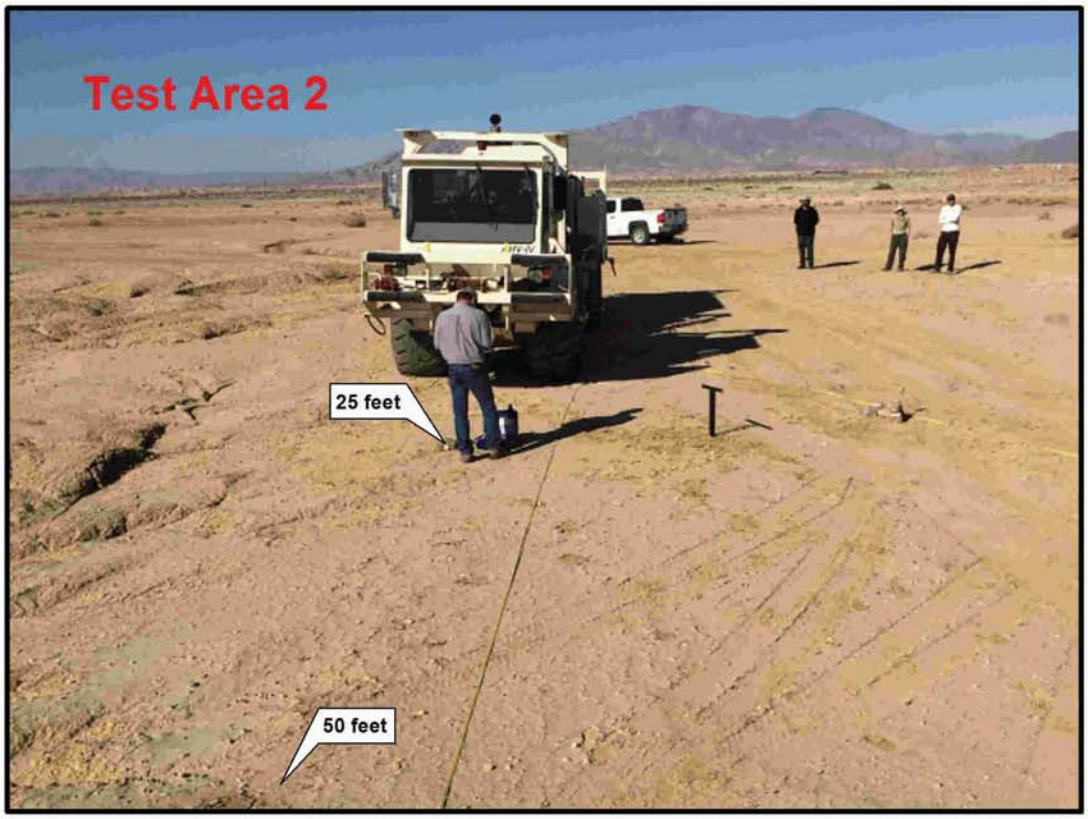
Vibroseis Demo Project
Salton City, California

Project No.: 117710 | Date: 01/18

SOUTHWEST GEOPHYSICS INC.

Figure 1

EEC ORIGINAL PKG



SITE PHOTOGRAPHS

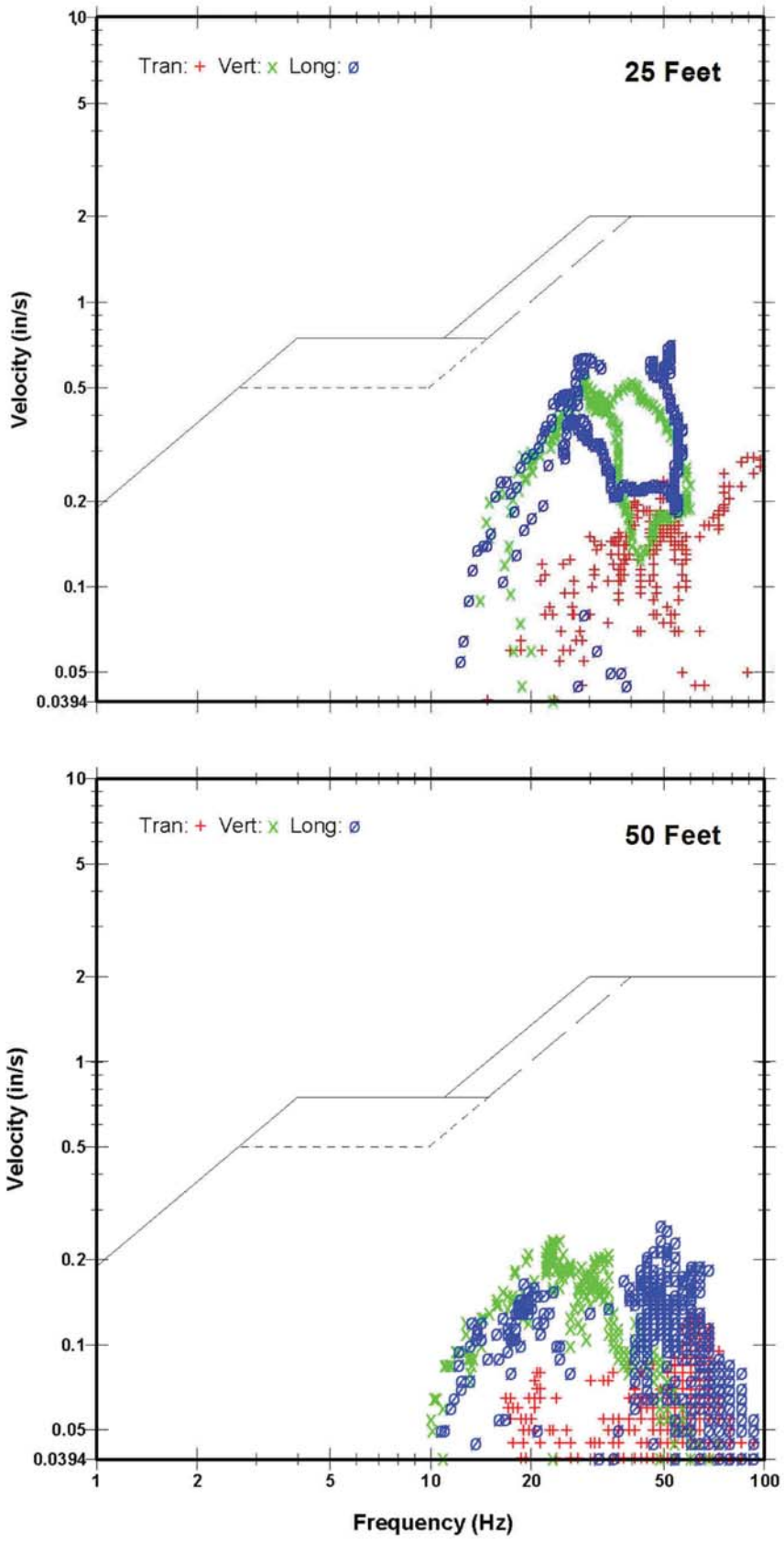
Vibroseis Demo Project
Salton City, California

Project No.: 117710 | Date: 01/18

SOUTHWEST GEOPHYSICS INC.

Figure 2

USBM RI8507 and OSMRE



PEAK PARTICLE VELOCITY Station 1	Vibroseis Demo Project Salton City, California	SOUTHWEST GEOPHYSICS INC.
	Project No.: 117710 / Date: 01/18	Figure 3

Station	Location (ft)	Trans (in/s)	Vert (in/s)	Long (in/s)	PPV (in/s)	PPV ZC Freq (Hz)	PVS (in/s)	Comments/Notes
STA 1	25	0.010	0.010	0.005	0.010	>400	0.012	Background
STA 1	25	0.285	0.545	0.710	0.710	53	0.791	70% Capacity
STA 1	50	0.160	0.245	0.270	0.270	50	0.292	70% Capacity
STA 2a	25	0.745	0.525	0.845	0.845	42	0.874	70% Capacity
STA 2a	50	0.305	0.195	0.385	0.385	36	0.452	70% Capacity
STA 2b	25	0.340	0.225	0.575	0.575	62	0.591	35% Capacity
STA 2b	50	0.110	0.130	0.210	0.210	36	0.218	35% Capacity

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EEC ORIGINAL PKG

APPENDIX H – PREVIOUSLY RECORDED SITES AND ISLOATES FROM THE SCIC RECORDS SEARCH, DECEMBER 2015 (DVD) (CONFIDENTIAL)

EEC ORIGINAL PKG

APPENDIX I – NEWLY RECORDED DPR 523 FORM SETS, SITES, AND ISOLATES (DVD) (CONFIDENTIAL)

APPENDIX J DRAFT COMMENTS AND FINAL CHANGES MATRIX

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BLM Comments on Draft (dated October 4, 2018) Matrix Table

COMM #	BLM EL CENTRO: KATE CROSMER	PAGE	COMMENT	POWER RESPONSE	POWER COMPLETED MODIFICATION DATE
1	KC	v	"CE" for Categorical Exclusion is abbreviated within BLM as "CX". Make change throughout document	Change made at BLM request	April 2019
2	KC	vii	On item (6)(B) would it be too difficult to separate out the State Acres into those managed by State Parks and those by the CSLC?	Change made at BLM request	April 2019
3	KC	ix	paragraph (p) 1, 2: "Salton Sea Airport" and "Salton City Airport" both used. I believe the airport is officially identified as the Salton Sea Airport.	Change made at BLM request	April 2019
4	KC	ix	p 2: permission was obtained to survey on "certain privately-held parcels within the 3-D Study." *Certain* or *all*? If access onto private land within the study area was not granted, these areas will need to be identified.	Ormat obtained permission to trespass on all parcels located inside the project footprint only	April 2019
5	KC	x	p 3: "One report, not filed with the SCIC..." Name/reference this report	Added citation	April 2019
6	KC	x	p 4, line 6: about 7 sites recorded during well survey change or add to the sentence that these sites were also recorded and/or updated as part of the seismic survey	Text altered for clarity	July 24
7	KC	x	p 4, last sentence: reference the regulation to indicate that isolates are not Historic Properties by definition.	Text altered for clarity in two places	July 25
8	KC	x	p 5, line 5: "Indirect impacts….*are not considered a potential effect*..." the way this is phrased makes it an incorrect statement. Do you mean to say that indirect effects are not a *permanent* effect? Please clarify.	Text altered for clarity	July 25
9	KC	x	p 5, line 7: "*All but one* of the 175 *historic properties*…." Please reference the site number in parentheses for this one site not avoided. Using the term 'historic properties' here implies that these sites have been formally evaluated; would be better to change to cultural or archaeological sites.	Text altered for clarity and Primary number added	April 2019 and July 2019

COMM #	BLM EL CENTRO: KATE CROSMER	PAGE	COMMENT	POWER RESPONSE	POWER COMPLETED MODIFICATION DATE
10	KC	xi	p 1: "collapsed slab features considered to have a greater potential sensiticity to vibrational impacts than other elements." Why? Likely to collapse further or shift alignment?	Text explanation offered,	July 25
11	KC	xi	p 2, line 3: insert "offered eligibility ***consideration*** statements" and follow at the end of the paragraph that these sites have not yet been formally evaluated and, therefore, should be treated as eligible. You did a great job including a statement to this effect in the NRHP recommendations for individual resources later on in this document.	Change made at BLM request to all entries	April 2019
12	KC	xii	Table header: Add "NRHP/CRHR Eligibility Statement" and remove or change "Historic Properties" header. Again, this term implies that these resources have already been formally evaluated.	Change made at BLM request	April 2019
13	KC	1	p 1, line 3: "all permits" should be changed to identify who is approving permit applications (e.g. BLM/Federal, State, County, etc.)	Text altered for clarity	July 24
14	KC	3	p 1: change "defining which historic properties…when seismic testing takes place" to 'identifying if historic resources are present in the project area and if the undertaking has the potential to affect them."	Change made at BLM request	April 2019
15	KC	3	p 2, line 7: "…assumed to be historic properties (and historical resources from the State standpoint)…" can be changed to "assumed to be eligible for lisiting to the NRHP/CRHR." Definitions for historic properties and historic resources should be outlined in the regs. section.	Both requests addressed, and text changes made and added to	July 24
16	KC	4	p 1, last line: final source points would also need to be approved by agencies as Power has recommended specifc distances from cultural resource features.	Text corrected and added to for clarity	July 24
17	KC	4	p 5, last line: ensure avoidance of what?	Text corrected for clarity	July 24
18	KC	4	p 6: "In areas of rock outcrops, battery-operated	POWER notes that Ormat provided Plan Of	July 24

COMM #	BLM EL CENTRO: KATE CROSMER	PAGE	COMMENT	POWER RESPONSE	POWER COMPLETED MODIFICATION DATE
			hand drills may be used to provide a pilot hole for the geophone spike if they cannot be coupled to the ground sufficiently." Has this been previously included in the Plan of Operations? Is there a potential to affect cultural or paleontological resources (and does a monitor need to be present)?	Operations as support for the text in this section. Parks objected to this as well and therefore the CEQA Mitigation Monitoring Plan (MMP) should state what needs to be done in this regard	
19	KC	7	Consider changing the color of the Staging Area…At this map scale, the color starts did not stand out as well against the quad colors when I printed it.	Change made at BLM request by GIS	April 2019
20	KC	12	p 2, line 1: "a cultural resource that has been ***listed*** or is ***determined*** eligible for listing…" (insert bolded words)	Change made at BLM request	April 2019
21	KC	13	NRHP criteria listed on a previous page. Does CRHR listing criteria need to be included or summarized?	Added criteria as footnote in report	July 25
22	KC	18	p1, last line: mean to say this leaves the "decision" of what is the appropriate buffer distance to BLM land managers?	Text edited to better reflect the concepts stated in this section	July 25
23	KC	21	video from the demonstration should be supplied to BLM and Parks along with all other project documentation	Digital video files will be supplied to BLM with submittal	July 25
24	KC	32	4.2.2: add a brief explanation on recent radiocarbon testing done for ECO substation project for evidence of occupation/land use during this period closer to the project area. I can provide this text.	Text added with KC assistance.	July 26
25	KC	32	4.3: Should add brief mention of Anza camp located at nearby San Sebastian Wash for local context during this period.	Text added with KC assistance.	July 26
26	KC	39	Table 1: Please indicate in your header that these are "SCIC Report Numbers"	Change made at BLM request	April 2019
27	KC	41-56	It would be good to verify this table is accurate.	Re-verified using 2015 SCIC data in 2019	July 2019
28	KC	58-72	correct number of resources, but please check for accuracy of descriptions and recommended avoidance measures. All temporary site numbers will need permanent numbers assigned by SCIC before BLM will consider this report complete	Changes made at BLM request during draft to final report conversion	July 2019

COMM #	BLM EL CENTRO: KATE CROSMER	PAGE	COMMENT	POWER RESPONSE	POWER COMPLETED MODIFICATION DATE
29	KC	73-156	site description overall notes: would be beneficial to add text to each description saying the site will be avoided by vibroseis paths/source points and by what distance. For sites in the previous table with specific recommendations for avoidance this information should again be provided with the site description. When referencing sites to each other within descriptions, reference site numbers in parentheses (you need to do this with fish trap sites mentioned in CN-22 on pg 81 for ex.). I would also like to see some attention paid to general grammar and layout...there were a number of typos and what look like possible copy and paste errors throughout this section that I have not highlighted here.	Change made at BLM request. Matrix table for distance between site boundary and seismic centerlines added to Report	June 2019
30	KC	78	"CN-15 (CA-IMP-6250)" should probably keep the assigned site number and include your temporary site number as an expansion to the previously recorded site. Add in language to explain why you are suggesting these sites be combined and possible explanation on why the original debitage may not have been observed during the efforts of this project.	SCIC require original site number to be kept and submitted DPR523 is considered an update	July 25
31	KC	83	CN-31: would be good to have a brief description of the pssible habitation foundations. What exactly was left out of the recording of possible cremation (i.e. photos, sketch, no detailed notes)…hopefully you at least got some GIS?	Text on this subject added.	July 25
32	KC	83	CN-32: ceramic potsherds are identified (as LCB), but should be considered as "type unidentified."	Ware classification changed in text	April 2019
33	KC	85-86	CN-36 and CN-37: site descriptions are VERBATIM is this a copy paste issue?	Copy/paste issue resolved and propert text added.	June 2019
34	KC	87	CN-39E: read over for clarity. Instead of saying "damaged" and "likely caused site elements to be removed by the public" it would be better to state that the site "appears to have been previously impacted by the IID powerline which bisects the site	Text changes made for clarity	July 25

COMM #	BLM EL CENTRO: KATE CROSMER	PAGE	COMMENT	POWER RESPONSE	POWER COMPLETED MODIFICATION DATE
			and allows the general public to easily access the site as evidenced by xx..." Also would be good to state what made them this that several areas were used ceremonially. Move last sentence to beginning of site description.		
35	KC	88-89	CN-41: again with areas not fully recorded due to tribal monitor request you need to be clear in exactly how much was and was not done. If there were specific reasons given by the monitors this should also be noted. Be sure to include this edit throughout all site descriptions as needed.	The text was rephrased to reflect the events. POWER recommends that BLM issue permits that state all resources must be recorded if encountered. Sensitive resources should be recorded despite objections.	July 25
36	KC	90	CN-48: "due to trespassing issues…" does this mean you were denied right-of-entry?	No, the site extended outside the Work Plan limits. Text was rephrased.	
37	KC	91	CN-50: you actually identified red wares at this site in addition to buff wares or the sherds were red in color?	Rephrased text to be more clear	
38	KC	92	CN-53: Should define what you intend by "potdrop" are all pot rims indicative of a single vessel? Does this imply a ceremonial location?	Rephrased text to be more clear	
39	KC	95	DM-4: would be beneficial to note if it was an arch or tribal monitor who identified the crecentic as a bear	Modified text to state Frank Salazar found this item and called it a bear	
40	KC	114	RK5H: what's the reasoning for "1960s?" diagnostic artifacts should be noted withn the text	The use of 1960's was eliminated and better text added	July 25
41	KC	126	RK-35: was the fossilized non-human patella and long bone reported to the paleontolgists?	Yes. Added UTM location into the text	July 23
42	KC	137	S-04-003: this is the first instance you use terminology like "cortical" to describe debitage. Please stay consistent throughout the document.	We eliminated the use of 'cortical' in this text. One crew member used these terms in his notes until he was advised against it's use.	July 25
43	KC	157	6.4. #2: Will vibe paths be marked before buggy teams allowed to drive? Will highly sensitive areas need to be flagged?	POWER is of the opinion that an MMP to be prepared during the CEQA compliance work should be provided to BLM so that the needs of BLM and State Parks can be met with regard to buggy use and geophone placement processes as they may affect cultural resources. It is possible that Parks will take a far more conservative tack on this subject.	July 25

COMM #	BLM EL CENTRO: KATE CROSMER	PAGE	COMMENT	POWER RESPONSE	POWER COMPLETED MODIFICATION DATE
44	KC	158	#4 "sensitive site elements": what consittutes as sensitive elements? Has POWER ensured that the current vibe paths meet that these distances can be kept? What is the certain distance? Is it a minimum distance from all site boundaries and/or element or on a case-by-case basis that POWER has looked at. Again...this info would be really beneficial if included with the site descriptions.	All sites save one (P13-14306) have been avoided by the seismic drive pathways POWER created for Ormat during the inventories. The question then is what is an appropriate buffer distance between source points and the types of sensitive features we mentioned in the Executive Description. My view is that the distance should be negogiated between BLM and State Parks. If a site is approached, and the monitor knows it contains a sensitive element per the DPR523 forms, the monitor can direct the buggy to move to a point beyond the negotiated distance. The only way the sites will not be driven over is by employing an archaeologist to walk the seismic pathway with a Trimble in hand in front of the buggies. Ormat has made their commitment to this as shown in the Project Description.	July 25

California State Parks Comments Matrix Table (Comments dated February 28, 2019)

"The following letter contains California State Parks comments on the draft Class III Archaeological Survey of the Truckhaven 3-D Seismic Project document. Our comments are categorized into three sections:

1) General Report Comments
2) Specific Report Comments
3) Future Phase II Work Comments

This draft document discusses items that could be viewed as relating to the future work plan for phase II. Our phase II comments within this letter should not be taken as final comments on the future work plan, as a draft has not been submitted for review. Phase II comments are meant to prompt thought about items that will need to be considered or clarified in a future work plan but do not impact completion of this draft document. Additional comments about the phase II drive paths and work plan will be furnished in the future."

POWER notes that an archaeological mitigation/monitoring plan (MMP) and a new project description is likely be prepared as part of the development of a Categorical Exemption/Mitigative Negative Declaration (CX/MND) for this project. Since our report is an inventory associated with once specific type of environmental class of data, we defer to the preparers of the EA/MND as to the specific details that may be placed in the MMP.

COMMENT	COMMENT STATEMENT FROM DPR	POWER RESPONSE
1a	There is no mention of Public Resources Code 5024 or 5024.5; which are the primary laws and regulations dictating the process of cultural resources management for state-owned historical resources which include archaeological and built-environment resources owned and managed by California State Parks. The code states: i. PRC 5024 (f): (f) Each state agency shall submit to the State Historic Preservation Officer for comment documentation for any project having the potential to affect historical resources listed in or potentially eligible for inclusion in the National Register of Historic Places or registered as or eligible for registration as a state historical landmark. ii. PRC 5024.5(a): No state agency shall alter the original or significant historical features or fabric, or transfer, relocate, or demolish historical resources on the master list maintained pursuant to subdivision (d) of Section 5024 without, early in the planning processes,	Requested language added to text

COMMENT	COMMENT STATEMENT FROM DPR	POWER RESPONSE
	first giving notice and a summary of the proposed action to the officer who shall have 30 days after receipt of the notice and summary for review and comment. iii. (f) Until such time as a structure is evaluated for possible inclusion in the inventory pursuant to subdivisions (b) and (c) of Section 5024, state agencies shall assure that any structure which might qualify for listing is not inadvertently transferred or unnecessarily altered. PRC 5024 and the relevant sections should be included in the discussion of relevant laws and guidance.	
1b	Add a discussion detailing how site boundaries were determined. For example, if two sites are within 50 meters of each other, why are they recorded as separate sites? Why are sites to the east of Hwy 86 so much larger than the sites within the SVRA? Why were some isolates left out of sites?	These questions go to the heart of an often-contentious issue: how fieldwork gets done and how experienced staff interprete what was seen as part of a task that committed visual clues in the field to paper records. Several paragraphs with our opinions were added to the text in new subsection 5.2.1
1c	A site or section specific treatment plan will need to be developed in order to identify treatments for historic properties or a discussion of appropriate mitigation measures. In many cases the treatment plan can be for entire sections or areas. Individual site treatments may also have to be designed in areas where significant resources are close or within drive paths. This is the next logical step. These treatments, reduction methods, or mitigation measures will need to be reviewed by State Parks and may need to be submitted to the State Historic Preservation Officer for review.	Because an MND must be prepared, the CEQA preparer organization may be requested by the County to develop a document that describes how cultural resources can be avoided during the seismic test. A "Mitigation/Monitoring Plan" (MMP) is allowable under a MND, but it is problematic that a formal plan is allowable as the CX is prepared. We note that the DRECP PA calls for BLM to process appropriate NEPA documents as long as they are underlain by Class 3 survey results. Once the results are concurred with, BLM can agree to a post-review discovery plan or parts or all of the seismic study area so that inadvertant impacts to historic properties, whether they are known or not and direct or indirect, can be avoided. This plan can be referred to as a Treatment Plan if BLM chooses to do so.
1d	State Parks has an obligation under PRC 5024.5 to submit the results of this survey and treatment measures to the State Historic Preservation Officer for concurrence and comments. That submittal will need to be prepared by project proponents and submitted to the SHPO by the Cultural Resources Division. Funding for this submittal will need to be made available.	BLM is not required to submit these documents to SHPO since all historic properties can be avoided by the use of stipulations.
1e	What is the status of Native American consultation? Have the tribes been given an opportunity to comment on this report? Do they have questions? What about the prescribed buffers and treatment? Have they looked at those and what are their comments? Information is needed on how this document may be used during Native American consultation.	POWER has been informed that BLM is undertaking all formal government-to-government tribal consultations. POWER is not privy to any consultation information.

COMMENT	COMMENT STATEMENT FROM DPR	POWER RESPONSE
1f	It appears that historic resources (in this instance, historic meaning items dating between 1900 and 1969) are not being recorded with the same diligence or standards as prehistoric resources. In many instances, WWII items were not recorded within the boundaries of a site, or were treated differently (see comments for RK-23 below)	POWER respectfuly disagrees with this assessment..
1g	Submit all GIS data (including point located artifacts) and photos of the sites, isolates, and artifacts located within the boundaries of Ocotillo Wells State Vehicular Recreation Area. Collaborate with OWSVRA GIS Department to insure GIS attributes are compatible.	a) Formal site and isolate numbers have been received from the SCIC. Edits to the GIS database will be completed and submission of a final compatible database to State Parks and BLM will occur. b) POWER has asked BLM if BLM desires to have all photos taken provided to them for their records. BLM has indicated no. Thus, POWER shall submit to State Parks all photographs taken of resources and isolated artifacts located within or partially within the SWRA. Parks will receive a data table with pictures identified using the CHRIS center site and isolate identification codes.
2a	Page 1 of the paper copy (page 33 of the PDF) mentions topography too severe for the 3-D study equipment. What constitutes 'too severe' terrain? Is this term defined in the document? Has the feasibility for all drive paths been sufficiently reviewed during the pedestrian surveys?	POWER archaeological crews were accompanied by Geokinetics, Inc. vibroseis buggy drivers and it was the drivers of the type of vehicle, as discussed in the permit Work Plan who decided the encountered terrain could be driven acrossby the type of vibroseis buggies described. The text in Section 6.2 was clarified as to this issue
2b	Page 5 of the paper copy (page 37) - discusses some impacts to soils and vegetation. It reads "Soils in the area are the mostly finer-textured silt and sandy soils which are less likely to compact." Provide citation for this determination. It also states that these impacts are minimal and recovery time will be short in a normal rainfall growing season. Are there any citations for this statement of recovery time; are they applicable to this desert environment?	Statements were based on experience with similar environments: there are no citations.
2c	Page 33 (page 65) – when discussing historic era roads it mentions that one leads to a "long-abandoned homestead south of Dump Road and east of Poleline Road". Was this information gathered from SCIC? There does not seem to be an associated P-number or Trinomial on the map.	The homestead was discussed in 2016 during an on-site meeting by Parks staff with POWER staff in attendance: POWER was informed of this by Parks staff. We know of no trinomial associated with this homestead.
2d	Page 33 – "Ocotillo Wells SVRA covers 40,000 acres of land"… verify information.	
2e	Page 35 (page 67) – Were the Tierra Environmental Services reports (2008, 2009) forwarded to any of the mentioned agencies (SCIC, Parks, BLM)?	Yes. The 2008 and 2010 reports were sent to State Parks and BLM by POWER staff in 2016. POWER will reforward these documents to both agencies upon submittal of the revised report.
2f	Page 57 (page 89) – mentions "in a few cases square "roomblock" type	This is the only "roomblock" we observed and the text has been clarified.

COMMENT	COMMENT STATEMENT FROM DPR	POWER RESPONSE
	constructions" How many roomblock type-sites were located?	
2g(i)	Page 73 in section 6.2 Results (page 105) – starts a list of quick overviews for the sites. Within this list RK-32, RK-33 and CN-12 are listed as being owned by BLM. These are actually on State Parks property.	These facts have been altered in the text.
2g(ii)	RK-57 was not found on GIS layer provided to Parks.	This resource has been added to final GIS database.
2g(iii)	RK-23 / RK-ISO-11Ha-d – RK-23 has four Historic isolates surrounding it, which are listed in GIS as RK-ISO-11Ha, Hb, Hc and Hd. They are mentioned in the site record, however they are not mapped within the site record. There is also only one RK-ISO-11 artifact record but no additional ones for b, c, or d. Expand site boundaries to include historic items to make it a multicomponent historic/prehistoric site or create three additional isolate records.	RK-isolate 11 was recorded as an isolate while the 11a,b,c and d were added to site RK23 due to proximity.
2g(iv)	RK-59 –Site record has discrepancy between Point Located Artifact numbers in the first page (P3a) and second page (A5).	Four of the stone tools were point located as was the bottle base for a total of five point-locations.
2g(v)	TW-36 – A site was reported to park staff after this survey was completed. During the exploration of the site, it was found to be a component of TW-36, however the items recorded by state parks staff change the boundaries of TW-36 slightly.	POWER recommends that Parks create an update page for the DPR523 and send to the SCIC as part of the process of allowing the seismic survey to take place. It is possible that additional resources will be observed by the monitors and updates to the individual DPR523 form setscan be made once monitoring is complete.
2g(vi)	TW-39 – Found WWII items in the middle of a proposed drive path which would extend the boundaries of TW-39 into the salt spring fence and possibly beyond.	TW-39 DPR523 shows this site is associated with prehistoric elements only: see this section in 6.2.
2g(vii)	TW-ISO-5 – This isolate is located roughly 5 meters from P-13-15905/CA-IMP-12476/P-040915-02 (potsherds +9) was not relocated by POWER, and TW-ISO-5 was not located by State Parks when attempting to find it during a field session.	The TW-ISO-5 form was submitted to the SCIC and Primary number P13-17532 was issued. POWER staff observed the recorded resources in the field.
2g(viii)	Certain items within drive path corridors were not re-located by POWER. This could be for any number of reasons. Some items were listed on maps, some were not.	This comment is accurate. Previously recorded sites and isolates that were not relocated by POWER staff are nonetheless kept on all CHRIS center shapefile databases. POWER does not wish to cloak the fact that these do not now exist as they could have been covered up by dust or alluvium as the teams passed by.
2g(ix)	P-13-12665 is located in section 1 and is 6 meters off the drive path. It is listed as "Not in APE, avoided completely". This may not be avoided completely if it is 6 meters away from the centerline of the drive path. There are a few others listed similarly, check for accuracy or better explain the APE.	P13-12665 is an isolate: we are unsure which site the comment refers to. A check of Table ES-1 does not show any resource being 6 meters away from a proposed drive pathway. POWER believes that all sites can be avoided by the use of a monitor who will guide the vibroseis buggies past recorded site boundaries.
2g(x)	P-13-014306 – a road listed as a historic era isolate. It also	a) We note that all vibroseis pathways are recommended pathways and that final

COMMENT	COMMENT STATEMENT FROM DPR	POWER RESPONSE
	states that it is within the APE, but avoided completely. Previously in the document (page x, second to last sentence) it says that they propose to drive over segment E which would indicate the avoided completely statement is false. On page 64 it states that POWER reanalyzed the road network and concluded certain segments were not constructed during WWII. Additionally, page 64 says this resource is 'Considered potentially ineligible, which the site record states it is potentially eligible. It should be made more clear in the Arch Report which segment(s) were found to be constructed later than the 1940's, what year they assume the segments were made, and include a discussion of why segment E was chosen to be driven over.	approval of the vibroseis pathways must be left up to the Lead Agencies because there may be other environmental impacts that POWER archaeological staff are not aware of. b) P13-014306 was recorded as an historic isolate by the SCIC and this fact was not discovered until after POWER crews undertook a vibroseis pathway survey and crossed the resource in 2018. We have adjusted the report text to reflect the direct impact and have made suggestions for avoidance so that the use of the crossing by vibroseis buggies is not potentially adverse.
2g(xi)	P-13-11154 – SE edge of new boundary appears to touch the drive path centerline. Site record says "Since the Truckhaven 3-D seismic project has avoided crossing the 2009 site boundary completely, and the new southern extension of this site by several dozen meters…" This does not appear to be true according to the map provided.	The southern tip of this recorded site boundary is 31 meters away from a recommended vibroseis pathway. BLM has asked POWER to add a matrix table to the report naming each site and the closest approach of a vibroseis path centerline to all sites POWER encountered is now provided in the report.
2h	Page 157 (page 189) – "no indirect impacts are anticipated after the 3-D study concludes". What assumptions are being made for this statement? After mitigation, normal rainfall, etc…	Text has been modified to reflect one direct impact to road site, however no adverse impacts are expected once the suggested treatment is applied It is POWER's opinion that this is the case: the preparer of the CX/MND may come to a different conclusion.
3a	There has been conflicting information about size of buggies. What type of buggies will be used? There is also some confusion about the tandem buggy pairs. These will need to be clarified in the future work plan.	a) We understand that the geotechnical project POD is a work in progress. POWER is using a project description provided to us by the Proponent in early 2018 wherein the use of tandem buggy pairs was clearly described. b) POWER defers to the opinion of the firm that will prepare the archaeological work plan for the CX/MND
3b	The discussion of previous seismic studies and proposed buffers based upon resource types is presented, however the results or effectiveness of these buffer distances is still not adequately presented. What are the results and effectiveness of "buffers" for protecting historic properties and resources identified in these studies?	a) POWER is uncertain why our lengthy discussions with citations as to the potential for vibrational impacts during the seismic work through heavy machinery use are not adequate. In addition, we clearly point out that there is no scientific knowledge of the true effectiveness of any buffer associated with the potential direct impacts of vibrations on sensitive receptors including archaeological resources. Decisions of this nature have been left up to land managers as far as we are aware. We believe that the agencies can agree to a process in the MMP where potential adverse indirect impacts can be avoided. b) Archaeologial monitors, if mandated in the MM Passociated with the future seismic

COMMENT	COMMENT STATEMENT FROM DPR	POWER RESPONSE
		project, should be able to observe if sensitive resources impacted during vibration events and halt the process if there are any observed physical changes to sensitive resources.
3c	Page x of the paper copy (12 of the PDF) states that "any land scarring the agencies deem undesirable can be mitigated during the 3-D study". It is not noted how, or what happens if the damage cannot be mitigated.	POWER defers to the opinion of the firm that will prepare the MMP for the CX/MND
3d	Page x of the paper copy statess "the Proponent proposes to drive over one possible historic-era dirt road segment". This road has small graveled berms lining it that are pristine in this area. Although this may be discussed later on during mitigation talks, this berm should be repaired.	The "small graveled berms" were created by a flat-bladed bulldozer as "push" when the road was first bladed. POWER defers to the opinion of the firm that will prepare the MMP for the CX/MND for language associated with protection of the noted berms.
3e	Page 4 (page 36) - discusses field crews totaling 50-60 people. Would this be 30 person teams for each buggy tandem? How will they be set up in the field? All walking? Set up in a camp? People's shoes can be destructive in these areas. Try to keep team members within drive path corridor, or within approved areas (May need to survey staging areas?)	a) The total estimated number of workers, some of which will be in the field, and some that will not, is the estimate we have provided. Exact numbers are not known at this time b) as far as the Seismic Test process is concerned, POWER defers to the opinion of the firm that will prepare the MMP and the Work Plan to be placed in the CX/MND. c) POWER does not agree that the effects of archaeological fieldwork at historic properties should be considered harmful or adverse. If this were the case, then no fieldwork of any kind would be allowed on any site. Monitors can be instructed to avoid treading on features and guide other project staff around such features.
3f	Page 4 –Proposed mitigation or treatment calls for monitors to be on-site during much of the work proposed in high sensitivity areas. What types of monitors? Who is going to hire the monitors? What authority is going to be proscribed to Parks' staff to manage and ensure the monitors are effective?	POWER defers to the opinion of the firm that will prepare the MMP for the CX/MND
3g	Page 4 - Sandstone outcroppings are found throughout the TGLA/APE. These should be avoided by the trucks and should not be drilled through in order to place geophones.	POWER defers to the opinion of the firm that will prepare the MMP for the CX/MND
3h	Page 5 (page 37) – discusses how the buggies will be driving over the terrain and how if they need to backtrack, they will offset their tracks. Which could be more destructive: two sets of tracks verse one set driven over twice? Majority of drive paths appear to be dead ends, rather than paths that are able to be driven straight through.	POWER defers to the opinion of the firm that will prepare the MMP for the CX/MND
3i	Page 36 (page 68) – section 5.3.1 paragraph 3 mentions direct effects	POWER defers to the opinion of the firm that will prepare the MMP for the CX/MND

COMMENT	COMMENT STATEMENT FROM DPR	POWER RESPONSE
	on historic properties, but it fails to mention field crews as an impact. Field crews are mentioned as an impact on page 157 in section 6.3	
3j	Page 158, item 4 (page 190) – Should specifically lay out the distance to be kept, and detail what a 'sensitive element' is once the work plan is written.	POWER defers to the opinion of the firm that will prepare the MMP for the CX/MND
3k	Page 158, item 5 - Helicopter drop areas should be more clearly defined in the future work plan.	POWER defers to the opinion of the firm that will prepare the MMP for the CX/MND
3l	Page 158, item 7 – in the future work plan, 'sensitivity training' should be clearly defined.	POWER defers to the opinion of the firm that will prepare the MMP for the CX/MND

APPENDIX E – CLASS III ARCHAEOLOGICAL SURVEY OF TRUCKHAVEN 3-D EXPLORATORY WELLS

June 15, 2018

ORMAT NEVADA, INC.

Class III Cultural Resources Survey of the Truckhaven Geothermal Project: Test Well Pads and Access Roads

Imperial County, California

Final, revision 1

BLM Statewide Permit No.: CA-15-48
BLM FWA Permit No.: CA-670-16-077-FA02

PROJECT NUMBER:
146639

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CONFIDENTIAL

All information in this report on the locations of cultural resources shall be treated as confidential and shall not be released to the public or other unauthorized entity, consistent with Section 304 of the National Historic Preservation Act (NHPA), Section 9 of the Archaeological Resources Protection Act (ARPA), and California Office of Historic Preservation (OHP) guidelines.

Class III Cultural Resources Survey of the Truckhaven Geothermal Project: Test Well Pads and Access Roads Imperial County, California

Final

PREPARED BY: POWER ENGINEERS, INC.
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ACRONYMS AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effects
BLM	Bureau of Land Management
bsl	below sea level
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
County	Imperial County Planning & Development Services Department
CRHR	California Register of Historic Resources
DPR523	California Department of Parks and Recreation Archaeological Form 523
DRECP	Desert Renewable Energy Conservation Plan
EIR	Environmental Impact Report
FWA	fieldwork authorization (survey permit)
GPS	global positioning system
m	meters
MMP	Mitigation Monitoring Plan
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
NHPA	National Historic Preservation Act
Parks	California Department of Parks and Recreation
POWER	POWER Engineers, Inc.
PPV	Peak particle velocity
PRC	Public Resources Code
Proponent	Ormat Nevada, Inc.
RPA	Register of Professional Archaeologists
SCIC	Southern Coastal Information Center
SHPO	State Historic Preservation Office
SLC	California State Lands Commission
SVRA	State Vehicular Recreation Area
TGLA	Truckhaven Geothermal Lease Area
U.S.C.	United States Code
USGS	United States Geological Survey
YBP	years before present

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BLM SUPPLEMENTAL STATISTICS REPORT PAGE

1. Project Name.	Ormat-Truckhaven Geothermal Wells Project	
2. BLM State Permit Number.	CA-15-48	
3. Field Authorization Number.	CA-670-16-077-FA02	
4. Dates of Field Survey.	April 26-30, 2016 and May 24-30, 2017	
5. Total acreage of lands surveyed at BLM Class II level.		0
Of item 5 above:		
A) Acreage of BLM lands surveyed.		NA
B) Acreage of other lands surveyed (private, state, other federal) list separately.		NA
6. Total acreage of lands surveyed at BLM Class III level.		174.77
Of item 6 above:		
	A) Acreage of BLM lands surveyed.	46.73
	B) Acreage of other lands surveyed (private, state, other federal) list separately.	Private-98.57 State-29.47
7. Total number of cultural properties in project Area (of Potential Effect).		12
Of item 7 above:		
	A) Total number of cultural properties for which site records were completed (newly recorded cultural properties).	12
	B) Number of new cultural properties on BLM lands.	5
	C) Number of new cultural properties on other lands (private, state, other federal).	Private-2 State-5
8. Of the cultural properties located within the Area (of Potential Effect): [If properties are not located on BLM, place this number in parentheses ( ) after the number of BLM properties.]		
	A) Number of cultural properties that you are recommending as eligible for the National Register of Historic Places (NRHP).	5 (6)
	B) Number of cultural properties you are a recommending as not eligible for the NRHP.	0 (1)
Of item 8A above:		
	a) Number of cultural properties that can/will be avoided.	11
	b) Number of cultural properties that will be affected.	0
	c) Number of cultural properties that you are recommending data recovery/mitigation.	0
	d) Number of cultural properties that were data recovered/mitigated.	0
Of item 8B above:		
	a) Number of cultural properties that can/will be avoided.	1
	b) Number of cultural properties that will be affected.	0

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EXECUTIVE SUMMARY

In accordance with the National Environmental Policy Act and 36 Code of Federal Regulations Part 800 regulations that implement Section 106 of the National Historic Preservation Act (NHPA), POWER Engineers, Inc. (POWER) undertook a Class III cultural resource survey and impact analysis associated with cultural resources located on Bureau of Land Management (BLM), State and private land within a proposed geothermal project area in the Salton City region of Imperial County, California. Ormat Nevada, Inc. (Proponent) is planning to construct a set of geothermal exploration wells near the Salton Sea Airport.

The BLM is the lead federal agency for this project, and the BLM's El Centro Field Office is the local representative of the agency. The archaeological study area is located on land slightly south of the unincorporated community of Salton City and the study area surrounds the Salton Sea Airport. Part of the study area is located within the borders of the Ocotillo Wells State Vehicular Recreation Area (SVRA): California Department of Parks and Recreation (Parks), manages surface lands inside the SVRA.

The purpose of the Class III survey is to support a federal permit application by the Proponent through the BLM that requires, in part, that impacts to historic properties be fully delineated and considered during project planning. The BLM has agreed to allow State-level compliance considerations in this report (C. Sagahun pers. comm. 2016) because this report may be used to support a joint federal/State environmental compliance document.

In the spring of 2016 POWER archaeological staff, with permits obtained from BLM and Parks, performed a survey of lands for a much larger joint wells-vibroseis project proposed by the Proponent. Numerous archaeological resources were discovered. After the 2016 fieldwork concluded, a draft Class III survey report and numerous new DPR523 form sets were issued by POWER and submitted to BLM (POWER 2016). In 2017, the Proponent revised the project description to separate the draw and injection wells portion of the project from the vibroseis portion of the project; modified the locations of certain proposed well pads; identified proposed well pad access roads; then contacted BLM to initiate the change in project scope. As a result, additional archaeological survey for revised well placement and proposed access roads was needed in support of a wells-only project description, and a new BLM fieldwork authorization permit was required to undertake additional field surveys. Those resources encountered by the wells portion of the POWER 2016 survey were extracted from the original 2016 document and are discussed herein.

A proposed Area of Potential Effects (APE) covering 174.77 acres has been prepared as a part of this study. The APE includes 13 potential exploration well pad areas, several proposed well pad access roads, and all cultural resource sites encountered during the 2016 and 2017 surveys. The proposed APE also includes archaeological survey buffer zones surrounding the well pads and roads that were required as part of the archaeological survey permit. Buffer zones outside the perimeters of well pads in the SVRA were 25 meters in 2016, while buffer zones for well pads outside the SVRA in both years were 25 feet. Because the archaeological team encountered many resources during the 2017 survey, a few of the survey locations described in the 2017 BLM archaeological permit application were modified in the field so that complete survey coverage could be attained and previously undiscovered resources avoided.

Based on the results of the records search, which was provided to POWER by the staff of the Southern Coastal Information Center (SCIC) at San Diego State University in December 2015, 21 cultural resource studies have been conducted within one mile of the APE. Of these, all or part of seven studies occurred within the APE. The SCIC search also identified 67 archaeological sites and

90 isolates in and near the APE, while POWER's 2016 survey identified an additional 37 sites near the APE.

The intensive pedestrian cultural resource surveys in 2016 and 2017 undertaken as part of the wells analysis covered 174.77 acres on BLM/SVRA land, State Lands Commission land, and private land. All of the well pad areas surveyed in 2016 are discussed herein; some were removed from consideration by the Proponent in 2017 because archaeological sites existed on the proposed well pad and/or possible access roads. These original but rejected well placements are considered alternative areas that shall not be advanced by the Proponent for construction, but could potentially be used in the future. Except for one, all prehistoric sites detected in the proposed APE are recommended eligible for listing on the National Register of Historic Places (NRHP) and the California Register of Historic Resources (CRHR). The Proponent has made it clear that they wish to directly avoid all historic properties during construction. Finally, of the 13 exploratory well areas examined during the archaeological surveys, no more than six well pads are proposed to be constructed. The remaining seven well areas could serve as potential alternatives.

The historic properties in the proposed APE will be avoided during construction; therefore, POWER recommends to BLM that a finding of *No Historic Properties Affected* is appropriate. Mitigation measures are recommended to ensure that direct and indirect impacts to nearby historic properties are avoided during well construction and operation.

Table ES-1 summarizes the descriptions of the 12 archaeological sites and 12 isolates encountered during the 2017 survey; POWER's preliminary recommendations for eligibility to the NRHP and CRHR; and the preliminary assessments of the effects/impacts of well construction on these historic properties. The 12 isolated resources are not considered eligible for either the NRHP or the CRHR; therefore, no further research on the isolates is warranted.

TABLE ES-1 NRHP/CRHR ELIGIBILITY RECOMMENDATIONS AND PRELIMINARY ASSESSMENTS OF EFFECTS FOR CULTURAL RESOURCES WITHIN THE APE

RESOURCE # AND JURISDICTION	AGE	TYPE	DESCRIPTION	EFFECTS SUMMARY
CA-IMP-6249 BLM/SVRA	Prehistoric	Artifact scatter	16 flakes, four tools, eight potsherds, no features.	Recommended Eligible to the NRHP and CRHR. Avoid during potential well pad and road construction [redacted] by at least 10 meters.
CA-IMP-12788 (Temp. CN-10) BLM/SVRA	Prehistoric	Artifact scatter	25+ flakes, eight tools, a pumice concentration and lithic concentration as features.	Recommended Eligible to the NRHP and CRHR. Avoid during potential well pad and road construction [redacted] by at least 10 meters.
CA-IMP-12789 (Temp. CN-20) BLM/SVRA	Prehistoric	Fish trap site	Four flakes, three tools, three cobble fish trap foundations.	Recommended Eligible to the NRHP and CRHR. Avoid during potential well pad construction [redacted] by at least 150 meters.
CA-IMP-12790 (Temp. DM-1) SLC/private	Prehistoric	Lithic scatter	150+ flakes and 22+ tools. No features	Recommended Eligible to the NRHP and CRHR. Avoid during potential well pad construction [redacted] by at least 80 meters.

RESOURCE # AND JURISDICTION	AGE	TYPE	DESCRIPTION	EFFECTS SUMMARY
CA-IMP-12791 Temp. DM-2 SLC/private	Prehistoric	Lithic scatter	36 flakes and at least seven tools. No features.	Recommended Eligible to the NRHP and CRHR. Avoid during potential well pad construction [redacted] by at least 10 meters.
CA-IMP-12792 Temp. DM-5 SLC	Prehistoric	Lithic scatter	Nine flakes, one core and one tool. No features.	Recommended Eligible to the NRHP and CRHR. Avoid during potential well pad and road construction [redacted] by at least 10 meters.
CA-IMP-12793 (Temp. RK-1) SLC	Multi-component	Artifact scatter	Three flakes, three tools and two church-key opened cans. No features.	Recommended Eligible to the NRHP and CRHR. Avoid during potential well pad and road construction [redacted] by at least 10 meters.
CA-IMP-12794 (Temp. RK-2) SLC	Multi-component	Artifact scatter	Two flakes and two cans: one church key and one hole-in-top. No features.	Recommended Not eligible to the NRHP and CRHR. Avoid during potential well pad and road construction [redacted] by at least 10 meters.
CA-IMP-12795 (Temp. RK-3) Private	Prehistoric	Lithic scatter	14 flakes and six tools. No features.	Recommended Eligible to the NRHP and CRHR. Avoid during potential well pad and road construction [redacted] by at least 10 meters.
CA-IMP-12796 (Temp. RK-4) BLM/SVRA	Prehistoric	Lithic scatter	One flake and two tools. No features.	Recommended Eligible to the NRHP and CRHR. Avoid during potential well pad construction [redacted] by at least 10 meters.
CA-IMP-12797 (Temp. RK-5) Private	Prehistoric	Lithic scatter	Three flakes and two tested cobbles. No features.	Recommended Eligible to the NRHP and CRHR. Avoid during potential well pad and road construction [redacted] by at least 80 meters.
CA-IMP-12798 (Temp. RK-6) BLM/SVRA	Prehistoric	Lithic scatter	Ten flakes. No features.	Recommended Eligible to the NRHP and CRHR. Avoid during potential well pad and road construction [redacted] by at least 10 meters.
Isolated Artifacts				
P-13-17178 (Temp. DM-ISO-2) Private	Prehistoric	Isolated artifact	Brown quartzite flake	Not eligible
P-13-17179 (Temp. DM-ISO-4) Private	Prehistoric	Isolated artifact	Grey quartzite flake	Not eligible
P-13-17186 (Temp. RK-ISO-1) SLC	Historic-era	Isolated trash	Steel can	Not eligible

RESOURCE # AND JURISDICTION	AGE	TYPE	DESCRIPTION	EFFECTS SUMMARY
P-13-17187 (Temp. RK-ISO-2) Private	Prehistoric	Isolated artifact	EMF chert	Not eligible
P-13-17188 (Temp. RK-ISO-3) Private	Prehistoric	Isolated artifact	Grey quartzite flake	Not eligible
P-13-17189 (Temp. RK-ISO-4) Private	Prehistoric	Isolated artifact	Beige quartzite flake	Not eligible
P-13-17190 (Temp. RK-ISO-5) Private	Prehistoric	Isolated artifact	Grey-tan quartzite flake and a milky quartz partial biface	Not eligible
P-13-17191 (Temp. RK-ISO-6) BLM/SVRA	Prehistoric	Isolated artifact	Dark grey quartzite expended core	Not eligible
P-13-17192 (Temp. RK-ISO-7) BLM/SVRA	Prehistoric	Isolated artifact	EMF-quartzite preform	Not eligible
P-13-17193 (Temp. RK-ISO-8) Private	Prehistoric	Isolated artifact	Brown quartzite flake	Not eligible
P-13-17194 (Temp. RK-ISO-9) Private	Prehistoric	Isolated artifact	Dark grey quartzite flake	Not eligible
P-13-17195 (Temp. RK-ISO-10) Private	Prehistoric	Isolated artifact	Buffware potsherd	Not eligible

1.0 INTRODUCTION

Ormat Nevada, Inc. (the Proponent) is proposing to construct a series of geothermal test wells located on pads in the vicinity of the Salton Sea Airport in Imperial County, California (Figure 1). Once the preferred well pad locations are chosen by the Proponent, no more than six of these well pads will be used to test subsurface geothermal resources within a deeply buried hot water source located at the north end of the Bureau of Land Management (BLM) Truckhaven Geothermal Lease Area (TGLA). The lead federal agency is the BLM and the proposed well construction is considered an undertaking following 36 Code of Federal Regulations (CFR) Part 800.3(a), therefore a Class III cultural resource survey is necessary prior to project approval.

The general location of the Class III survey study area is positioned inside a disconnected area measuring approximately 3,000 meters from east to west and 2,000 meters from north to south. Figure 1 shows all areas surveyed by POWER Engineers, Inc. (POWER) archaeological staff in 2016 and 2017. The Class III survey area covers 174.77 acres as disconnected polygons within this study area. Fieldwork occurred in parts of Sections 31 and 32 of T10S/R10E, and parts of Sections 4, 5, 6 and 8 of T11S/R10E as shown on the *Kane Spring NW, CA* and *Truckhaven, CA* 1:24,000 topographic maps. The survey area is located within a multi-jurisdictional regulatory environment (Figure 2). Prior to beginning fieldwork, the Proponent advised POWER that avoidance of all cultural resource sites was their preferred choice.

The Class III survey took place on land owned by the BLM, the California Department of Parks and Recreation (Parks), and the California State Lands Commission (SLC), as well as private lands. Potential well pads in the eastern portion of the survey area (Section 4) are located on land managed by the SLC. Potential well pads in the southwestern portion of the survey areas (Sections 6 and 8) are located on BLM-State Vehicular Recreation Area (SVRA) managed land. Potential well pads in the central (Section 5) and northernmost portions of the survey areas (Sections 31 and 32) are located on private land.

Fieldwork began in April 2016 when the project consisted of a combined well pad and vibroseis pathways study. POWER archaeological staff obtained a BLM permit associated with the 2016 archaeological survey (#CA-670-16-077-FA01) and wrote a Work Plan in support of the survey permit. For the 2017 field season, a new permit request was filed by POWER with the BLM (#CA-670-16-077-FA02) and the Work Plan for the 2017 surveys tiered off the original with BLM permission. In early 2017 the two project elements were separated by the Proponent with BLM approval.

The BLM Work Plan allowed the environmental teams assigned to undertake the fieldwork the necessary latitude to develop revisions to the project through the identification of various types of environmental constraints in the field, including archaeological resources. The field director for the 2017 surveys was Rebekka Knierim, M.A., RPA with Jessica Jay, B.A. serving as the archaeological field technician. Mr. Frank Salazar of the Campo Band of Mission Indians served as the 2017 Indigenous Monitor. Mr. Scott Kessler served as the Proponent's representative in the field. Michael Dice M.A., RPA is the Principal Investigator. POWER staff archaeologists that undertook the 2016 surveys were pre-approved in the 2016 Fieldwork Authorization (FWA) and are named in the 2016 draft report (POWER 2016).

Numerous federal laws and regulations have been developed to protect cultural resources, including the National Historic Preservation Act (NHPA), which established both the Advisory Council on Historic Preservation (ACHP) and the National Register of Historic Places (NRHP). Regulations associated with Section 106 of the NHPA (36 CFR Part 800 et seq.) require that any permitted activity (or undertaking) located on federal land that involves the expenditure of federal funds or that

requires federal permits must take into account the effect of the undertaking on all potentially historic properties. The BLM must afford the ACHP a reasonable opportunity to comment on such undertakings if there are potential effects to any historic properties. During the BLM-mandated Class III analysis, an inventory must be made of all potentially historic properties within the undertaking's proposed Area of Potential Effects (APE), a concept that is defined by 36 CFR Part 800.16(d). Properties judged significant within the context of the criteria in the NRHP must be avoided or be subject to programs that mitigate for adverse effects. BLM would then initiate consultation with the State Historic Preservation Officer (SHPO) if the undertaking was to adversely affect a historic property.

BLM agreed during development of the 2016 Work Plan that regulatory elements associated with State archaeological compliance guidelines could be incorporated into the Class III report. Development-related projects that occur on State-managed lands and private lands in California are subject to cultural resource regulations that have been made a part of the California Environmental Quality Act (CEQA) process. The Imperial County Planning & Development Services Department (County) is the lead CEQA agency for this project and Appendix G of the CEQA Guidelines requires that the County account for potential adverse effects for any listed, unevaluated, or eligible historical resources as part of preparing County environmental compliance documents.

1.1 Description of the Federal Undertaking

Federal agencies must comply with Section 106 regulations when they directly undertake federal activities and when they are involved indirectly through funding, approving, permitting or licensing. Federal agencies must also comply with Section 106 when they are indirectly involved by delegating a federal program under which State or local agencies issue permits. The 1992 amendments to the NHPA specifically defined the term 'undertaking' as:

> "…a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including A) those carried out by or on behalf of the agency; B) those carried out with Federal financial assistance; C) those requiring a Federal permit, license, or approval; and D) those subject to State or local regulation administered pursuant to a delegation or approval by a Federal agency. (16 U.S.C. [United States Code] § 470w, Section 301[7])."

ACHP current regulations in 36 CFR Part 800.2(o) defines the 'undertaking' as:

> "…any project, activity, or program that can result in changes in the character or use of historic properties, if any such historic properties are located in the area of potential effects [APE]. The project, activity, or program must be under the direct or indirect jurisdiction of a Federal agency, or licensed or assisted by a Federal agency. Undertakings include new and continuing projects, activities, or programs and any of their elements not previously considered under Section 106."

ACHP takes the position that its current regulatory definition of undertaking is broad enough to encompass the 1992 definition. For the purposes of BLM, the action that is the undertaking is the issuance of a permit to the Proponent to drill wells on BLM-managed lands. Approval of the undertaking is contingent on defining which historic properties can be avoided, and which cannot, when seismic testing takes place.

Key to fulfilling these requirements is developing an appropriate APE. Here, BLM must consider potential direct, indirect, and cumulative effects to historic properties and all aspects of integrity, including their associated settings as applicable. Thus, the proposed APE for the project includes those portions of the study area that could have a potentially harmful impact on a known and

unknown cultural resource and, specifically for this project, any portion of the archaeological study area where ground-disturbing activities could be proposed. All cultural resources observed during the Class III survey must be included in the APE and all are assumed to be historic properties (and historical resources from the State standpoint), unless research demonstrates otherwise. Confirmation of the proposed APE involves consultation with key stakeholders such as Native American Tribes, Parks, the County, and SHPO. POWER has produced a preliminary APE in this document (Figure 3) that can serve as a starting point for BLM to consider.

1.1.1 Project Description

The Proponent proposes to drill up to six geothermal exploration wells in the APE. The purpose of the project is to drill, complete, test, and monitor the geothermal resource wells. The geothermal wells are designed to reach into and flow-test the anticipated underlying geothermal reservoir to confirm the characteristics of the geothermal reservoir and determine if the geothermal resource is commercially viable. The well pads will cover an area 400 feet by 400 feet in size or approximately 160,000 square feet (3.67 acres) but the pad size or shape can be adjusted or reduced to avoid environmental, ownership, or topographic limiters. Access road centerlines can be moved if needed for the same reasons.

The proposed well pad sites must be accessed for construction by heavy machinery, and be easily accessible for operations/maintenance once they are in use. Each access road shall be graded to a maximum point of 29 feet (25 feet wide with two feet on each side to include shoulder drainage), and gravel shall be applied once they are completed. Each well that is built will require minimal grading inside the pad area, but shall be fenced as part of the construction process and during operations. Construction may involve the preparation of a temporary base-covered foundation for heavy well drilling equipment should such equipment prove necessary during the design phase. In addition, a temporary pond for capturing debris and sludge will be constructed at each pad for drilling operations. Once a well is completed, surface tie-ins to the future geothermal power plant shall be constructed under a separate permit.

To meet the goals of the Proponent, POWER staff surveyed a total of 91.19 acres for well pad siting purposes; 32.29 acres for roads and road siting purposes; and 40 acres for the airport staging area. Because some of the archaeological sites (Table ES-1) extended outside the areas necessary for survey, the additional area inside the site boundaries, but outside the proposed facilities totaled 11.29 acres. The total amount of survey covered 174.77 acres. A listing of the total acreage surveyed within various management agencies' lands can be found in the required *BLM Supplemental Statistics Report Page* attached at the front of this document.

Proposed Well Pad Areas

For the purposes of this report, below are the names of the survey areas. They are labelled generally counterclockwise, beginning in the far southeast portion of the APE, which is shown on Figure 3. Proposed well pads are 400 feet by 400 feet square but can be reduced in size to avoid sensitive areas. Each area surveyed shows the number of acres examined inclusive of the archaeological survey buffer zones named in the Work Plan. In some instances, detected archaeological sites were larger than the area intended to be surveyed:

- **Area #1.** Located southwest of the Salton Sea Airport on the north side of Dump Road, the area surveyed covers 9.3 acres and no archaeological resources are located therein. The area can be accessed from Dump Road.
- **Area #2.** Located southwest of the east end of the Salton Sea Airport runway on the north side of Dump Road, the area surveyed covered 4.64 acres and site [redacted] was detected within

[redacted] This Area was removed from consideration by the Proponent due to the existence of archaeological site [redacted].

- **Area #3.** Located northwest of the east end of the Salton Sea Airport runway and 440 meters west of State Route 86, the area surveyed in 2016 covered 4.64 acres. An additional 6.52 acres was surveyed in 2017. Site [redacted] and [redacted] were detected within and extending outside of Area #3. Site [redacted] and [redacted] were found inside Area #3 as was isolate [redacted]. Construction can avoid all sites if the well pad is placed in the southwest quadrant of Area #3 and is constrained [redacted]. The area can be accessed by a road to be extended east from Skyway Drive.
- **Area #4.** Located north of the Salton Sea Airport, the area surveyed covered 4.64 acres and enveloped archaeological site [redacted] Any well pad built in this area can be reduced in size [redacted] The area can be accessed by a road extending northwest from Skyway Drive.
- **Area #5.** Located north of the Salton Sea Airport, Area #5 enveloped a dirt road known as Air Way Avenue and 4.64 acres were surveyed. Due to land issues, this area was abandoned by the Proponent and no well pads will be constructed in this area.
- **Area #6.** Located northwest of the Salton Sea Airport, this area is bisected by a large modern berm and a well pad could be placed on either side of the berm. The original well pad in this area was surveyed in 2016 and covered 4.64 acres. Additional acreage on either side of the 2016 well pad totaling 13.17 acres was surveyed in 2017 for a total of 17.81 acres surveyed in Area #6. Three isolated artifacts but no sites were encountered in this area. The area can be accessed by a road extending south from Arroyo Salado.
- **Area #7.** Located north of the Salton Sea Airport, the area surveyed covers ground located northwest of the Desert Air Court cul-de-sac and is 4.64 acres in size. The potential well pad was abandoned due to land issues and no cultural resources were detected.
- **Area #8.** Located roughly 350 meters northwest of the western end of the Salton Sea Airport runway, the original well pad is located inside the SVRA and 5.33 acres were surveyed in 2016. Archaeological site [redacted] and site [redacted] are located to the [redacted] of the original, so an additional 1.6 acres was surveyed in 2017 so that the pad could be moved [redacted] Isolate [redacted] is located inside the area surveyed [redacted]. The well pad can be accessed by a dirt road constructed between it and Dump Road.
- **Area #9.** Located roughly 900 meters southwest of the western end of the Salton Sea Airport runway, 6.8 acres of ground was surveyed in 2017 and site [redacted] was found in [redacted] the surveyed area. A well pad can be constructed such that site [redacted] can be avoided. The pad will be accessed directly from Dump Road.
- **Area #10.** Located roughly 666 meters southwest of the western end of the Salton Sea Airport runway, this 5.33 acre area was surveyed in 2016 and abandoned by the Proponent [redacted].
- **Area #11**. Located roughly 200 meters southwest of the western end of the Salton Sea Airport runway, 5.33 acres were surveyed in 2016 such that a well pad could be constructed here, but, ultimately the well pad at this location was abandoned. Several proposed roads in this area may be constructed allowing access to Area 8 to the north and Area 12 to the west. No cultural resources were detected in this area.

- **Area 12.** Located due south of the Salton Sea Airport roughly 335 meters north of Dump Road, 4.64 acres were surveyed and one isolated artifact was detected. Access to the area will be from an access road paralleling the south side of the Salton Sea Airport runway.
- **Area #13.** Located due south of the Salton Sea Airport on the south side of Dump Road, 5.33 acres were surveyed in 2016 and no archaeological resources were detected. This area will be accessed directly from Dump Road.

Proposed Well Pad Access Road Alignments

Well pad access road centerlines plus buffers were surveyed using a 75-foot survey corridor outside of the SVRA and 165 feet inside the SVRA. Construction widths of these roads will be 25 feet with a two-foot water control shoulder on either side. All access roads were surveyed in 2017:

1. The survey of the Area #3 access road from the south end of Skyway Drive covered 1.52 acres. Located on private land outside the SVRA, the proposed road is L-shaped and approximately 284 meters long. No cultural resources were detected.
2. Survey of a road from the north end of Skyway Drive to Area #4 covered 0.56 acre. Located on private land outside the SVRA, the proposed road is straight and approximately 95 meters long. No cultural resources were detected.
3. The survey of a road from Arroyo Salado to Area #6 covered 2.89 acres. Located on private land outside the SVRA, the proposed road runs more or less south and is approximately 480 meters long. Two isolated artifacts were detected.
4. A road from Desert Air Court to Area #7 was surveyed but abandoned. A total of 0.91 acre was surveyed. No cultural resources were detected.
5. A road from Air Park Drive to the SVRA boundary for the purpose of accessing Area #8 was surveyed and covered 4.05 acres including acreage in RK-5 that extends slightly outside the area of survey. Located on private land outside the SVRA, the proposed road runs more or less southwest and is approximately 740 meters long. The road was abandoned [redacted].
6. A complex road pathway that links the western end of the Salton Sea Airport runway with Area #11 to the west and Area #12 was examined. A total of 11.51 acres was surveyed and two isolated artifacts were detected.
7. A road between Area 8, Area 11 and Dump Road was surveyed inside the SVRA and, excluding the Area 11 pad that is counted elsewhere, a total of 10.98 acres were surveyed. One isolate and one site [redacted] were detected. The road was moved to avoid the site.

Salton Sea Airport Staging Area (surveyed in 2016)

The Salton Sea Airport is covered in either asphalt or gravel and roughly 40 acres were surveyed as a staging area in 2016. Portions of the airport grounds that have not been bladed, graded or bermed were not included within the APE.

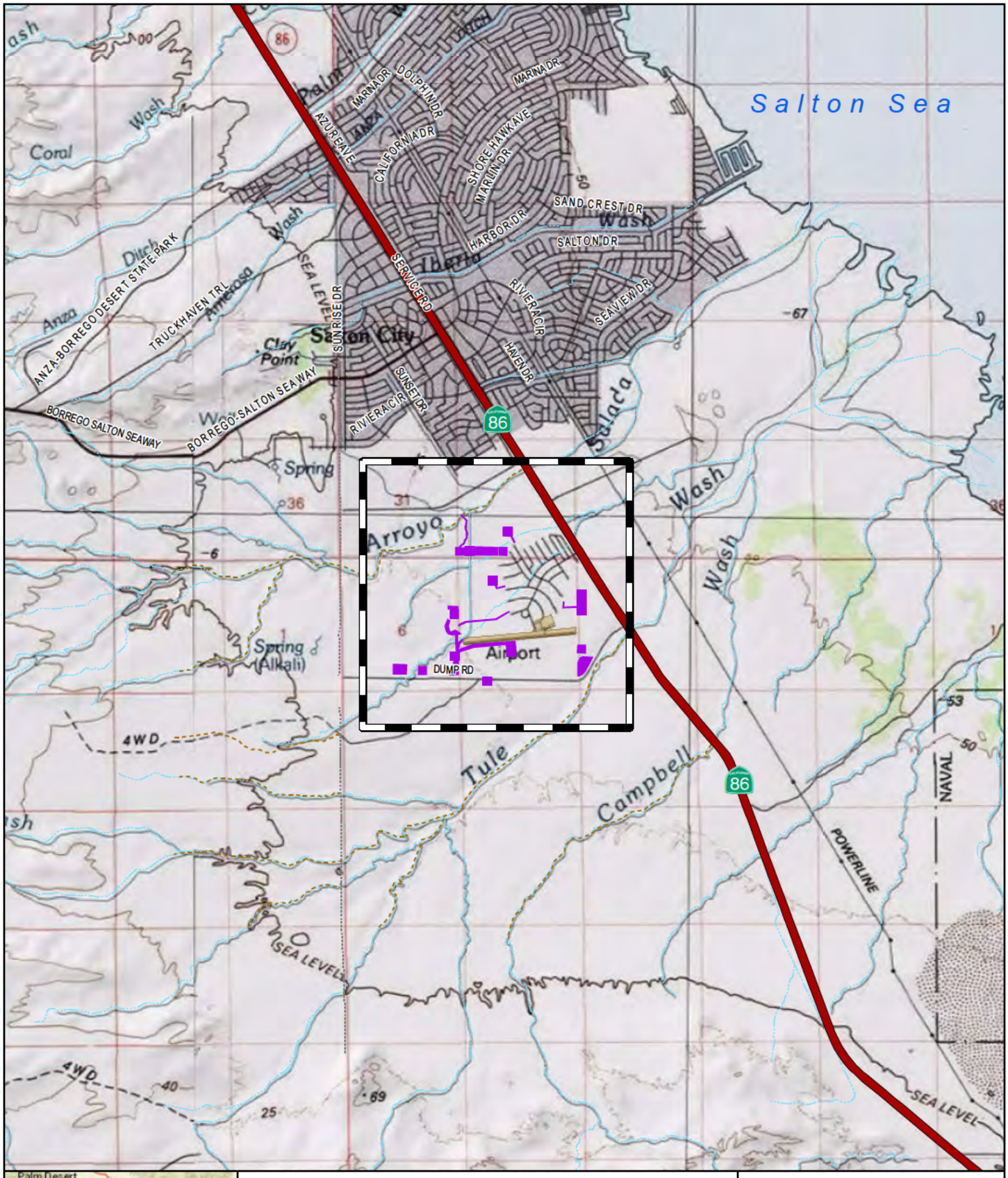
1.2 Proposed Area of Potential Effects

Because the wells and well pad access roads are currently considered alternatives to be approved by various project stakeholders (no more than six well locations will ultimately be selected), the APE associated with this report (see Figure 3) includes the following elements:

1. All potential well pad areas surveyed in 2016 and 2017 including rejected pads.

2. Survey of buffer zone ground around well pad areas located inside the SVRA extended 25 meters (82 feet) outside the pad.
3. Survey of buffer zone ground around well pad areas located outside the SVRA of 7.62 meters (25 feet).
4. Survey of buffer zone ground located on either side of a proposed access road located inside the SVRA of 25 meters (82 feet).
5. Survey of buffer zone ground located on either side of a proposed access road located outside the SVRA of 7.62 meters (25 feet).
6. All the archaeological site boundaries encountered when the five classes of areas above were surveyed.
7. Vertical depth of the well pads chosen for construction and their associated access roads is assumed to be approximately one meter below current grade because some of the pads and access roads may require substantive grading. The wells themselves could be drilled up to 7,000 feet below the surface and the drill core will be 12 inches wide or less.
8. The Salton Sea Airport shall serve as the staging area for well and road construction. The area indicated in Figure 3 shows this area as environmentally cleared in 2016.

The APE does not include any previously proposed vibroseis paths (see POWER 2016) nor any archaeological sites encountered during the 2016 vibroseis path surveys that are not located in a well pad or access road buffer zone. Vibroseis pathway surveys, and their adjoining sites and isolates will be addressed in a separate report.



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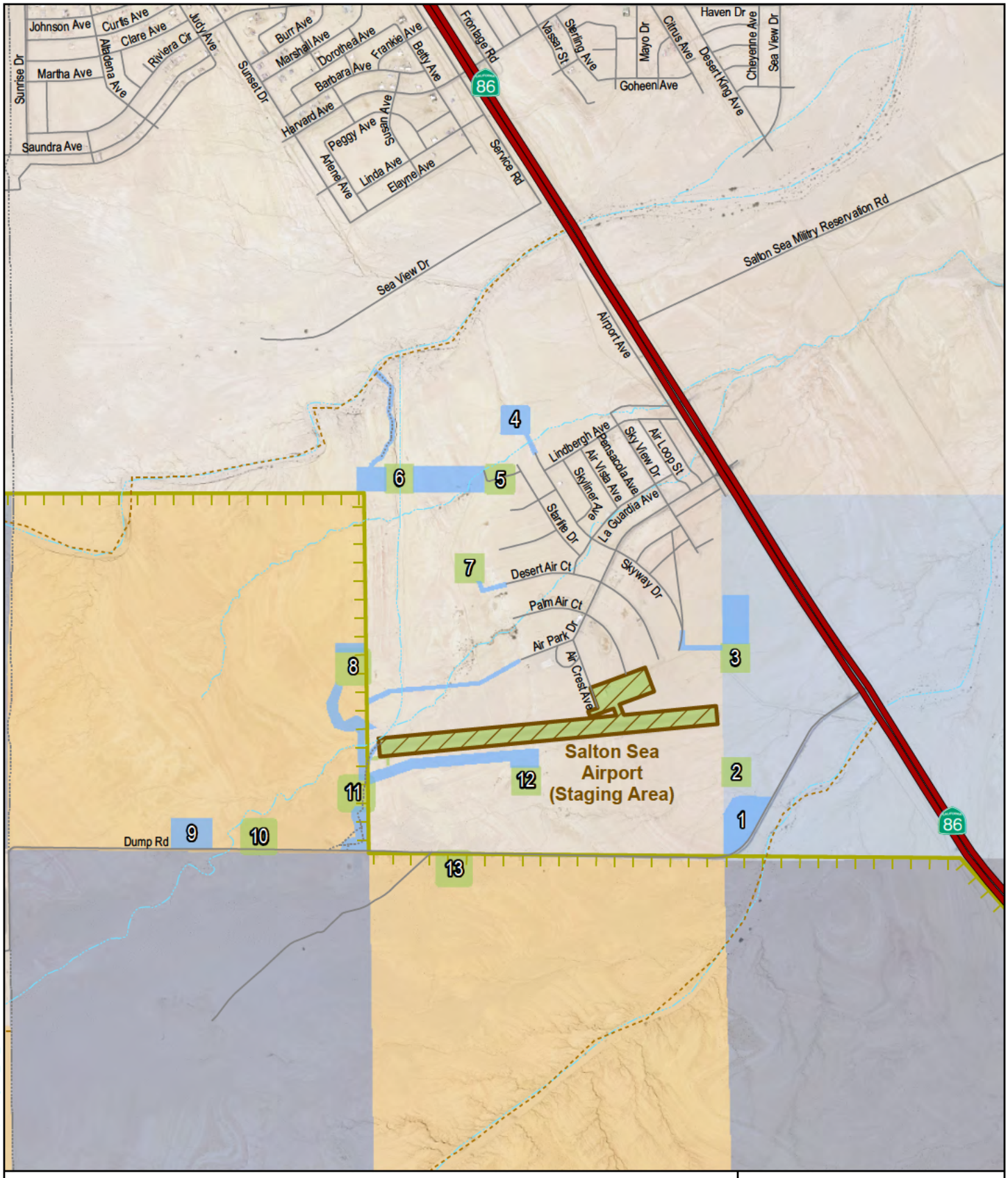

Legend

- 2017 Survey Area
- 2016 Survey Area
- Salton Sea Airport (Staging Area)

Base Data

- State Highway
- Local Road
- Dirt Road
- Trail
- Intermittent Stream, Wash, or Ditch

Jurisdiction

- Bureau of Land Management
- Private
- State Lands: Lands Commission
- State Lands: Parks and Recreation
- Ocotillo Wells SVRA

ORMAT NEVADA, INC. TRUCKHAVEN

Figure 2
Project Jurisdictions

0 250 500 750 1,000

Meters

N

POWER ENGINEERS

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1.3 Regulatory Framework

The archaeological survey for this project is being performed to allow BLM to comply with elements of National Environmental Policy Act (NEPA), Section 106 of the NHPA, and for the County elements of CEQA. According to BLM Handbook 8110 (BLM 2004), field office managers are responsible for ensuring that all cultural properties on public lands in their jurisdiction are appropriately managed. Sections 106 and 110 of the NHPA, and implementing regulations at 36 CFR Part 800, place specific procedural requirements on managers. Managers are required to take into account the effects that a proposed BLM undertaking (action or authorization) would have on significant cultural properties prior to making a decision to approve or authorize the undertaking (pp 23).

1.3.1 National Environmental Policy Act

Federal or federally-assisted projects must take into account effects on historic and cultural resources. NEPA (42 U.S.C. §4321-4346) establishes national policy for the protection and enhancement of the environment. Part of the function of the federal government in protecting the environment is to "preserve important historic, cultural, and natural aspects of our national heritage." NEPA is implemented by the Council on Environmental Quality regulations at 40 CFR Parts 1500 to 1508. Integration of the NEPA process and the Section 106 process early in the environmental analysis is encouraged.

This project is a federal undertaking regulated by BLM; therefore, BLM is the lead federal agency for NEPA compliance. A definition of "effects" to cultural resources requires that NEPA compliance document must address historic and cultural resources. (40 CFR Part 1508.8) Per 40 CFR Part 1508.8, any adverse and beneficial effects must also be addressed in NEPA documents.

The "affected environment" section of a NEPA document should provide background information on the prehistory and history of the area, and describe known historic and cultural resources that may be affected by the project (40 CFR Part 1502.15). Lastly, the "environmental consequences" section of a NEPA document must address effects to historic or cultural resources that could result from the proposed action and each alternative (40 CFR Part 1502.16(f)).

1.3.2 National Historic Preservation Act

The NHPA, as amended (16 U.S.C. §470f), is the principal federal law in the United States protecting cultural resources. Section 106 of the NHPA directs all federal agencies to take into account the effects of their undertakings (i.e., actions, financial support, and authorizations) on cultural resources that have been included in or eligible for the NRHP. Such resources are known as historic properties by federal agencies and may include any prehistoric or historic district, site, or building structure. Section 106 of the NHPA is the key portion of the Act, and it directs all federal agencies to take into consideration the effects of their actions on historic properties.

The ACHP regulations at 36 CFR Part 800 implement Section 106. These regulations establish the NRHP as a planning tool to help federal agencies evaluate cultural resources in consultation with the SHPO and the ACHP. The criteria for determining whether cultural resources are eligible for listing in the NRHP are provided in 36 CFR Part 60.4. Eligible sites are those that:

a) are associated with events that have made a significant contribution to the broad patterns of history;

b) are associated with the lives of persons significant in the past;

c) embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction; or

d) have yielded, or may be likely to yield, information important in prehistory or history.

A cultural resource that has been or is eligible for listing on the NRHP is deemed a *historic property* regardless of the time period to which it dates. To be listed in or determined eligible for the NRHP the cultural resource must meet one or more of the above criteria and possess integrity. Integrity is defined as the authenticity of a resource's historic identity as evidenced by the survival of physical characteristics that existed during the prehistoric or historic period of use. The NRHP recognizes seven aspects of integrity: location, design, setting, materials, workmanship, feeling, and association. Integrity of location means that the resource has not been moved from its historic location. Integrity of design, materials, and workmanship mean that the resource's original building materials, plan, shape, and design elements remain intact. Integrity of setting means that the surrounding landscape has changed very little since the period of importance for the resource. Integrity of feeling and association means the resource retains a link to an earlier time and place and is able to evoke that era.

Historic properties must generally be at least 50 years old; however, certain cultural resources associated with more recent, exceptionally important events (e.g., the development of nuclear energy; space exploration) may also be considered eligible for listing in the NRHP.

Compliance with Section 106 is required whenever a project has a federal nexus, meaning that the project is on federal land, uses federal funds, or is permitted by a federal agency. The project constitutes an undertaking as defined in 36 CFR Part 800.16(y) and requires implementing the Section 106 process as part of environmental compliance performance.

1.3.3 Desert Renewable Energy Conservation Plan

The Desert Renewable Energy Conservation Plan (DRECP), a major component of California's renewable energy planning efforts, will help provide effective protection and conservation of desert ecosystems while allowing for the appropriate development of renewable energy projects.

The DRECP is focused on 22.5 million acres in the desert regions and adjacent lands of seven California counties – Imperial, Inyo, Kern, Los Angeles, Riverside, San Bernardino, and San Diego. The DRECP is a landscape-level plan that streamlines renewable energy development while conserving unique and valuable desert ecosystems and providing outdoor recreation opportunities. The DRECP is a collaborative effort between the California Energy Commission, California Department of Fish and Wildlife, the BLM, and the United States Fish and Wildlife Service.

The BLM signed the Record of Decision approving its Land Use Plan Amendment on September 14, 2016, completing Phase I of DRECP requirements. The BLM Plan Amendment covers the 10 million acres of BLM-managed lands in the DRECP plan area and supports the overall renewable energy and conservation goals of the DRECP.

1.3.4 California Environmental Quality Act

The County will comply with the cultural resource requirements of CEQA (Sections 21000-21177 California Public Resources Code [PRC]) and CEQA Guidelines (14 California Code of Regulations Section 15000 et seq.).

Under CEQA, the County not only has an obligation to determine whether a project would have significant impacts on historical resources, archaeological resources, or human remains, but also to "identify potentially feasible measures to mitigate significant adverse changes in the significance" of

these resources, and to "ensure that any adopted measures to mitigate or avoid significant adverse changes are fully enforceable through permit conditions, agreements, or other measures (California Code of Regulations Section 15064.5)." Specifically, CEQA asks would the project:

- Cause a substantial adverse change in the significance of a historical resource as defined in California Code of Regulations Section 15064.5?
- Cause a substantial adverse change in the significance of an archaeological resource as defined in California Code of Regulations Section 15064.5?
- Disturb any human remains, including those interred outside of formal cemeteries?

California Department of Parks and Recreation General Plan

In April 1982, Parks published a General Plan specific to the Ocotillo Wells SVRA (Parks 1981) and an Environmental Impact Report (EIR) written in support of the acquisition of the SVRA. The General Plan closed portions of the SVRA to off-road use, including lands located south of Dump Road and east of Power Line Road. Mitigation Measure #4 in the General Plan states the following:

> 4. Areas of high natural and cultural resource value will be preserved as noted in the plan and will be patrolled by staff (Some less noticeable resource values may be better protected by not having special attention drawn to them, especially in lightly used areas.)

Imperial County General Plan

The Open Space Element of the Imperial County (County) General Plan presents numerous pieces of evidence related to that part of the County west of the Salton Sea. Goals of the Plan included the following:

Goal 3. Preserve the spiritual and cultural heritage of the diverse communities of Imperial County.

> Objective 3.1: Protect and preserve sites of archaeological ecological, historical and scientific value, and/or cultural significance.
>
> Objective 3.2: Develop management strategies to preserve the memory of important historic periods, including Spanish, Mexican, and early American elements of Imperial County.
>
> Objective 3.3: Engage all local Native American Tribes in the protection of tribal cultural resources, including prehistoric trails and burial sites.

The Open Space Element was updated by the County in March 2016 and approved by County Commissioners. The new Element contains the following policy and programs associated with Cultural Resource Conservation:

> Policy: Identify and document significant historic and prehistoric resources, and provide for the preservation of representative and worthy examples; and recognize the value of historic and prehistoric resources, and assess current and proposed land uses for impacts upon these resources.
>
> Programs:
>
> - The County will use the CEQA process to conserve cultural resources and conform to Senate Bill 18 "Consultation with Tribal Governments" and Assembly Bill 52 "Consultation with Tribal Governments." Public awareness of cultural heritage will be stressed. All information and artifacts recovered in this process will be stored in an appropriate institution and made available for public exhibit and scientific review.

- Encourage the use of open space easements in the conservation of high value cultural resources.
- Consider measures which would provide incentives to report archeological discoveries immediately to the Imperial Valley Desert Museum.
- Coordinate with appropriate federal, State, local and Tribal agencies to provide regular updates to the County "Sensitivity Map for Cultural Resources."
- Discourage vandalism of cultural resources and excavation by persons other than qualified archaeologists. The County shall study the feasibility of implementing policies and enacting ordinances toward the protection of cultural resources such as can be found in California Penal Code, Title 14, Point 1, Section 622-1/2. The County should maintain confidentiality of specific resource locations to prevent vandalism and desecration of sensitive cultural resources.

Lastly, Appendix F of the General Plan EIR provides the County's Mitigation Monitoring Program. For the purpose of complying with CEQA, the County has issued the following requirements that apply to this project:

MM 6. Require the preparation of a cultural resource study by a qualified archaeologist for any for any project proposed in an area identified as very, moderately, or lightly sensitive.

- The planning department must monitor the reporting process.
- The report must be generated and approved prior to approval of the development project.
- The report must be submitted to the Planning Department.

2.0 ENVIRONMENTAL SETTING

The Salton Sea is located several miles west of the archaeological survey area, and was created in 1905-6 after irrigation canals were breached during spring floods on the Colorado River. Salinity rapidly increased just after the freshwater inflows were cut off. Today, die-offs of fish due to high salinity levels are common (Marti-Cardona et al. 2008) and often occur when high winds stir deep oxygen-deprived lake waters to the surface. The depression in which the Salton Sea is located lies some 230+ feet below sea level (bsl).

Landscapes surrounding the Salton Sea are extremely hot, dry and are subject to incessant wind. Vegetation in areas not affected by agriculture consists of low woody plants adapted to extreme temperatures and lack of rainfall (Barbour et al. 2007). There are numerous examples of mesquite bushes in the project area with extensive root systems that have captured sand and created hummocks up to two meters high. In those years after abundant winter rains, annual and perennial spring flowers are plentiful.

The survey area is cut by a series of washes, some of which are extremely narrow and deep, such that crossing them is very difficult. Much of the area is used by off-road enthusiasts but portions of the survey area have been closed off to vehicles. Bedrock outcrops and slabs are common: some of this material has been procured by prehistoric peoples to make cairns and rock-slab hearths. Numerous cobble foundations of weirs (fish-traps) can be observed: their placements likely define the approximate shoreline of Lake Cahuilla in the prehistoric past.

2.1 Geo-Cultural Background of the Salton Sink

The Coachella Valley and the Salton Basin, from North Palms Springs to the Mexican border, was pristine when the first American surveyors rode through the region. The 1853 journal by the geologist W.P. Blake (Blake 1853 and 1854; Williamson et al. 1856), who served with Lieutenant John Parke and John Pope during work on the southernmost Pacific Railroad Survey (1854-1855), provides an accurate historical view of the region with a careful examination (for the period) of Cahuilla peoples. Parke and Pope reached Cahuilla territory in the Coachella Valley, turned south toward Mexico, then headed west to San Diego with few water stops noted between. Blake understood from local informants and visible geology that a large lake once existed in the Salton Sink, but had no idea how it formed or when it was last filled.

The Salton Sink was formed by the continued effects of the San Andreas Fault, which represents the region's primary complex rift zone between the Pacific and North American tectonic plates. Prior to approximately 12 million years ago, most of southern California was covered with a shallow sea, and the mountains lining both sides of the rift zone had not yet begun to rise. As the Pacific Plate moved northwestward causing parts of the Farallon Plate to disintegrate, the East Pacific Rise was created and the tip of Baja California began to split off from Mexico (Alles 2011). Crust on the Pacific and North American plates were forced against one another forming numerous small volcanoes, mountains, and valleys as the rising blocks of land buckled under immense pressure. The Salton Sink, technically a "graben" (Frisch et al. 2010), represents an area currently under severe tectonic strain. Because the center of the sink lays approximately 277 feet bsl and the Colorado River sediments that have filled it to that point reach at least 13,000 feet bsl, this is a place where water can accumulate and sink to bedrock. The extreme depth of tectonically-heated ground water and has created a potent geothermal source that has been tapped by many other geothermal plants in the Imperial Valley.

The floor of the sink is currently hidden by the Salton Sea. Annual sediment load in the Lower Colorado, prior to construction of dams upstream in the 1950s (Topping et al. 2000), delivered up to 83 million metric tons of sediment into the Gulf of California per year, as calculated at Yuma. If such

rates were to continue backward into the prehistoric millennia as southern California moved along the rift zone, Colorado River sediments might be expected to have rested at Palm Springs and Thousand Palms prior to the beginning of the Pliocene or approximately 5.5 million years ago (Barker 1995) with the Gulf of California likely located just to the south, and a much longer Baja California Peninsula. Over the next few million years, the Colorado River mouth grew more distant from the upper Coachella Valley due to northwestward tectonic movement of the Pacific Plate and yearly deltaic sedimentation, but not distant enough to prevent the occasional infill of water into the Salton Sink during the Colorado River's flood season.

At least by the middle Pleistocene, when the Colorado River's flow was directed for a long enough time southwest and then to the north near the region known as the Myoma Dunes, the entire trough would fill with water, forming what is now known as Lake Cahuilla or possibly a seawater extension as the Colorado's flow was blocked off by deltaic dams. If the flow of the river continued unabated into the sink, the water would spill out to the southwest and into the Gulf of California near Cerro Prieto, Mexico via a path now called the Rio Hardy. This would occur during the late Pleistocene only after reaching a potential high stand of +/-12 meters (approximately 42 feet) above sea level (Wilke 1978). At the high-water mark, lagoons would have connected Lake Cahuilla with the Gulf of California (Norris and Norris 1961).

Waters (1993) has calculated that if the Colorado River delivered all of its runoff into the sink, roughly 18 years of infill would be needed to fill it to 42 feet above sea level, and Norris and Norris (1961) indicate that at least half the Colorado's yearly flows would be necessary to keep the lake at the 42-foot high stand continuously to replenish that lost to evaporation. At the 42-foot-high water stage, the Lake would have had lowered mineral levels. Fresh water fish, bivalve and crustacean species would survive, but when the lower Colorado River changed its position in its delta and flow was cut off from delivery to Lake Cahuilla, the lake would slowly revert to saline brine in a few decades and as it evaporated all of the native species would become extinct.

An area known as Bermuda Dunes located east of the city of La Quinta represents the most northern reach of Lake Cahuilla that can be well demonstrated today (ibid). The "bathtub" ring of travertine first recorded by Blake in 1853 a few miles north of Salton City may signify the last long high stand of Lake Cahuilla. Wilke's 1978 review indicates that the Colorado delta likely formed a natural dam across the lower reaches of Lake Cahuilla, but that dam was not noticed by the earliest Spanish explorers (in the 1500s), nor was Lake Cahuilla itself. The dam was composed entirely of sand and silt and may have been swampy ground occasionally replenished by Colorado River flooding before agriculture began to drain the water table in the late 1800s. The sand and silt dam probably reached a maximum height above sea level to match the "bathtub ring" of travertine, which is approximately 12 meters above sea level (+/- 42 feet).

Another much smaller dry basin, known as Laguna Macuata, is located southwest of Lake Cahuilla, lying approximately 10 feet below sea level, and was flooded both during extreme high tides, heavy rainstorms, and possibly during extreme Colorado River flooding (Laylander et al. 2016). Laylander reports that this lake was first observed by members of the Juan de Oñate exploration of 1604-1605. Other explorers viewed the Laguna Macuata and noted fish bones of salt water species by the score on its banks. The existence of several large low-lying basins suggest that the lower Colorado was an extremely complex place geographically and would have been the site of numerous lakes, tidal pools, estuaries, and swamps within a scorching desert for many millennia.

During POWER 2016 fieldwork associated with the vibroseis pathways, the ancient lake bottom sediments were observed in all the cutbanks found in the larger washes. These slices of sediment are like a layer cake, each representing infilling and desertification during the last several hundred

thousand years. Once the Colorado River infills were cut off, a minimum of roughly 56 years would be needed before Lake Cahuilla evaporated completely (Laylander 2006; Schaefer and Laylander 2007), and fluvial deposits would begin to cover lake bottom sediments. Various types of geological, vegetative and cultural clues would be needed to determine when and at what altitude the various high stands and low stands could be expressed in the geological and archaeological records. Variations in high tide through time surrounding Lake Cahuilla can be expressed by travertine deposits and the locations of archaeological sites bearing lake edge features. The project (Figure 4) is located between -38 meters bsl (-125 feet) and approximately -15 meters bsl (-50 feet). A prehistoric site (CN-20) located in the southwestern part of the project area exhibits three hook-shaped cobble alignments suggestive of prehistoric weirs or "fish-traps." The existence of this feature suggests that at least part of the project is located on an ancient Lake Cahuilla shoreline of recent age.

The last diversion of Colorado River water into the Salton Basin was man-made. In 1905, spring flooding breached temporary irrigation canal control gates that directed water for irrigation into the lower Coachella Valley, and sent the entire flow of the Lower Colorado into the sink forming the Salton Sea. Engineers were not able to stop the flow until early 1907 and, according to MacDougal et al. (1914), caused the maximum depth of the new lake to reach roughly 80 feet. At that point the shores of the Salton Sea would rest at approximately 60 meters (197 feet) bsl. This height lies many meters below the lowest point of this project.

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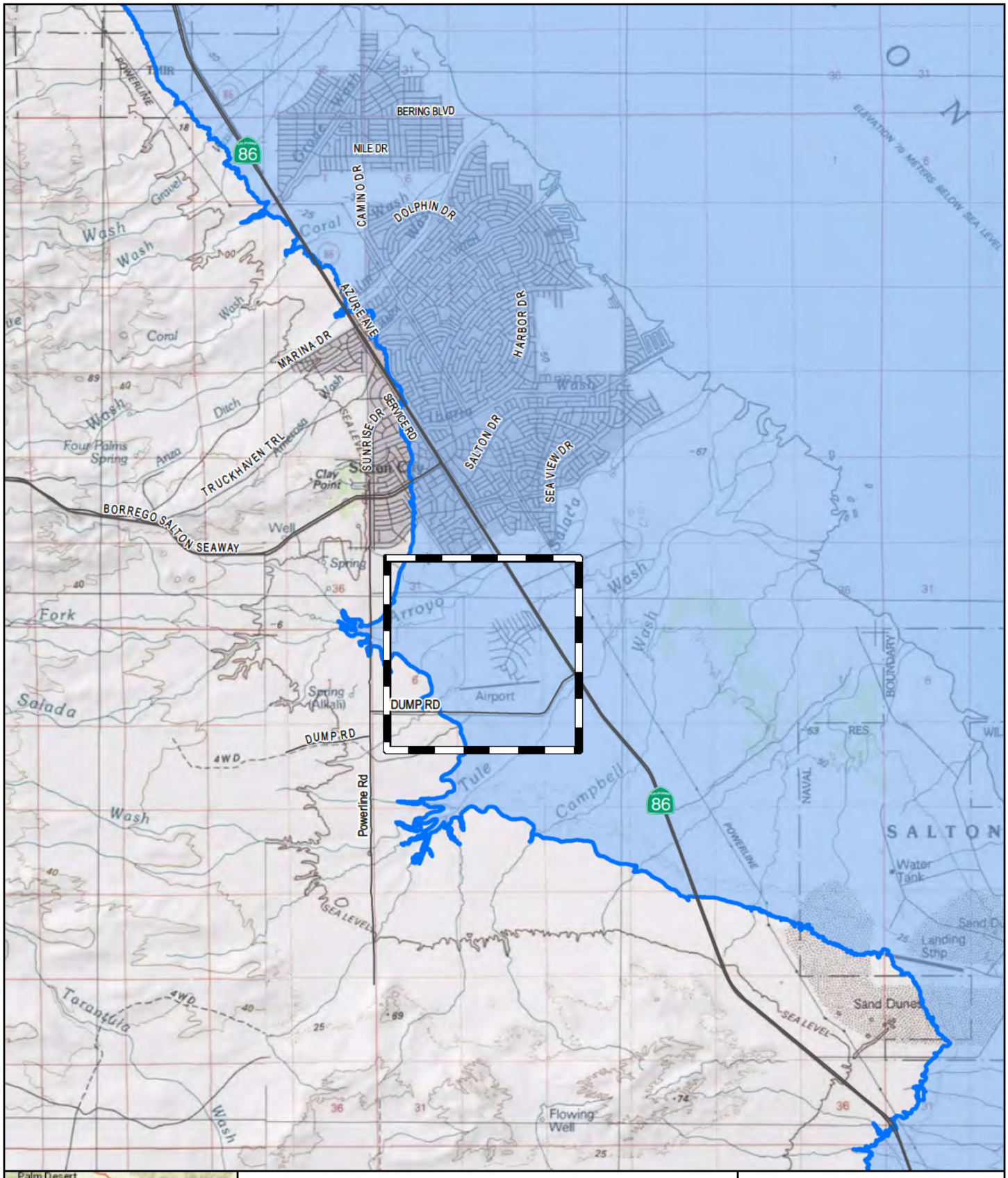

Legend

- General Survey Area
- Highway or Main Road
- 60 feet below Sea Level Contour
- Prehistoric Lake Cahuilla

Salton Sea and Borrego Valley, CA
USGS 100K Topographic Maps

Credits: ESRI Street Map

ORMAT NEVADA, INC. TRUCKHAVEN

Figure 4
Prehistoric Lake Cahuilla

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Miles

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POWER ENGINEERS

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3.0 CULTURAL SETTING

Historic contexts are defined as "those patterns or trends in history by which a specific occurrence, property, or site is understood and its meaning and significance is made clear" (NPS 1990). A context may be organized by a theme, geographic area, or chronology. Typically, a historic context is associated with a defined area and an identified period of significance, and the context should be linked to the evaluated resource through the concept of property types. In this way, the contextual statement provides a framework for the evaluation of the significance of any cultural resource in a project and ultimately the potential for effects to historic properties that could take place as a result of an undertaking.

3.1 Ethnographic Background

Cahuilla historical traditions, first discussed by Blake in the 1850s, told of an ancient lake that filled the valley but then disappeared little by little. Given the geology Blake witnessed while travelling through the central and southern portions of the Coachella Valley, it was hard for him to disagree with this tradition. The region is home to two distinct tribal groups: the Cahuilla, who once lived in the areas north of the project, and Ipai-Tipai (Kumeyaay) groups to the south. The nearest Desert Cahuilla are represented by the Torres Martinez Desert Cahuilla Indians, while Ipai-Tipai groups are represented by 12 Kumeyaay tribes in San Diego County: Barona, Campo, Ewiaapaayp, Inaja, Jamul, Los Posta, Manzanita, Mesa Grande, San Pasqual, Iipay Nation of Santa Ysabel, Sycuan and Viejas. Although the La Posta Band reservation lies closest to the project area, none of the San Diego tribes holds land in Imperial County. The Native American Heritage Commission named a member of the Kwaaymii (an Ipai village), Carmen Lucas, as the Most Likely Descendant during the fieldwork. It is likely that the Lake Cahuilla shoreline was utilized by all tribal members in this area during the prehistoric period, only to be slowly abandoned when Colorado River flows into Lake Cahuilla stopped and the Lake desiccated completely.

Although the coast of Alta California was first explored by the Spanish in the mid-1500s and lightly exploited for the next 250 years (Cutter and Engstrand 1998), the Lower Colorado and Gulf of California was visited in 1539 by Francisco de Ulloa (Forbes 1965). Realizing the potential for conquest, in 1540 Hernando de Alarcón sent two boats several miles up the Colorado and saw local natives for the first time (ibid). Land-based explorations north from Sonora were also undertaken in the 1540s, first to Zuni and then to Yuma. But these forays stopped once the Spanish realized that the natives bore no gold and were often hostile, so the Spanish concentrated on developing mining interests in northern Mexico. In the early 1600s, Juan de Oñate explored the Gila and Colorado rivers via overland routes, encountering large populations and agricultural development. More than 160 years passed before the coastal regions of California were colonized under the Mission system (Castillo in Heizer 1978) mainly because the Spanish saw California as a very poor and distant outpost while the rest of the empire was troubled. As the coastal regions of Alta and Baja California began to be developed by Franciscan and Jesuit Missionaries in the 1760-1820 period, overland routes to the Colorado were developed for trade purposes: many of the trails utilized were created by prehistoric traders. Finally, upon declaration by Mexico as a sovereign state in 1831, the Mexican government could only claim control over a narrow strip of coastal territory (ibid) for a few decades before Americans and the development of more reliable overland trade routes could effectively colonize the region. Although treated with disdain by the Spanish (see Forbes 1965), the 1800's Mexican and American governments treated most California native groups harshly, killing many in battles, subjecting them to disease, and conscripting many into servitude on cattle ranches (ranchos).

3.1.1 Cahuilla

The project area is located in the far southeastern range of an area that may have been used by the Cahuilla during prehistoric times (Bean 1978). Their spoken language is of the Takic-Cupan branch (Shoshonean) of the Uto-Aztecan language family. Prior to the incursion of Europeans, the tribe lived in three topographically and linguistically distinct sections of their ancestral homeland (Kroeber 1925). The Santa Rosa-San Jacinto Mountains and the Coachella Valley formed the eastern part of the homeland, and as a result the tribe lived in the drier and relatively remote sections of inland southern California many miles from missions or outposts (Bean 1972) until the early 1800s. This fact allowed many aboriginal Cahuilla to survive well into the mid-nineteenth century with little effective white exploitation. By approximately 1850, pressure from American settlers and the development of important transportation routes had forced many from their ancestral lands and onto marginal areas still bearing little European presence (Doody and Meltzer 2012). At about that time, 17 Rancherias were known in the Coachella Valley, and the eastern branch of the tribe (aka Desert Cahuilla) had adapted a successful desert lifestyle. Due to the occasional explorer and cattle ranching in the mountains, visits by Europeans were not unknown to them.

The diverse habitats where the three geographic divisions of the Cahuilla lived provided a tremendous variety of plant and animal foodstuffs. Various basket and pottery forms were used to process and cook plant foods. Stone-lined pit ovens were used to cook root crops, granaries were built for acorn or mesquite bean storage, and seeds were stored in ollas. The Rancheria system allowed permanent structures to develop and be managed year after year, and also prevented the loss of a pre-existing clan-based social system.

Lake Cahuilla allowed tribal members to exploit fish, shellfish, and birds until lacustrine changes in the Colorado Delta cut off the supply of fresh water to the Salton Basin. After a desiccation period, the lake would become too salty to support fresh-water species and the tribes would be forced to return to a more desert-oriented lifestyle or migrate. Schaefer and Laylander (2007: 247-257) cite archaeological evidence dating to the Late Prehistoric Period for domesticated agriculture (e.g., corn, beans, squash, melons) that matched the “Patayan” lifestyle origination source. This proximity to diverse habitats and the agriculture gave the Cahuilla a unique world view and adaptability unmatched in the Late Prehistoric Period.

3.1.2 Kumeyaay

The Kumeyaay, also known as Tipai-Ipai (formerly Kamia or Diegueño), have been defined by three separate languages: Ipai (Northern Kumeyaay), Kumeyaay (including the Kamia/Kwaaymii), and Tipai (Southern Kumeyaay) of northern Baja California. All three languages belong to the Delta–California branch of the Yuman language family, to which several other linguistically distinct but related groups may also belong, including the Cocopah (Kwapa, or Xawiłł kwñchawaay) and Quechan (Kwatsáan). There is some controversy regarding these divisions as most of the original speakers have been lost.

Gifford (1931) examined the Desert Tipai (Kamia), who according to Schaefer (2006), are the only Tipai group with a substantial oral tradition regarding Lake Cahuilla. Kroeber (1925) places the Kamia in the far southeastern corner of the state, with Mexico to the south and neighboring Yuman-speaking groups to the east along the Colorado River. Formerly known as the Western Diegueño or Kumeyaay, Tipai groups were centered at the south end of Lake Cahuilla and lived within the extreme desert between that point and the main artery of the Colorado.

Kumeyaay lifeways closely resembled Yuman groups with their wetlands adaptations, devotion to agriculture and structure design. At least 11 rancherias were known in the 1850s (Schaefer 2006) but

permanent villages were not known due to the distinct possibility that lower Colorado flooding could destroy all they had built. While annual flooding replenished the Alamo and New River sloughs, drought could just as easily wipe it all away. Unlike the Desert Cahuilla with their ability to remain isolated in rough mountainous regions, the Kumeyaay were frequently exposed to European contact. Many had succumbed to European diseases, died in violence with Mexican settlers, or had been displaced or starved by drought before ethnographers could fully document their existence. A lifestyle at this location was precarious.

The Kumeyaay built small communities, subsisted on wild plants and crops, and supplemented their diet with fish caught in the sloughs. Origin myths state that they emerged near Needles, California, along the Colorado River. Along with the rest of the lower Colorado tribes, they were forced to the south by the expansion of the Mojave. Recognition that the Colorado delta would be an agricultural bonanza hastened assimilation of local natives by California and Mexican governments in the mid-1800s into a single rancheria possibly located on the Alamo River near the Mexican border.

Peoples of the Southwest and California used traditional methods to capture fish in fresh water lake environments. The concept of the prehistoric “fish trap” or weir has been discussed for decades (Treganza 1945), and the subject was recently explored by White and Roth (2011). These authors believe that the V- and J-shaped structures found in many places along the western side of the Salton Basin (as described by von Werlhof 1996; Wilke 1978 and 1980; Wilke and Lawton 1975) may have been constructed to capture certain species of fish. Here, a weir underpinned by single or multiple courses of stones could be quickly constructed to support nets or fences with a shallow basin dug behind the rocks to hold water. These would be placed on the lakefront to capture fish swimming in the extreme shallows. The opening of the weir would face the deeper parts of the Lake and allow fish to enter either through coercion or force. Fish could have been driven into the weir (razorback suckers are docile when handled), or the structure may have been designed and built to take advantage of the fact that certain species (specifically the razorback sucker and the bonytail chub) used gravel covered lakefronts to spawn. The trap behind the opening could have held bait for the entering fish to consume. These fish otherwise reside in the deeper waters of the lake where they would have to be captured in a boat with hook and line, which are tools difficult to observe in the archaeological record. A weir constructed from cobbles along the edge of Lake Cahuilla would be a high gain tool designed to capture food with little continuous effort or maintenance. If preservation was good, such features could leave evidence behind for archaeologists to find even if the high water mark of the Lake changed through time. Similar structures were documented during archaeological work at the Salton Sea Test Base (Rose and Bowden-Renna 1998). Crucial to weir use would be the reliability of the lake shore, periodic maintenance and extraction of food, and low salinity.

3.2 Models of Local Prehistory

Models designed to compare and contrast the prehistory of the region have focused upon data derived from excavated sites located in the Coachella Valley and the Salton Basin, with inferences about the prehistoric past derived from field surveys with no chronological controls. Of those excavated sites bearing hard dates, sites located near the Lake Cahuilla shoreline have dated to the Late Prehistoric only. Scant attention has been given to earlier periods in this part of California due to the lack of hard radiocarbon dates taken from excavated sites beyond Lake Cahuilla itself. As discussed by Schaefer (2006), the following prehistoric phases or Periods stretching back to approximately 12,000 years ago are reviewed here: 1) Early Man or the Malpais; 2) Paleoindian or the San Dieguito Period; 3) Archaic or the Pinto and Amargosa period; 4) Late Prehistoric or Patayan Period; and 5) Ethnohistoric Tipai and Cahuilla Period (for the Ethnohistoric era see Section 3.1 above).

3.2.1 Early Man – Malpais Period (+/- 12,000 + YBP)

Originally conceived by Rogers (1939 and 1966) and applied to the existence of cleared circles and rock alignments found in the Colorado Desert using the original term San Dieguito I, the term was assigned to choppers and scrapers found in the desert with a heavy patina of desert varnish that was assumed to predate the Paleoindian Period. Rogers believed that the Malpais dates from 12,000 years before present (YBP) and perhaps earlier. Resources bearing such dates have been not found in the region causing this period, unlike other places in California and Arizona, to be not useful for model building.

3.2.2 Paleoindian – San Dieguito Period (+/- 7,000 to 12,000 YBP)

Archaeological materials found on survey bearing an early but more "advanced" appearance were assigned to all three San Dieguito phases of this Period, but the early model devised by Rogers (1939) remains untested. The period, which is believed to have existed before the specialized use of milling stones by California tribes, is characterized by a toolkit exclusively designed to capture and process small and large game. Later seed grinding technologies appear to have developed during the early Archaic Period. A "Late" San Dieguito Phase III adaptation is suggested at coastal sites to 8,000+ YBP and several of these coastal sites bear hard dates. The early San Dieguito culture (Phases I and II) has been assigned to heavily varnished choppers and scrapers found on the desert floor. Sites lacking projectile points and milling stones have been assigned to these early phases.

3.2.3 Archaic – Pinto, Amargosa Period (+/-1,500 to 7,000 YBP)

Assigned to sites in the Great Basin, the Mojave Desert and Arizona's Sonoran Desert that bear Pinto style projectile points and Elko style dart points, the Archaic Period appears reliable because many such points have been excavated from datable archaeological contexts. Schaefer (2006) suggests that a limited picture of Archaic prehistoric lifestyle is slowly emerging after decades of archaeological work in this area. Assuming that sedimentation in Lake Cahuilla would serve to bury the deposits of early sites, nearby excavations in watered canyons paint a view that the Archaic period was characterized by mobile bands of hunters and seed gatherers with a lifestyle that had probably been mitigated by the sporadic appearance of Lake Cahuilla. Spear and dart points were used, along with atlatls. A few burials are known for this period.

3.2.4 Late Prehistoric – Patayan Period (European contact to 1,500 YBP)

Common in the local archaeological record, Late Prehistoric sites have been divided into several phases, with ceramics and horticulture introduced approximately 975 YBP. At least five infillings of Lake Cahuilla are known during this Period, with the next to last during the Patayan II phase (525 to 975 YBP) and a final infilling between approximately 400 and 300 YBP. Many of the ethnographic and lifestyle characteristics perceived in the archaeological record appear to have been derived from the influence of Yuman-speaking groups located to the east in the Sonora Desert of Arizona and Mexico. Known as Patayan, the concept involves assuming a technological flow of ideas from the east including pottery making, even though the Cahuilla speak an entirely different language, such that survival traits of the Sonoran peoples could be successfully adapted by the Cahuilla, whose language is derived from Shoshonean (Uto-Aztecan) stock. Many Cahuilla survival traits and their own ethnohistoric history suggest a direct link between themselves and the prehistoric peoples observed in sites dated to the latter parts of this Period.

3.3 Historic-era Background

As noted in Section 3.1, there appears to be very limited, if any, use of lands in and near the project area during the Spanish and Mexican historic periods. It is likely that many of the local native groups

knew of and were met by Europeans between 1540 and 1770, but upon establishment of southern California coastal Missions, visits and raiding became more common. An unusual story regarding Lake Cahuilla (Chalfant 1947) suggests that in 1615, Spanish explorer Juan de Iturbe sailed a shallow-drafted caravel up the Gulf of California in search of pearls. A high tide carried the ship across a strait into Lake Cahuilla. After exploring the lake for several days, Iturbe found himself unable to sail out again, whereupon he beached the craft and made his way back to the nearest Spanish settlement on foot, leaving behind a fortune in pearls.

Prior to the accidental creation of the Salton Sea (1905-1906), the Salton Basin and region underwent a relatively detailed exploration by American transcontinental railroad surveyors (Williamson 1856). The extreme heat and dryness prevented most cattle grazing operations, but salt mining did occur on the bed of the Salton Basin prior to inundation both by local tribes and miners. After the Salton Sea was formed, entrepreneurs developed marinas on the edge of the lake. These became successful after the Salton Sea, which began to slowly dry up after 1907, stabilized due to development of irrigation and large agribusinesses at the north and south ends of the Salton Basin.

The road following the route of what is now State Route 86 was first built in 1912 and improvements were made in 1916 (Mealey et al. 2012). During World War II, the area was used for practice sorties with the Salton Sea Test Base as the headquarters, and many sorties were flown over the Salton City area. One of the debris fields recorded in the Truckhaven region area is known as the “Winona I” site (P13-13675).

Roads built to access the interior of the 3D Study area from State Route 86 were constructed during the historic period. One leads to a long abandoned homestead south of Dump Road and east of Pole Line Road, while others may have been developed when the area was used to access Salton Sea Test Base targets. A few geothermal wells have been drilled in the area, and Schaefer (2006) notes that petroleum exploratory wells have been drilled in several places in the TGLA. None were successful at tapping oil or gas reserves.

Between 1958 and the late 1960s, a major attempt was made to turn the Salton Sea marina area on State Route 86 into the primary vacation housing development in north Imperial County (Time 1959). Per the Los Angeles Times (Streitfeld 2007), the infamous California developer M. Penn Phillips, with the Holly Sugar Corporation, conceived and developed Salton City in 1957-1958.With County approval, Phillips plotted out and then graded lots and streets (paving some of the streets). By the mid-1970s, it was clear that the development was a failure (among many in California, the victim of an economic downturn and inflation in the early 1970s) and the existing landowners attempted to sue Phillips for damages in 1977. Little improvement, save for the occasional sale of a lot, has occurred since that time.

After World War II, the United States military began selling off its jeeps to the public for very low prices, prompting a surge in off-road recreation in Ocotillo Wells and Truckhaven. Due to its ever-increasing popularity statewide, California State Parks created an Off-Highway Vehicle Division in 1971, and the Ocotillo Wells SVRA was established in 1979 (Parks 2011-12). The Ocotillo Wells SVRA covers 40,000 acres of land with the most northern sections of the SVRA extending to points northwest of Salton City. Operated by Parks, Off-Highway Motor Vehicle Rrecreation Division, for the enjoyment of off-road motoring enthusiasts, sections of land near the project (Sections 6, 7, 8, 9 T11S R10E) are jointly managed by Parks and the BLM, which controls all subsurface mineral rights.

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4.0 METHODS

4.1 Records Search

Archaeological staff at the Southern Coastal Information Center (SCIC) at San Diego State University performed the cultural resource records search for the entire Truckhaven project and delivered the results of the search to POWER in December of 2015. POWER requested additional information from the SCIC in January of 2016 and again in May of 2016. SCIC staff reviewed historic maps, historic aerial photographs and copied all official forms and records associated with cultural resources within and located up to 0.5-mile of all sides of the original Truckhaven survey block (POWER 2016).

The full SCIC record search crosses four 1:24,000 scale (7.5-minute) topographic maps, including (clockwise) *Truckhaven, California* (1998), *Kane Spring NW, California* (1995), *Shell Reef, California* (1991), and *Seventeen Palms, California* (1991). Many of the earliest recorded cultural resource sites in the SCIC database were originally plotted on 15' topographic maps, then transferred to 7.5' maps when those became available through the United States Geological Survey (USGS). The project records search reproduced in Appendix A is located on the north-central portion of the *Kane Spring NW, California* and the southern edge of the *Truckhaven, California* topographic maps.

An important set of survey data was not reported to the SCIC and therefore was not included in our records search. Tierra Environmental Services undertook an archaeological survey (McGinnis and Murphy 2008) on land within the proposed Salton City Landfill Expansion, which required the preparation of an EIR to fulfill CEQA guidelines (ICF 2011). An additional draft report was written on Phase II (CEQA) testing that had taken place at those sites that could have been destroyed by the proposed landfill enlargement (McGinnis and Murphy 2010), but this was not submitted to the SCIC. When POWER discovered that the Tierra reports had not been submitted to the SCIC, Parks, or the BLM, Mr. Dice requested and received copies of the Tierra reports from the original contractor.

In addition, the BLM's records associated with cultural resources were examined by Mr. Dice at the El Centro Field Office in April 2016. The data stored therein matched the SCIC records search with all BLM records accounted for by the SCIC.

4.2 Fieldwork

In 2016, POWER archaeological staff surveyed proposed well pads and vibroseis drive paths (POWER 2016) that crossed certain pads and roads proposed for use by the Proponent. In 2017, POWER staff surveyed newly proposed well pads, blocks of land surrounding well pads requiring as yet undefined well pad siting adjustments by the Proponent, and well pad access roads. Survey timing of each field season can be seen in Figure 3. In 2017, POWER surveyed adjustments to roads and proposed well pads the Proponent's representative, Scott Kessler, made as he accompanied the crew in the field. For the purpose of reporting, the 2016 survey data, as well as the associated records search applicable to this Wells study has been extracted from POWER 2016 and is included here.

The 2017 survey process followed the archaeological Work Plan BLM had approved in 2016. Non-SVRA lands required a 7.62-meter (25-foot) buffer survey around each proposed well pad and access road. The roads are composed of 25 feet of graded width plus two feet of water control features along each side of the road for a total width of 29 feet. SVRA lands required a 25-meter buffer survey around each proposed well pad and access road, whereas lands outside the SVRA required a 25-foot buffer survey around each proposed well pad and access road. Transects intervals in all cases were 10 meters between each archaeologist.

4.3 Evaluation

Because the project must comply with NEPA, Section 106 of the NHPA, CEQA, and the DRECP Programmatic Agreement, all cultural resources within the APE on federal lands are evaluated for eligibility to the NRHP. To fulfill CEQA Guidelines, resources located on non-federal land are also evaluated for eligibility to the California Register of Historic Resources (CRHR). Eligibility recommendations are based on the results of the surface survey and, for previously recorded sites, information provided on the curated DPR523 inventory forms.

Because prehistoric archaeological resources are extremely important to Native American tribes, and because no testing has been undertaken for this project, all prehistoric sites are considered eligible for the NRHP and the CRHR. Eligibility of historic-era archaeological resources was judged on their field integrity and their ability to meet NRHP and CRHR criteria as discussed below.

4.3.1 National Register of Historic Places Eligibility

The criteria for determining whether cultural resources are eligible for listing in the NRHP are provided in 36 CFR Part 60.4. These criteria are that a site must:

A) Be associated with events that has made a significant contribution to the broad patterns of history;
B) Be associated with the lives of persons significant in the past;
C) Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction; or
D) Have yielded, or may be likely to yield, information important in prehistory or history.

Following the terms of the DRECP Programmatic Agreement, each criterial element must be applied to the cultural resources identified in this report, and the integrity of the resource must be considered during that evaluation.

4.3.2 California Register of Historical Resources Eligibility

The CRHR is the official State list of important cultural resources and includes districts, sites, buildings, structures, and objects that have significance to one or more of the following categories: California history, architecture, archaeology, engineering, and culture. The significance of a cultural resource is evaluated within its historic context. This context can serve as backdrop or framework to allow the CRHR criteria to be applied to specific cultural resources. If a cultural resource (prehistoric age or historic age) is recommended to the CRHR, it becomes a "historical resource."

Four criteria are considered to assess significance. These criteria are written broadly and generally and follow the federal guidelines used to nominate properties to the NRHP. The four criteria of the CRHR are that a resource:

1. Is associated with events or patterns of events that have made a significant contribution to the broad patterns of the history and cultural heritage of California and the United States;
2. Is associated with the lives of persons important to the nation or California's past;
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4. Has yielded, or may be likely to yield, information important to the prehistory or history of the state or the nation.

4.4 Assessment of Effects

4.4.1 Effects under the National Historic Preservation Act

Under Section 106 of the NHPA, adverse effects to a historic property (i.e., a cultural resource eligible for or listed in the NRHP) can include physical demolition, destruction, relocation, or alteration of the property or its immediate surroundings such that the integrity of the property's location, design, setting, materials, workmanship, feeling, or association would be materially impaired or diminished.

Section 106 regulation states that the regulatory definition of "effect," pursuant to 36 CFR Part 800.16 (i) is that the term means "alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register." In practice, a direct effect under Section 106 is that which is a "direct physical disturbance of a historic property." Effects that are immediate but not physical in character, such as visual intrusion, and reasonably foreseeable effects that may occur at some point subsequent to the implementation of the proposed undertaking are referred to as "indirect effects."

Direct effects on historic properties in the project area could result from ground disturbing activities associated with the construction of geothermal exploratory well facilities, such as clearing vegetation, grading roads, blading well pads, delineating staging areas, and drilling wells.

4.4.2 Impacts under the California Environmental Quality Act

Under CEQA, a project is considered to have an impact on the environment if it alters any characteristics of a historical resource that qualify it for inclusion in the CRHR. Furthermore, it is stated in CEQA that the lead agency may require that reasonable efforts be made to permit any or all of these resources to be preserved in place or left in an undisturbed state. CEQA also requires that impacts as defined by PRC 21083.2 must be addressed and mitigated as outlined in PRC 15126.4 and 15331.

CEQA impact significance thresholds include:

- Would the project cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?
- Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?
- Would the project disturb any human remains, including those interred outside of formal cemeteries?

Evaluation for impacts under CEQA guidelines follows the same technical procedures as NEPA and the Section 106 process except with slightly different background concepts.

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5.0 RESULTS

5.1 Results of Records Search

A total of 21 cultural resource studies have been conducted within one mile of the APE. Of these studies, all or part of seven studies occurred within the proposed well pad areas and access roads. Three of the previous surveys identified by the SCIC occurred in the past 10 years, and the rest occurred between 11 and 45 years ago. The earliest studies were associated with the widening of State Route 86, and represent the first modern archaeological studies in this region. Table 1 lists the studies that are in, or are within, one mile of the proposed APE, while Table 2 lists the resources that are near the proposed APE. The sites listed include those detected during the POWER 2016 survey.

TABLE 1 PREVIOUS CULTURAL RESOURCE STUDIES IN APE AND 1.0 MILE FROM APE

REPORT NUMBER	AUTHOR	YEAR	REPORT TITLE (SHORTENED)	COMMENT
IM-00001	Gross, Tim and Edward J. Germeshausen	1973	An Archaeological Survey of Proposed Routes of Freeway 86 from Kane Spring to Interstate Freeway 8	
IM-00190	Rhode, David	1979	Report of An Archaeological Survey of A Proposed Highway Widening Project On Highway 86 Imperial County	
IM-00243	Westec Services, Inc.	1981	Truckhaven Prospect Geothermal Exploratory Wells Draft Environmental Impact Report	Crosses APE
IM-00266	Stuart, Bob	1982	Draft Environmental Impact Report Airport Land Use Plan	Crosses APE
IM-00308	Rosen, Martin	1984	First Addendum Report of an Archaeological Survey on State route 86 in Imperial and Riverside Counties from Campbell Wash (11-imp-86, p.m. 51.87) to Oasis (11-RIV-86, P.M. 3.2)	
IM-00354	Department of Parks and Recreation	1986	Ocotillo Wells East Acquisition Final Environmental Impact Report	
IM-00372	Caltrans	1987	Fourth Addendum - Archaeological survey Report for Units 1, 2, and 3 of the Proposed State Route 86 Expressway	
IM-00429	Gallegos, Dennis and Andrew Pigniolo	1989	Cultural Resource Survey of Eight Geothermal Well sites and access Roads in the Truckhaven Project Area, Imperial County, California	Crosses APE
IM-00441	Ensr Consulting and Engineering	1990	Environmental Assessment/Initial Study for the Placement of Fiber Optic Facilities Between Salton Microwave Station and Calexico California	
IM-00442	Gallegos, Dennis and Andrew Pigniolo	1990	Cultural Resource Survey of Eight Geothermal Well sites and Access Roads in the Truckhaven Project Area, Imperial County, California	Crosses APE
IM-00517	Imperial County Planning Department	1994	West Shores/Salton City Urban Area Plan	Crosses APE

REPORT NUMBER	AUTHOR	YEAR	REPORT TITLE (SHORTENED)	COMMENT
IM-00731	Peak & Associates	1989	Cultural Resource Survey and Clearance - Salton Sea Radio Site to Calexico, Imperial County, California. American Telephone and Telegraph Company's Fiberoptic Communication Cable	
IM-00751	Rosen, Martin	1984	Historic Property Survey Imperial/riverside 86 Expressway	
IM-00806	Eckhardt, William	2002	Cultural Resources Inventory Report - Malin Space Science Systems Temporary Use Permit	
IM-00942	Underwood, Jackson	2003	Archaeological Survey And Monitoring of Truckhaven Geophysical Test Sites Ocotillo Wells State Vehicular Recreation Area, Imperial County, California	
IM-01087	Steidl, Leslie	2006	Archaeological Survey Report - Ow-Layman Geo Thermal Drilling	
IM-01115	Hines, Philip	1999	Proposed Survey Design For Lands to be Transferred from The Bureau of Land Management, El Centro District to the State of California, Department of Parks And Recreation	
IM-01348	Schaefer, Jerry	2006	A Class I Cultural Resources Inventory of The Truckhaven Geothermal Leasing Area, Imperial County, California	Crosses APE
IM-01372	McGinnis, Patrick and Hillary Murphy	2008	Cultural Resource Survey for the 320-Acre Salton City Landfill Project Imperial County, California	
IM-01458	ICF International	2011	Final Environmental Impact Report for the Salton City Landfill Expansion	
IM-01496	Mealey, Marla	2012	Archaeological Site Reexamination And Reconnaissance At Ocotillo Wells State Vehicular Recreation Area, 2008 Through 2011	Crosses APE

The 2015 records search identified a total of two recorded cultural resources inside the APE and 65 additional resources within the one-mile search radius located in and around the APE. Ninety isolated artifacts listed by the SCIC were found in the search radius. Copies of all forms sets have been attached in Appendix B. POWER recorded 37 sites and 40 isolates in the one-mile radius during the 2016 field season (POWER 2016), with the temporary site numbers included below. Four of these sites are located in the APE but will not be directly impacted during construction as efforts were made during the 2017 survey to avoid them. Mitigation measures shall be applied so that these sites will be avoided during construction. Some of the archaeological sites exhibited artifacts not observed in 2016 or by previous archaeologists. The older site forms have been updated to reflect the 2017 discoveries.

TABLE 2 ARCHAEOLOGICAL RESOURCES RECORDED IN APE AND 1.0 MILE FROM APE

P NUMBER	TRINOMIAL	POWER TEMP NUMBER (2016)	COMMENT (SEE NOTE)	SCIC RECORD?
13-000047	CA-IMP-47		Not in APE. Avoided completely	Yes
13-001311	CA-IMP-1311		Not in APE. Avoided completely	Yes
13-003178	CA-IMP-3178		Not in APE. Avoided completely	Yes
13-003221	CA-IMP-3221		Not in APE. Avoided completely	Yes
13-003223	CA-IMP-3223		Not in APE. Avoided completely	Yes
13-003224	CA-IMP-3224		Not in APE. Avoided completely	Yes
13-003232	CA-IMP-3232		Not in APE. Avoided completely	Yes
13-003247	CA-IMP-3247		Not in APE. Avoided completely	Yes
13-005086	CA-IMP-5086		Not in APE. Avoided completely	Yes
13-005321	CA-IMP-5321		Not in APE. Avoided completely	Yes
13-005322			Not in APE. Avoided completely	Yes. Iso
13-005323			Not in APE. Avoided completely	Yes. Iso
13-005324			Not in APE. Avoided completely	Yes. Iso
13-005325			Not in APE. Avoided completely	Yes. Iso
13-005326			Not in APE. Avoided completely	Yes. Iso
13-005326			Not in APE. Avoided completely	Yes. Iso
13-005327			Not in APE. Avoided completely	Yes. Iso
13-005329			Not in APE. Avoided completely	Yes. Iso
13-005330			Not in APE. Avoided completely	Yes. Iso
13-005331	CA-IMP-5331		Not in APE. Avoided completely	Yes
13-005650			Not in APE. Avoided completely	Yes. Iso
13-006244	CA-IMP-6244		Not in APE. Avoided completely	Yes
13-006245	CA-IMP-6245		Not in APE. Avoided completely	Yes
13-006246	CA-IMP-6246		Not in APE. Avoided completely	Yes
13-006247	CA-IMP-6247		Not in APE. Avoided completely	Yes

P NUMBER	TRINOMIAL	POWER TEMP NUMBER (2016)	COMMENT (SEE NOTE)	SCIC RECORD?
13-006248	CA-IMP-6248		Not in APE. Avoided completely	Yes
13-006249	CA-IMP-6249		**Was observed during survey: well pad location was moved to avoid.**	Yes: site enlarged by POWER
13-006250	CA-IMP-6250		Not in APE. Avoided completely	Yes
13-006251			Not in APE. Avoided completely	Yes. Iso
13-006252			Not in APE. Avoided completely	Yes. Iso
13-006253			Not in APE. Avoided completely	Yes. Iso
13-006254			Not in APE. Avoided completely	Yes. Iso
13-006255			Not in APE. Avoided completely	Yes. Iso
13-006256			Not in APE. Avoided completely	Yes. Iso
13-006257			Not in APE. Avoided completely	Yes. Iso
13-006258			Not in APE. Avoided completely	Yes. Iso
13-006259			Not in APE. Avoided completely	Yes. Iso
13-006260			Not in APE. Avoided completely	Yes. Iso
13-006261			Not in APE. Avoided completely	Yes. Iso
13-006291			Not in APE. Avoided completely	Yes. Iso
13-006292			Not in APE. Avoided completely	Yes. Iso
13-006293			Not in APE. Avoided completely	Yes. Iso
13-006294			Not in APE. Avoided completely	Yes. Iso
13-006301	CA-IMP-6301		Not in APE. Avoided completely	Yes
13-006302	CA-IMP-6302		Not in APE. Avoided completely	Yes
13-006303			Not in APE. Avoided completely	Yes. Iso
13-006304			**Was not observed during survey even though the isolate plot was located in the survey area.**	Yes. Iso
13-006305				Yes. Iso
13-006306				Yes. Iso
13-006307				Yes. Iso

P NUMBER	TRINOMIAL	POWER TEMP NUMBER (2016)	COMMENT (SEE NOTE)	SCIC RECORD?
13-006308				Yes. Iso
13-006369				Yes. Iso
13-006399	CA-IMP-6399		Not in APE. Avoided completely	Yes
13-008148	CA-IMP-7748		Not in APE. Avoided completely	Yes
13-008379	CA-IMP-7860		Not in APE. Avoided completely	Yes
13-008565			Not in APE. Avoided completely	Yes. Iso
13-008671	CA-IMP-8671		Not in APE. Avoided completely	Yes
13-008672			Not in APE. Avoided completely	Yes. Iso
13-008673			Not in APE. Avoided completely	Yes. Iso
13-008878	CA-IMP-8298		Not in APE. Avoided completely	Yes
13-009272	CA-IMP-9272		Not in APE. Avoided completely	Yes
13-009273	CA-IMP-9273		Not in APE. Avoided completely	Yes
13-009274	CA-IMP-9274		Not in APE. Avoided completely	Yes
13-009275	CA-IMP-8473		Not in APE. Avoided completely	Yes
13-009276	CA-IMP-8474		Not in APE. Avoided completely	Yes
13-009277	CA-IMP-8475		Not in APE. Avoided completely	Yes
13-009278	CA-IMP-8476		Not in APE. Avoided completely	Yes
13-009512	CA-IMP-8608		Not in APE. Avoided completely	Yes
13-011122	CA-IMP-010128		Not in APE. Avoided completely	Yes
13-011145	CA-IMP-010151		Not in APE. Avoided completely	Yes
13-011164	CA-IMP-010170		Not in APE. Avoided completely	Yes
13-011166	CA-IMP-010172		Not in APE. Avoided completely	Yes
13-012039	CA-IMP-010764		Not in APE. Avoided completely	Yes
13-012040	CA-IMP-010765		Not in APE. Avoided completely	Yes
13-012041	CA-IMP-010766		Not in APE. Avoided completely	Yes
13-012042			Not in APE. Avoided completely	Yes. Iso

P NUMBER	TRINOMIAL	POWER TEMP NUMBER (2016)	COMMENT (SEE NOTE)	SCIC RECORD?
13-012043	CA-IMP-010767		Not in APE. Avoided completely	Yes
13-012044			Not in APE. Avoided completely	Yes. Iso
13-012045	CA-IMP-010768		Not in APE. Avoided completely	Yes
13-012046	CA-IMP-010769		Not in APE. Avoided completely	Yes
13-012463			Not in APE. Avoided completely	Yes. Iso
13-012469	CA-IMP-011028		Not in APE. Avoided completely	Yes
13-012470			Not in APE. Avoided completely	Yes. Iso
13-012471			Not in APE. Avoided completely	Yes. Iso
13-012472			Not in APE. Avoided completely	Yes. Iso
13-012473			Not in APE. Avoided completely	Yes. Iso
13-012474			Not in APE. Avoided completely	Yes. Iso
13-012475			Not in APE. Avoided completely	Yes. Iso
13-012476	CA-IMP-011029		Not in APE. Avoided completely	Yes
13-012477			Not in APE. Avoided completely	Yes. Iso
13-012478			Not in APE. Avoided completely	Yes. Iso
13-012480			Not in APE. Avoided completely	Yes. Iso
13-012481			Not in APE. Avoided completely	Yes. Iso
13-012482			Not in APE. Avoided completely	Yes. Iso
13-012483			Not in APE. Avoided completely	Yes. Iso
13-012484			Not in APE. Avoided completely	Yes. Iso
13-012485			Not in APE. Avoided completely	Yes. Iso
13-012486			Not in APE. Avoided completely	Yes. Iso
13-012487			Not in APE. Avoided completely	Yes. Iso
13-012488	CA-IMP-011031		Not in APE. Avoided completely	Yes
13-012490			Not in APE. Avoided completely	Yes. Iso
13-012491			Not in APE. Avoided completely	Yes. Iso

P NUMBER	TRINOMIAL	POWER TEMP NUMBER (2016)	COMMENT (SEE NOTE)	SCIC RECORD?
13-012492			Not in APE. Avoided completely	Yes. Iso
13-012493	CA-IMP-011032		Not in APE. Avoided completely	Yes
13-012494			Not in APE. Avoided completely	Yes. Iso
13-012495	CA-IMP-011033		Not in APE. Avoided completely	Yes
13-012496			Not in APE. Avoided completely	Yes. Iso
13-012497			Not in APE. Avoided completely	Yes. Iso
13-012498			Not in APE. Avoided completely	Yes. Iso
13-012499			Not in APE. Avoided completely	Yes. Iso
13-012500			Not in APE. Avoided completely	Yes. Iso
13-012501			Not in APE. Avoided completely	Yes. Iso
13-012502			Not in APE. Avoided completely	Yes. Iso
13-012503			Not in APE. Avoided completely	Yes. Iso
13-012504			Not in APE. Avoided completely	Yes. Iso
13-012505			Not in APE. Avoided completely	Yes. Iso
13-012506			Not in APE. Avoided completely	Yes. Iso
13-012507			Not in APE. Avoided completely	Yes. Iso
13-012508	CA-IMP-011034		Not in APE. Avoided completely	Yes
13-012509	CA-IMP-011035		Not in APE. Avoided completely	Yes
13-012510			Not in APE. Avoided completely	Yes. Iso
13-012511			Not in APE. Avoided completely	Yes. Iso
13-012512			Not in APE. Avoided completely	Yes. Iso
13-012513			Not in APE. Avoided completely	Yes. Iso
13-012514			Not in APE. Avoided completely	Yes. Iso
13-012515	CA-IMP-011036		Not in APE. Avoided completely	Yes
13-012516	CA-IMP-011037		Not in APE. Avoided completely	Yes
13-012517			Not in APE. Avoided completely	Yes. Iso

P NUMBER	TRINOMIAL	POWER TEMP NUMBER (2016)	COMMENT (SEE NOTE)	SCIC RECORD?
13-012518	CA-IMP-011038		Not in APE. Avoided completely	Yes
13-012519			Not in APE. Avoided completely	Yes. Iso
13-012520	CA-IMP-011039		Not in APE. Avoided completely	Yes
13-012521	CA-IMP-011040		Not in APE. Avoided completely	Yes
13-012619	CA-IMP-011041		Not in APE. Avoided completely	Yes
13-012621			Not in APE. Avoided completely	Yes. Iso
13-012634			Not in APE. Avoided completely	Yes. Iso
13-012635	CA-IMP-011042		Not in APE. Avoided completely	Yes
13-012646			Not in APE. Avoided completely	Yes. Iso
13-012650			Not in APE. Avoided completely	Yes. Iso
13-012653	CA-IMP-011029		Not in APE. Avoided completely	Yes
13-012654	CA-IMP-011030		Not in APE. Avoided completely	Yes
13-012665			Not in APE. Avoided completely	Yes. Iso
13-012666			Not in APE. Avoided completely	Yes. Iso
13-013321	CA-IMP-011505		Not in APE. Avoided completely	Yes
13-013324	CA-IMP-011508		Not in APE. Avoided completely	Yes
13-013367	CA-IMP-011522		Not in APE. Avoided completely	Yes
13-013389			Not in APE. Avoided completely	Yes. Iso
13-013390	CA-IMP-011534		Not in APE. Avoided completely	Yes
13-013401			Not in APE. Avoided completely	Yes. Iso
13-013445	CA-IMP-011555		Not in APE. Avoided completely	Yes
13-013453	CA-IMP-011561		Not in APE. Avoided completely	Yes
13-013473			Not in APE. Avoided completely	Yes. Iso
13-013480			Not in APE. Avoided completely	Yes. Iso
13-013675	CA-IMP-011730		Not in APE. Avoided completely	Yes
13-014305	CA-IMP-012074		Not in APE. Avoided completely	Yes

P NUMBER	TRINOMIAL	POWER TEMP NUMBER (2016)	COMMENT (SEE NOTE)	SCIC RECORD?
13-014306			Not in APE. Avoided completely	Yes. Iso
13-014307			Not in APE. Avoided completely	Yes. Iso
13-014308			Not in APE. Avoided completely	Yes. Iso
New		CN-1	Not in APE. Avoided completely	No. POWER 2016
New		CN-2	Not in APE. Avoided completely	No. POWER 2016
New		CN-3	Not in APE. Avoided completely	No. POWER 2016
New		CN-4	Not in APE. Avoided completely	No. POWER 2016
New		CN-5	Not in APE. Avoided completely	No. POWER 2016
New		CN-7	Not in APE. Avoided completely	No. POWER 2016
New		CN-10 (CA-IMP-12788)	**In APE. Well pad redesigned to avoid.**	No. POWER 2016. Re-examined by this study.
New		CN-11	Not in APE. Avoided completely	No. POWER 2016
New		CN-12	Not in APE. Avoided completely	No. POWER 2016
New		CN-13	Not in APE. Avoided completely	No. POWER 2016
New		CN-14	Not in APE. Avoided completely	No. POWER 2016
New		CN-16	Not in APE. Avoided completely	No. POWER 2016
New		CN-17	Not in APE. Avoided completely	No. POWER 2016
New		CN-18	Not in APE. Avoided completely	No. POWER 2016
New		CN-19	Not in APE. Avoided completely	No. POWER 2016
New		CN-20 (CA-IMP-12789)	**In survey area. Well pad subsequently abandoned**	No. POWER 2016
New		CN-21	Not in APE. Avoided completely	No. POWER 2016
New		CN-22	Not in APE. Avoided completely	No. POWER 2016
New		CN-23	Not in APE. Avoided completely	No. POWER 2016
New		DM-1 (CA-IMP-12790)	**In survey area. Well pad subsequently abandoned**	No. POWER 2016. Re-examined by this study.
New		DM-2 (CA-IMP-12791)	**In APE. Well pad redesigned to avoid completely**	No. POWER 2016. Re-examined by this study.
New		DM-3	**In APE. Well pad redesigned to avoid completely**	No. POWER 2016. Re-examined by this study.

P NUMBER	TRINOMIAL	POWER TEMP NUMBER (2016)	COMMENT (SEE NOTE)	SCIC RECORD?
New		DM-4	Not in APE. Avoided completely	No. POWER 2016
New		DM-5 (CA-IMP-12792)	Not in APE. Avoided completely	No. POWER 2016. Re-examined by this study.
New		DM-6	Not in APE. Avoided completely	No. POWER 2016
New		S-04-006	Not in APE. Avoided completely	No. POWER 2016
New		S-04-010	Not in APE. Avoided completely	No. POWER 2016
New		S-04-012	Not in APE. Avoided completely	No. POWER 2016
New		TW-6	Not in APE. Avoided completely	No. POWER 2016
New		TW-15	Not in APE. Avoided completely	No. POWER 2016
New		TW-25	Not in APE. Avoided completely	No. POWER 2016
New		TW-26	Not in APE. Avoided completely	No. POWER 2016
New		TW-27	Not in APE. Avoided completely	No. POWER 2016
New		TW-28	Not in APE. Avoided completely	No. POWER 2016
New		TW-30	Not in APE. Avoided completely	No. POWER 2016
New		TW-34	Not in APE. Avoided completely	No. POWER 2016
New		TW-39	Not in APE. Avoided completely	No. POWER 2016

Appendix B provides previously recorded DPR523 forms that are located within the APE, the locations of previously recorded surveys, and also provides a bibliography of reports generated in and within one-mile of the project survey area. Site forms generated by POWER that represent discoveries made during project fieldwork have also been provided in Appendix B.

The prehistoric archaeological sites consist mainly of lithic scatters, although sites bearing stacked rock features are plentiful near major washes. Sites bearing the remnants of fish traps, which in this area take the form of V- or J-shaped single-coursed cobble alignments, also exist. Many of these can be seen on high-resolution aerial photographs. Historic trash does occur near older roads, including dummy bombs and rounds dropped by World War II training planes between approximately 1940 and 1943 in portions of the "Winona I" site.

5.2 Results of Pedestrian Survey

The field investigations included an intensive pedestrian cultural resource survey of 134.77 acres. Several cultural resources were detected and when combined with the sites and isolated finds previously recorded by POWER (2016), a total of 12 archaeological sites and 12 isolated artifacts have been identified within the APE. General photographs taken during the fieldwork can be found in Appendix C. A description of each area surveyed and finds therein follows below.

5.2.1 Well Pad Areas

- **Area #1**. No cultural resources were encountered.
- **Area #2**. Archaeological site [redacted] was detected. This area was removed from consideration for well pad construction by the Proponent due to the existence of this site.
- **Area #3**. Archaeological sites [redacted] were detected but can be avoided. Isolate [redacted] was also encountered.
- **Area #4**. Archaeological site [redacted] was detected but can be avoided.
- **Area #5**. No cultural resources were encountered. This area was subsequently abandoned by the Proponent.
- **Area #6**. Three isolated artifacts [redacted] were detected but no archaeological sites were encountered in this area.
- **Area #7**. No cultural resources were encountered.
- **Area #8**. Archaeological site [redacted] and site [redacted] are located [redacted], but these sites can be avoided.
- **Area #9**. Archaeological site [redacted] was detected [redacted] but can be avoided.
- **Area #10**. Surveyed in 2016, this area was removed from consideration for well pad construction by the Proponent when site [redacted] was discovered.
- **Area #11**. One isolate [redacted] and no sites were encountered.
- **Area #12**. No cultural resources were encountered.
- **Area #13**. No cultural resources were encountered.

5.2.2 Well Pad Access Road Alignments

- Access road from the south end of Skyway Drive to Area #3: no cultural resources were encountered.
- Well pad access road from the north end of Skyway Drive to Area #4: no cultural resources were encountered.
- Well pad access road from Arroyo Salado to Area #6. Two isolated artifacts, [redacted] and [redacted], were encountered. No archaeological sites were encountered.
- Well pad access road from Air Park Drive to the SVRA boundary for the purpose of accessing Area #8: one archaeological site [redacted] was encountered. Once this site was detected, the Proponent decided to abandon this potential access road.
- Well pad access road that links the southern edge of the Salton Sea Airport runway with Area #11 and Area #12: three isolated artifacts [redacted], and [redacted] were encountered. No archaeological sites were encountered.
- For the purposes of access road siting, a polygon of land linking the west end of the Salton Sea Airport runway crossing into the BLM portion of the SVRA was surveyed so that the north edge of Area #11 could be accessed. No cultural resources were encountered.

- For the purposes of access road siting, a polygon of land linking the west end of the Salton Sea Airport runway crossing into the BLM portion of the SVRA so that the southwest corner of Area #8 could be accessed was surveyed. No cultural resources were encountered.
- For the purposes of road siting, a polygon of land currently bearing a dirt road between Dump Road and the south edge of Area #11 was examined. No cultural resources were encountered.

5.2.3 *Salton Sea Airport Staging Area*

No cultural resources or isolates were encountered during the 2016 or 2017 field seasons.

5.3 Resource Descriptions and Eligibility Recommendations

Table 3 below provides a summary of each cultural resource encountered during the Class III survey. Greater detail associated with the potential impacts is found in the narrative section following this table. The process by which the potential impacts during implementation of the project were established by POWER staff followed procedures discussed in the BLM Work Plan. No adverse impacts are anticipated when avoidance and mitigation measures are implemented.

TABLE 3 ARCHAEOLOGICAL SITES RECORDED DURING SURVEY

RESOURCE AND JURISDICTION	RECORDED DATE	AGE	TYPE	NRHP ELIGIBILITY RECOMMENDATION
CA-IMP-6249 BLM/SVRA	1989 2016 2017	Prehistoric	Artifact scatter	Recommended eligible to the NRHP and CRHR under Criterion D/4.
CA-IMP-12788 (CN-10) BLM/SVRA	2016	Prehistoric	Lithic scatter	Recommended eligible to the NRHP and CRHR under Criterion D/4.
CA-IMP-12789 (CN-20) BLM/SVRA	2016	Prehistoric	Sensitive rock alignments and lithic scatter	Recommended eligible to the NRHP and CRHR under Criterion A/1 and D/4.
CA-IMP-12790 (DM-1) SLC/Private	2016	Prehistoric	Lithic scatter	Recommended eligible to the NRHP and CRHR under Criterion D/4.
CA-IMP-12791 (DM-2) SLC/Private	2016	Prehistoric	Lithic scatter	Recommended eligible to the NRHP and CRHR under Criterion D/4.
CA-IMP-12792 (DM-5) SLC	2016 2017	Prehistoric	Lithic scatter	Recommended eligible to the NRHP and CRHR under Criterion D/4.
CA-IMP-12793 (RK-1) SLC	2017	Multi-component	Artifact scatter	Recommended eligible to the NRHP and CRHR under Criterion D/4.
CA-IMP-12794 (RK-2) SLC	2017	Multi-component	Artifact scatter	Recommended ineligible to the NRHP and CRHR.
CA-IMP-12795 (RK-3) Private	2017	Prehistoric	Lithic scatter	Recommended eligible to the NRHP and CRHR under Criterion D/4.
CA-IMP-12796 (RK-4) BLM	2017	Prehistoric	Lithic scatter	Recommended eligible to the NRHP and CRHR under Criterion D/4.

RESOURCE AND JURISDICTION	RECORDED DATE	AGE	TYPE	NRHP ELIGIBILITY RECOMMENDATION
CA-IMP-12797 (RK-5) Private	2017	Prehistoric	Lithic scatter	Recommended eligible to the NRHP and CRHR under Criterion D/4.
CA-IMP-12798 (RK-6) BLM	2017	Prehistoric	Lithic scatter	Recommended eligible to the NRHP and CRHR under Criterion D/4.

Site: CA-IMP-6249
Description: Artifact scatter
Period: Possibly Late Prehistoric
Dimensions: Roughly 254 meters (m) by 132 m with uncertain depth.
Jurisdiction: BLM/SVRA
NRHP/CRHR Eligibility Recommendation: Considered Eligible

In 1989, two flakes and one core both of brown quartzite were recorded at this site without the advantage of GPS. These particular artifacts were not relocated during the 2016 field season, possibly due to the construction of the proposed access road described in the original site record forms. The site was examined in 2017 as part of the Truckhaven Wells study (POWER 2018a), and the 2017 elements overlaps the previous site boundary in the southwest by 28 (nw/se) x 84m (ne/sw). Approximately ten primary and secondary quartzite, chert, and rhyolite flakes and a concentration of seven ceramic sherds were observed in 2017. There are no features. A northeast to southwest trending braided ephemeral drainage bisects the site. A graded road runs along the north side of the previously recorded site section. Topsoil is fine-grained, somewhat silty sand. The terrain is flat, with small cobbles and gravels, and sandstone outcrops are in the vicinity. Vegetation is very sparse and includes salt bush and bursage. Ground visibility during the survey was 99%.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site: CA-IMP-12788 (CN-10)
Description: Lithic Scatter
Period: Possibly Late Prehistoric
Dimensions: Roughly 200 m by 125 m with uncertain depth
Jurisdiction: BLM/SVRA
NRHP/CRHR Eligibility Recommendation: Considered Eligible

Recorded in 1989, 2016 and again in 2017, this resource is a dispersed lithic scatter, and includes a pumice stone concentration, as well as an activity locus containing a concentration of lithics. It lies on a sandstone littered cobbly flat bearing natural tool stone materials such as quartzite and basalt. Locus A includes a cluster of approximately 17 artifacts in a small area in the center of the site. No other features were observed. An east-to-west trending braided ephemeral drainage runs through the southern portion of the site. A larger braided wash, up to three meters deep, trends northeast to southwest along the northern edge of the site and is several meters wide, therefore limiting much of

the northern boundary as well as some of the west and northeast boundaries. A bladed road running NE/SW runs diagonally through the center of the site. Vegetation is very sparse, and ground visibility is 100 percent. Six large rock cairns (several courses high of tabular sandstone) are visible in the distance, several hundred meters to the west, and are part of a separate site.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site: CA-IMP-12789 (CN-20)
Description: Sensitive rock alignments and lithic artifact scatter
Period: Possibly Late Prehistoric
Dimensions: 162 m by 57 m with uncertain depth
Jurisdiction: BLM/SVRA
NRHP/CRHR Eligibility: Considered Eligible

Recorded in 2016, this resource contains three single-course J- and V-shaped rock alignments identified as the foundations of weirs (fish traps), and a very sparse artifact scatter. It is situated atop an eroded sandstone outcrop mantled by recessional lakeshore silts, gravels, and cobbles. The site is located [redacted], to the west and east by eroding sandstone outcrops and cobbles devoid of cultural material, and to the south by an unnamed bladed dirt and gravel road. The site surface is undulating, with stabilized cobble/gravel bars slightly raised above diffuse swales of silt and better sorted rocks. The lithology is composed of granitics, which is dominant, and gneiss and fine-grained basalts and schists; quartzite is rare. The landform is overall stabilized, with moderately developed desert pavement, and few rills and incised ephemeral drainages. All three rock features are within 20 m of one another in the east-central portion of the site. Direct association of the sparse artifact scatter with the features is unknown. Eleven individually recorded lithic tools are present, as are four pieces of lithic debitage in the early stages of reduction. All the artifacts are very weathered.

Eligibility Recommendation
Because there is potential that prehistoric data is buried below the modern ground surface, this site is considered eligible to the NRHP under Criterion D and the CRHR under Criterion 4. The site is also considered eligible to the NRHP under Criterion A and the CRHR under Criterion 1 because it exhibits a fish trap and lies several miles northwest of the Southwest Lake Cahuilla Recessional Shoreline Archaeological District which was listed on the NRHP in 1999 under Criteria A and D. This site therefore should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site: CA-IMP-12790 (DM-1)
Description: Large lithic scatter
Period: Possibly Late Prehistoric
Jurisdiction: SLC and Private
Dimensions: 184 m by 174 m with uncertain depth
NRHP/CRHR Eligibility Recommendation: Considered Eligible

First observed in 2016, this resource is a sparse prehistoric lithic scatter located a large area cut by washes. The site is located on a desiccated lakebed that is being eroded to the northeast. The site contains 150 plus pieces of debitage, mostly quartzite, with a few quartz, basalt and possibly

wonderstone flakes. All stages of reduction are present, but the majority is primary followed by secondary with very few tertiary flakes observed. Wind and sand erosion on the artifacts is substantial. Most materials present are readily available on the site and in the surrounding area as cobbles. Twenty-two tools were recorded. These include choppers, scraping tools, cores, and a small sandstone metate repurposed from a larger metate fragment. As with the debitage, the majority of tools are of quartzite with the exception of one basalt core and three quartz scraping tools. No features were observed. Visibility is near 100 percent with creosote and saltbush present.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site: CA-IMP-12791 (DM-2)
Description: Lithic scatter
Period: Possibly Late Prehistoric
Jurisdiction: SLC and Private
Dimensions: 169 m by 98 m with uncertain depth
NRHP/CRHR Eligibility Recommendation: Considered Eligible

First observed in 2016, this resource is large lithic scatter situated on relict lake bed. It contains seven tools, 24 quartzite flakes, eight quartz flakes, two chert flakes and three basalt flakes. Tools include two choppers, one multiuse tool, one spokeshave/end scraper, one tested cobble, a core/hammerstone, and two hammerstones that indicate use for bipolar reduction. Debitage reflects all stages of lithic reduction but cortical and semi cortical flakes predominate in equal amounts. Only five interior flakes were observed. Out of 36 pieces of debitage, approximately 10 are the result of bipolar percussion. Four tested cobbles, three quartzite and one quartz, were observed. All lithic materials utilized can be found naturally in the surrounding area except the two chert flakes. No features were observed. Disturbances on the site include erosion and modern human activity. The site is bisected in the east portion by a deep and relatively modern arroyo created by a large berm built by Caltrans that parallels the arroyo. Several smaller ephemeral washes cross the site trending roughly east-to-west. A modern fire ring identified by the presence of a burnt aluminum can is located in the south west portion of the site. Two modern five gallon oil drums were also observed. Most of the artifacts have been burnished by sand scouring. Off-road vehicle tracks cross the site and there are no visible features.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed. The sharp edges on the tools and debitage have been blunted by sand-blasting.

Site: CA-IMP-12792 (DM-5)
Description: Lithic scatter
Period: Possibly Late Prehistoric
Jurisdiction: SLC
Dimensions: 42 m by 15 m with uncertain depth
NRHP/CRHR Eligibility Recommendation: Considered Eligible

First observed in 2016, this resource is a lithic scatter located on the edge of a low pebbly terrace likely resting on a relict Lake Cahuilla shoreline. It consists of six pieces of debitage and one tested cobble. The site is in fair condition and there are no features. Observed disturbances are erosion and two sets of recent tire tracks crossing the site. Debitage consists of two quartzite flakes and three quartz flakes and all are fully cortical. Both quartzite flakes appear to have been reduced through bipolar reduction. The three quartz flakes all appear to been reduced by freehand percussion. A tested cobble of quartzite was also observed. Re-examination of the site in 2017 showed that the site also included one bifacially worked quartzite core and three quartzite flakes, one primary and two secondary.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site: CA-IMP-12793 (RK-1)
Description: Artifact scatter
Period: Multi-component
Jurisdiction: SLC
Dimensions: 32 m by 55 m with uncertain depth
NRHP/CRHR Eligibility Recommendation: Considered Eligible

This resource is a very small multi-component site containing a prehistoric lithic scatter with three stone tools and three flakes, and there are two historic-era church-key opened cans. There are no features. The site is located on a gravelly former lake bed flat with a very slight slope to the east-northeast that has been impacted by off-road vehicle use and previous water well development. Very little vegetation exists in this area and visibility was 100 percent.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 even though the integrity of the site is considered poor. Unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site: CA-IMP-12794 (RK-2)
Description: Artifact scatter
Period: Multi-component
Jurisdiction: SLC
Dimensions: 47 m by 32 m with uncertain depth
NRHP/CRHR Eligibility Recommendation: Considered Ineligible

This resource is a very small multi-component site containing a prehistoric lithic scatter with two flakes and two historic-era steel cans. There are no features. The site is located on a former lake bed flat with a very slight slope to the east-northeast that has been impacted by off-road vehicle use and previous water well development. Very little vegetation exists in this area and seeing was 100 percent. Recorded as a site, it nonetheless is regarded as two isolated artifact occurrences in the same area: one isolate composed of two pieces of debitage and another isolate composed of two historic-era cans.

Eligibility Recommendation
Because there is little potential that prehistoric data is buried below the modern ground surface, this site is considered ineligible for listing on the NRHP/CRHR. However, this site should be treated as a historic property until formal NRHP/CRHR evaluation can be completed.

Site: CA-IMP-12795 (RK-3 update)
Description: Lithic scatter
Period: possibly Late Prehistoric
Dimensions: 46 m by 31 m with uncertain depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Eligible

This is a lithic scatter on a denuded flat bearing a large number of isolated manos, a few other stone tools, and debitage. Two cairns observed are probably modern. The site is located on a flat just northwest of a large graded area [redacted] The site is located in an area denuded of vegetation, is subject to extreme wind erosion, and bears some minor off-roading damage. It is located roughly 20m east of a ditch designed to shunt water northward [redacted]. Visibility during the survey was 100% and no vegetation exists in the site boundary. The original site was recorded in 2017, the form submitted to the IC, then the site was expanded in size during the 2018 Truckhaven 3-D field season (POWER n.d.).

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site: CA-IMP-12796 (RK-4)
Description: Lithic scatter
Period: possibly Late Prehistoric
Dimensions: 23 m by 17 m with uncertain depth
Jurisdiction: BLM/SVRA
NRHP/CRHR Eligibility Recommendation: Considered Eligible

This resource is a very small prehistoric lithic scatter site with one flake and two stone tools. The site is located on a former lake bed flat with a very slight slope to the east that has been impacted by off-road vehicle use. A narrow arm of Surprise Wash lies just to the north. There are no features. Very little vegetation exists in this area and visibility was 100 percent.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site: CA-IMP-12797 (RK-5)
Description: Lithic scatter
Period: possibly Late Prehistoric
Dimensions: 76 m by 32 m with uncertain depth
Jurisdiction: Private
NRHP/CRHR Eligibility Recommendation: Considered Eligible

This resource is a very small prehistoric lithic scatter consisting of two tested quartzite cobbles and three pieces of quartzite debitage. Two of the flakes are located in the far southwest portion of the site, while the cobbles and one of the flakes are 36m to the northeast. There are no features. The site is located on a former lake bed flat with a very slight slope to the east that has been impacted by off-road vehicle use. Portions have been lightly impacted by grading, but far more surface damage to the surrounding lands can be found to the east and north. Very little vegetation exists in this area and visibility was 100 percent.

Eligibility Recommendation
This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered fair and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.

Site: CA-IMP-12798 (RK-6)
Description: Lithic scatter
Period: Uncertain Prehistoric period
Dimensions: 20 m by 20 m with uncertain depth
Jurisdiction: BLM/SVRA
NRHP/CRHR Eligibility Recommendation: Considered Eligible (3S/3CS)

This resource is a small, well-contained lithic scatter located just north of a large wash and west of a smaller, narrower wash. It contains eight flakes and two edge-modified flakes, all of quartzite. Two small brown broken chert pebbles are also located within the site and may or may not be culturally related (due to the general absence of natural chert in the area). There are no features. The site is located on a former lake bed flat with a very slight slope to the east that has been impacted by off-road vehicle use. [redacted] Very little vegetation exists in this area and visibility was 100 percent. Site CA-IMP-6249 lies [redacted] to the north.

Eligibility Recommendation

This resource appears potentially eligible for the NRHP and the CRHR under Criterion D/4 because the integrity of the site is considered good and unrecorded buried features may exist that have not been exposed to view by natural erosion. Finally, the site has yielded or may be likely to yield information important to the prehistory of the region. This site therefore should be treated as a historic property until a formal NRHP/CRHR evaluation can be completed.Potential Project Effects to Historic Properties

The project could impact surface and potential subsurface components of historic properties located in the APE either through construction of well pads, access roads, and/or well drilling. Dust could possibly kick up when the equipment is used for construction and settle on the historic properties, but the area is extremely windy and light dust will likely blow away soon after it settles. Construction-related erosion could harm some of these sites if rainwater is diverted from a disturbed area or if drilling mud escapes the temporary holding areas on the well pads. Erosion-related best management practices should be implemented as part of the construction and drilling plan and the erosion controls must avoid all historic properties.

POWER believes that none of the archaeological sites nearest to the construction limits contain highly sensitive resources that could be harmed by vibrations created by heavy equipment operations. If historic properties are located within ten meters of any construction limits, they should be flagged before construction begins and monitored as discussed in Section 5.5 below.

TABLE 4 AVOIDANCE RECOMMENDATIONS SUMMARY

RESOURCE	JURISDICTION	TYPE	AVOIDANCE RECOMMENDATION
CA-IMP-6249	BLM/SVRA	Artifact scatter	A well built [redacted] must be constructed so that this historic property will be avoided by at least 10 meters. The access road extending into the well pad must be designed to miss the site boundary by at least 10 meters; Follow CUL-1 and CUL-2.
CA-IMP-12788 (CN-10)	BLM/SVRA	Lithic scatter	A well built [redacted] must be constructed so that this historic property will be avoided by at least 10 meters. The access road extending into the well pad must be designed to miss the site boundary by at least 10 meters; Follow CUL-1 and CUL-2.
CA-IMP-12789 (CN-20)	BLM	Sensitive Rock Alignments and Lithic Scatter	Site will be avoided by 150 meters and there is no potential for impact.
CA-IMP-12790 (DM-1)	SLC/Private	Large lithic scatter	Site will be avoided by at minimum 40 meters and there is no potential for impact.
CA-IMP-12791 (DM-2)	SLC/Private	Lithic scatter	A well built [redacted] and the access road leading to this area must be constructed so that the site boundary will be avoided by at least 10 meters; Follow CUL-1 and CUL-2.
CA-IMP-12792 (DM-5)	SLC	Lithic scatter	A well built [redacted] must be constructed so that the site boundarywill be avoided by at least 10 meters; Follow CUL-1 and CUL-2.
CA-IMP-12793 (RK-1)	SLC	Artifact scatter	A well built [redacted] must be constructed so that the site boundarywill be avoided by at least 10 meters; Follow CUL-1 and CUL-2.
CA-IMP-12794 (RK-2)	SLC	Artifact scatter	Although not considered eligible for listing, a well built [redacted] must be constructed so that the site boundarywill be avoided; Follow CUL-1 and CUL-2.

RESOURCE	JURISDICTION	TYPE	AVOIDANCE RECOMMENDATION
CA-IMP-12795 (RK-3)	Private	Lithic scatter	A well built [redacted] and the access road originating from the south must be constructed so that the site boundary will be avoided by at least 10 meters; Follow CUL-1 and CUL-2.
CA-IMP-12796 (RK-4)	BLM/SVRA	Lithic scatter	A well built [redacted] must be constructed so that the site boundary will be avoided by at least 10 meters; Follow CUL-1 and CUL-2.
CA-IMP-12797 (RK-5)	Private	Lithic Scatter	Site will be avoided by at minimum 100 meters and there is no potential for impact.
CA-IMP-12798 (RK-6)	BLM/SVRA	Lithic scatter	The access road extending [redacted] from the south must be designed to miss the site boundary by at least 10 meters; Follow CUL-1 and CUL-2.

5.4 Recommended Cultural Resource Mitigation Measures to be Applied During Construction and Operation

The project shall require a Mitigation Monitoring Plan (MMP) authored by a qualified archaeologist and approved by BLM and Imperial County. The purpose of the MMP is to delineate best management practices that will reduce potential impacts to historic properties so that no significant impacts will be anticipated during the construction and operations phases of the project.

It is assumed that all known historic properties can be avoided during construction. Because there could be unintended impacts to historic properties during construction, the MMP should at minimum contain Measures CUL-1 and CUL-2:

CUL-1: Grading and Drilling

a) Construction of the well pads and access roads should be monitoring by a qualified Project Archaeologist and/or the Project Archaeologist's qualified representative (the Monitor). The archaeological team must be pre-approved by staff at BLM-El Centro Field Office and bear an active BLM FWA with Work Plan associated with the construction and operations phase of the project.

b) All historic properties that are located within 50 meters of any construction area shall be temporarily lathed and flagged by the project Archaeologist and/or his/her representative until all construction-related events that define the well pad and/or roads are completed. Once concluded, the lathe and flags shall be removed. Prior to actual drilling of any one well, CUL-1b need not be implemented.

c) Once all virgin earth has been turned in any one area during the construction process, additional monitoring need not take place in that one area. Since well drilling will take place in an area previously monitored, monitoring of well drilling need not occur.

d) Previously unrecorded isolated artifacts discovered by the Monitor must be recorded onto draft DPR523 isolate form sets and made part of the administrative record and report.

e) If a previously undetected archaeological site is encountered by the Monitor, the Monitor must immediately define the site boundary and work must cease in the site area plus a 10-meter buffer zone around that area. The BLM-El Centro Field Office must then be contacted. Salvage archaeological contingency plans in the FWA Work Plan obtained by the Project Archaeologist must be activated to mitigate for construction-related impacts to the resource.

f) Although unexpected, if any construction takes place less than 150 meters from resource CA-IMP-12789, the Monitor must be armed with a peak particle velocity (PPV) meter (*Vibra+*

Tri-Axial vibration meter or equivalent) to ensure that PPV emanating from the construction equipment does not reach 0.08 inch per second at the sensitive features of this historic property. If that threshold is passed, work must stop and the Monitor must confer with the construction contractor and the BLM El-Centro Field Office for any subsequent steps.

g) If human remains are encountered, work must stop in the area of the find plus a 30-meter buffer zone around that area and the BLM-El Centro Field Office must be called.

h) Once monitoring is completed, a monitoring report must be issued by the Project Archaeologist.

i) Once the BLM's Section 106 Consultation process has concluded, BLM-El Centro should codify the issue of Indigenous (Native American) Monitor presence in the use permit provided to the Proponent.

CUL-2: Operations and Maintenance

a) The well pads should be fenced and signs placed on the fence that indicate the well is located in an environmentally sensitive area and that trespassing is not allowed.

b) Operations management procedures should contain a disclaimer that the wells are located in an environmentally sensitive area and that operation workers should not walk or drive off the well pad into areas surrounding the well pad.

c) POWER does not recommend that the access roads should be fenced; however, future maintenance and repair of the roads should be restricted to the road right-of-way grant.

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6.0 REFERENCES

Alles, D.L. 2011. *Geology of the Salton Trough*. Paper edited by D.L. Alles, Western Washington University. Downloaded April 2017: http://fire.biol.wwu.edu/trent/alles/GeologySaltonTrough.pdf

Barbour, M.G., T Keeler-Wolf and A.A. Schoenherr. 2007. *Terrestrial Vegetation of California, 3rd Edition*. University of California Press, Berkeley.

Barker, C. 1995. "Salton Trough Province (016)." *U.S. Geological Survey Digital Data Series DDS-30, Release 2*. http://certmapper.cr.usgs.gov/data/noga95/prov16/text/prov16.pdf. Accessed October, 2016.

Bean, L.J. 1978. "Cahuilla." In *Handbook of North American Indians, Vol 8: California*. pp 575-587. R.F. Heizer, Ed. Washington D.C.: Smithsonian Institution.

_____. 1972. *Mukat's People: the Cahuilla Indians of Southern California.* Berkeley: University of California Press.

Blake, W.P. 1853. "Preliminary Geological Report of the U.S. Pacific Railroad Survey, under the command of Lieut. R.S. Williamson, Corps of Top. Eng." *American Journal of Science*, 2nd Series. v 19, pp 433-434.

_____. 1854. "An Ancient Lake in the Colorado Desert." *American Journal of Science* (Abstract) 2nd Series. Vol 21 pp270-272. Washington D.C.

Bureau of Land Management (BLM). 2004. *8110 – Identifying and Evaluating Cultural Resources* (Public version). Release Date December 3, 2004. Washington, D.C.

California Department of Parks and Recreation (Parks). 2011-2012. Ocotillo Wells SVRA Visitors Guide 2011-2012. Available on-line: http://ohv.parks.ca.gov/pages/1170/files/ow_visitors_guide-2011-12.pdf.

_____. 1981. *Unit 439 Ocotillo Wells State Vehicular Recreation Area (Preliminary) General Plan. December 1981*. Sacramento. Downloaded April 2017 from http://www.parks.ca.gov/pages/21299/files/439.pdf.

Chalfant, W.E. 1947. *Gold, Guns and Ghost Towns*. Palo Alto: Stanford University press.

Cutter, D.C. and I.W. Engstrand. 1996. *Quest for Empire: Spanish Settlement in the Southwest*. Golden, CO.: Fulcrum Publications.

Dice, M.H., R.G. Knierim, Nordal, C.

Doody, L.P. and B.K. Meltzer. 2012. *Losing Ground: the Displacement of San Gorgonio Pass Cahuilla Peoples in the 19th Century* (paperback edition). Morongo, CA, Malki-Ballena Press.

Forbes, J.D. 1965. *Warriors of the Colorado: The Yumas of the Quechan Nation and their Neighbors*. Norman, OK: University of Oklahoma Press.

Frisch, W., M. Meschede, and R.C. Blakey. 2010. *Plate Tectonics: Continental Drift and Mountain Building.* New York: Springer Heidelberg Dordrecht.

Gifford, E.W. 1931. "The Kamia of Imperial Valley." *Bureau of American Ethnology Bulletin* 97: 29-94.

Heizer, R.F. (ed). 1978. *Handbook of North American Indians, Volume 8: California*. pp 99-127. Washington D.C.: Smithsonian Institution.

ICF International (ICF). 2011. *Findings of Fact: Salton City Landfill Expansion Environmental Impact Report (SCH #2010071072).* Imperial County Planning and Development Services. http://imperial.granicus.com/MetaViewer.php?view_id=2&clip_id=368&meta_id=45788. Accessed October, 2016.

Jones, T.L. and K.A. Klar. 2007. *California Prehistory: Colonization, Culture and Complexity*. Altamira Press, New York.

Kroeber, A.L. 1925. *Handbook of the Indians of California.* (Dover edition reprint 1978). New York: Dover Publications, Inc.

Laylander, D. 1994. Phase III Data Recovery at the Elmore Site (CA-IMP-6427) *Imperial County. California, 11-IMP 88, P.M.33.6/43.2, 11221-19486, 11221-100710. San Diego*: Caltrans District 11.

_____. 2006. "The Regional Consequences of Lake Cahuilla." *San Diego State University Occasional Archaeological Papers (SOAP)* Vol. 1. http://soap.sdsu.edu/Volume1/LakeCahuilla/cahuilla.htm. Accessed October, 2016.

Laylander, D.L, A.P. Michelini and J.B. Patterson. 2016. "Lake Cahuilla's Little Sister: Exploring The Role of Laguna Macuata in Colorado Desert Prehistory." *Pacific Coast Archaeological Society Quarterly* v 52 no 1. pp 28-45. http://www.pcas.org/documents/LaylanderLagunaMacuataweb.pdf. Accessed October, 2016.

MacDougal, D.T. and collaborators. 1914. *Review: the Salton Sea: a Study of the Geography, the Geology, the Floristics, and the Ecology of a Desert Basin*. Carnegie Institution Publication No. 193. Washington D.C.

Marti-Cardona, B., T.E. Steissberg, S.G. Schladow, and S.J. Hook. 2008. "Relating fish kills to upwellings and wind patterns in the Salton Sea." *Hydrobiologia* 604:85-95.

McGinnis, P. and H. Murphy. 2008. *Cultural Resource Survey for the 320-Acre Salton Landfill Project. Imperial County, California.* San Diego: Tierra Environmental Services, Inc.

_____. 2010. *Draft Cultural Resources Testing, Evaluation and Data Recovery for the 320-Acre Salton City Landfill. County of Imperial, California.* San Diego: Tierra Environmental Services, Inc.

Mealey, M. 2012. *Archaeological Site Reexamination and Reconnaissance at Ocotillo Wells State Vehicular Recreation Area 2008 through 2011*. California State Parks Southern Service Center and Ocotillo Wells District, Borrego Springs.

National Park Service (NPS). 1990. *How to Apply the National Register Criteria for Evaluation. National Register Bulletin 15*. NPS, Washington D.C. https://www.nps.gov/Nr/publications/bulletins/nrb15/nrb15_5.htm. Accessed October, 2016.

Norris, R.M. and K.S. Norris. 1961. "Algodones Dunes of Southeastern California." *Geological Society of America Bulletin* 72(4): 605–619

POWER Engineers, Inc. (POWER). 2016. *Draft Class III Archaeological Survey of the Truckhaven 3-D Seismic Project.* POWER Engineers, Inc., Anaheim, CA. Prepared for the Bureau of Land Management, El Centro Field Office. Draft version submitted to BLM December, 2016. Initial DPR523 form sets submitted to BLM August 2016.

_____. 2018. n.d. *Class III Archaeological Survey of the Truckhaven 3-D Seismic Project. POWER Engineers, Inc., Anaheim, CA. Prepared for the Bureau ofLand Management, El Centro Field Office (BLM Project Number CA-670-16-077-FA03). Confidential Draft version.*

Reidel, R., D. Schlenk, D. Frank, B. Costa-Pierce. 2002. Analyses of organic and inorganic contaminants in Salton Sea fish. *Marine Pollution Bulletin* 44:403-411.

Rogers, M. 1939. "Early Lithic Industries of the Lower Basin of the Colorado River and Adjacent Desert Areas." San Diego Museum Papers No. 3. San Diego: San Diego Museum of Man.

_____. 1945. "An Outline of Yuman Prehistory." *Southwestern Journal of Anthropology* 1(2):167-198

_____. 1966. *Ancient Hunters of the Far West.* Union-Tribune Publishing, San Diego, CA.

Rose, S. and C. Bowden-Renna. 1998. *Sandstone Features Adjacent to Lake Cahuilla.* San Diego: KEA Environmental, Inc. https://www.scahome.org/publications/proceedings/Proceedings.12Rose.pdf. Accessed October, 2016.

Sagahun, C. 2016. Pers.comm. to M. Dice, POWER Engineers. BLM report needs in fieldwork authorization (permit).

Sapozhnikova, Y., O. Bawardi, D. Schlenk. 2004. Pesticides and PCBs in sediments and fish from the Salton Sea, California, USA. *Chemosphere* 55(6):797-809

Schaefer, J. 2006. *A Class I Cultural Resources Inventory of the Truckhaven Geothermal Leasing Area, Imperial County, California.* Carlsbad, CA: ASM Affiliates, Inc.

Schaefer, J. and D. Laylander. 2007. "The Colorado Desert: Ancient Adaptations to Wetlands and Wastelands." in *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, pp. 247-258. Walnut Creek, CA: Altamira Press.

Streitfeld, D. 2007. *Salton City: A Land of Dreams and Dead Fish.* Los Angeles Times dated July 1, 2007. http://articles.latimes.com/2007/jul/01/business/fi-salton1/2. Accessed June 2017.

Time (Magazine). 1959. http://content.time.com/time/magazine/0,9263,7601590302,00.html.

Topping, D.J., D.M. Rubin, and L.E. Vierra, Jr. 2000. "Colorado River Sediment Transport 1: Natural Sediment Supply Limitation and the Influence of Glen Canyon Dam." *Water Resources Research* v36 n2 pp 515-542. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.418.261&rep=rep1&type=pdf. Accessed October, 2016.

Treganza, A.E. 1945. "The Ancient Stone Fish Traps of the Coachella Valley, Southern California." *American Antiquity* 3:285- 294.

von Werlhof, J. 1996. *Archaeological Investigation of Aggregate Products, Inc. Gravel Pit, Imperial County*. Desert Museum Research Center, Imperial Valley College, Ocotillo, CA.

Waters, M.R. 1993. "Late Holocene Lacustrine Chronology and the Archaeology of Ancient Lake Cahuilla, California." *Quaternary Research* 19(3):373-387.

White, E.S. and B. Roth. 2011. "Fish Traps on Ancient Shores: Exploring the Function of Lake Cahuilla Fish Traps." *Journal of California and Great Basin Anthropology* 29(2): 183-193.

Wilke, P.J. 1978. "Late Prehistoric Human Ecology at Lake Cahuilla, Coachella Valley, California." *Contributions of the University of California Archaeological Research Facility* No. 38. Berkeley, CA.

_____. 1980. "Prehistoric Weir Fishing on Recessional Shorelines of Lake Cahuilla, Salton Basin, Southeastern California." Desert Fishes Council Proceedings XI:101-103.

Wilke, P.J. and H.W. Lawton. 1975. "Early Observations on the Cultural Geography of Coachella Valley." Ballena Press Anthropological Papers 3(1):1-43.

Williamson, R.S. 1856. *Volume V, Part 1. Report. Explorations In California for Railroad Routes, to Connect with the Routes near the 35th and 32nd Parallels of North Latitude*. Washington. U.S. Gov. Printing Office.

EEC ORIGINAL PKG

APPENDIX A – PROJECT MAPBOOK AND RECORD SEARCH RESULTS (CONFIDENTIAL)

EEC ORIGINAL PKG

APPENDIX B – NEWLY RECORDED DPR 523 FORM SETS (CONFIDENTIAL)

APPENDIX C – PROJECT PHOTOGRAPHS (CONFIDENTIAL)

APPENDIX D RESUMES

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MICHAEL DICE, RPA

SENIOR ARCHAEOLOGIST

YEARS OF EXPERIENCE
29

EDUCATION
- M.A., Anthropology, Arizona State University, 1995
- B.A., Anthropology, Washington State University, 1986

AREAS OF EXPERTISE
> Historic and Prehistoric Archaeology
> Native American Coordination and Consultation
> Section 106 and CEQA Compliance
> Architectural History
> Environmental Compliance Inspection and Monitoring
> Independent Contracting

MILITARY SERVICE

SPECIAL TRAINING
> Completed Section 106 and Historic Architecture Seminar, City of Los Angeles (SWCA staff), April 2012.
> Completed County of Riverside archaeological training/permitting program. 2005, 2010.
> Completed County of San Diego archaeological training/permitting program. 2008, 2012.

EQUIPMENT

AFFILIATIONS
> Register of Professional Archaeologists (RPA) since 2002.
> Society for American Archaeology (SAA) since 1999.
> BLM-California Statewide Survey Permit 2014.
> State of Oregon Registered Archaeologist. 2014.

PUBLICATIONS
> Author. 2013. HPSR (HRER/ASR). Caltrans District 6 Fulton Mall Redevelopment Project. Draft submitted July 2013 and final submitted August 2013.

EXPERIENCE SUMMARY

Mr. Dice is a Registered Professional Archaeologist specializing in archaeology and cultural resource management. He has conducted more than 200 cultural resource survey, testing, monitoring, data recovery, and inspection/monitoring/restoration projects in California, Arizona, Utah, Colorado and New Mexico. He has participated in a wide range of projects for local, state, and federal agencies, as well as for major utilities and project developers. Very active in the field as the primary archaeologist during field research, his studies have involved housing tracts, commercial tracts, high voltage transmission lines, natural gas pipelines, telecommunications facilities, and transportation projects. His experience includes projects on BLM lands in California, Arizona and New Mexico.

Kinder Morgan, Mojave Line No. 1901 Replacement Project, California

POWER Engineers provided environmental project and task management during the permitting phase of the Line No. 1901 Replacement Project, which replaced existing 30-inch-diameter pipe with thicker-walled pipe along a section of the existing Mojave Pipeline in Kern County, California. Pipe replacement was on privately owned land, as well as lands managed by the BLM. The project was subject to environmental review under NEPA; FERC was the lead federal agency. The project was also subject to BLM jurisdiction. POWER services included biological and cultural resource surveys, preparation of the Environmental Report for the FERC application, and more.

PREVIOUS WORK HISTORY

Caltrans, HPSR/HRER/ASR Projects, California

Principle Investigator for various Caltrans projects in southern California: wrote and teamed with colleagues on multiple projects requiring cultural resource compliance. Projects included new transportation-related infrastructure or federal roadway/transit-funded projects in Riverside, San Bernardino, Orange and Fresno Counties. Historic Property Survey Reports, supported by Archaeological Survey Reports and Historic Resource Evaluation Reports (written by colleagues) were developed and submitted.

California Department of Corrections, Cultural Resource Support, California

Cultural Resources Specialist associated with MND's and EIR's for improvements to state prisons in San Luis Obispo, San Diego, Los Angeles and Riverside counties.

> Lead author. 2011. Class III Cultural Resource Assessment for the LADWP Powerline Road Maintenance Project: Victorville to Baker Segment, County of San Bernardino, California. BLM ARPA Permit #CA-10-05, California Field Authorization Permit #FA-680-11-14 (acreage: BLM 685.234, State Lands Commission 24.196, Private /Unclassified 402.305. Michael Brandman Associates #0575.0043.

> Lead Author. 2013. Cultural Resources Survey and Assessment of the Dunnigan Specific Plan, Phase 1 Project Area. County of Yolo, California. Michael Brandman Associates #0575.0043.

> Lead Author. 2009. Phase I Archaeological Survey, Phase II Cultural Resources Assessment and Paleontological Records Review for the Barstow Industrial Park Specific Plan of 1,150 Acres. City of Barstow, San Bernardino County, California. Michael Brandman Associates #2958.0002.

City of Barstow, Barstow Industrial Park Phase I Survey and Phase II Significance Assessment, California

Lead Archaeologist in support of a large redevelopment project in the City of Barstow. Designed project methodology (Phase 1, Phase II and Phase III), directed and led a team of five archaeologists during survey of approximately 1,150 acres of former agricultural and vacant dune land lying adjacent to the east bank of the Mojave River. Rediscovered eight archaeological sites and two low-number RIV archaeological sites then tested a series of these sites with a group of four archaeologists. Conducted work with Native American monitors, and personally performed consultations with tribes for the City of Barstow. Wrote EIR section, which gained approval from City staff.

Various State-level Architectural History Projects: Evaluating Historic Buildings for Significance under CEQA Guidelines

Architectural Historian responsible for analyzing a series of historic-era buildings in multiple jurisdictions. Designed project-level analyses and undertook numerous individual historical building surveys and CEQA-level evaluations within the following jurisdictions: City of La Verne, CA (The Whitney Building), the City of Banning, CA. (The San Gorgonio Inn), The City of Long Beach (F&M Artesia Bank Building), The City of Santa Fe Springs, CA. (Premier Lanes Bowling Alley, Washington Boulevard Redevelopment District, Consolidated Redevelopment District), The City of Chino (Alfa Leisure Building).

City of Fresno, Fulton Mall Redevelopment Project, California

Cultural Resources Specialist and report author in support of various City of Fresno General Plan and EIR Projects. Wrote certain technical sections of the City's General Plan EIR, wrote the technical sections of the Fresno Mall Redevelopment EIR. Also responsible for compiling the HPSR/HRER/ASR (federal) portions of the project and funneling the draft and final reports through Caltrans District 6 staff prior to the development of the FOE.

Los Angeles, Riverside, Kings and Kern Counties, Silverado Power Passive Solar Farm Projects, California

Lead Archaeologist and report author for a series of proposed solar power stations in multiple counties. Designed project methodology for each, then directed and led a team of cultural resource specialists on survey of over 2,000 acres at 14 different locations of proposed utility-scale power plants in four different counties during a four-year competitive contract period. Numerous historic-era archaeological sites and prehistoric sites were encountered. Each project survey report was written to meet CEQA and Section 106 guidelines due anticipated future involvement with federal agencies, including FERC, ACOE and the BLM.

Los Angeles Department of Water and Power, On-Call Cultural Services Support, California

Lead Archaeologist responsible for providing rapid response cultural resource services in support of various LADWP projects in southern California and the Eastern Sierras. Projects included the Van Norman Dam Project, the Harbor Refineries Project, the Griffith Park Development

Project, the Olancha Overcrossing Project, the Victorville to Baker Powerline Road Maintenance Project, the Pine Creek - Rovana Meter Replacement Project, the Hines Spring Well Project, and the Owens Lake Solar Demonstration Project.

LA-RICS Authority, "LTE" Project Sites, California

Cultural Resources Specialist for the Authority subcontractor, Ultrasystems, Inc. Designed the process for architectural history and archaeological site visitations, performed archaeological site visits at 50 LTE locations, helped to develop the cultural resource section of the project EA, developed the databases associated with raw data management, and visited dozens of historic buildings as part of the FCC Form 620 assessments.

Riverside County Waste Management Department, Badlands Landfill and Lamb Canyon Landfill Expansion Projects, California

Lead Cultural Resources Specialist and report author in support of two Riverside County landfill projects. Designed project methodology for each, then directed and led a team of archaeologists and paleontologists on a total of 1000 acres adjacent to the existing Badlands Landfill and approximately 600 acres adjacent to the Lamb Canyon Landfill, both in the County of Riverside. The purpose of the studies was to evaluate adjacent property as part of an analysis for potential impacts during expansion of the Landfills, and the reports would support EIR's written by County staff. Several new resources were detected and recorded during the study. While RCWMD will not construct for several decades, the sites will be avoided when land development takes place in the site areas. Conducted consultations with local Tribal Authorities.

City of Moreno Valley, Phase I Survey, Phase II Historical Evaluation and Phase IV Monitoring for the World Center Specific Plan, California

Lead Archaeologist for two developmental projects, one project-level and the other program-level, for Highland Fairview's World Specific Plan. Undertook a Phase 1 survey of 3,200 acres of fallow agricultural property, in addition to other properties controlled by the proponent, and then headed a team of cultural professionals performing historic building evaluations and Phase II tests of archaeological sites. Led a field crew of monitors during the earth-moving phase of complex construction. Evaluated several historic era buildings and more than one dozen archaeological sites. Conducted consultations with local tribal authorities.

Colgreen Energy, Felicity and North Salton Sea Passive Solar Farm Projects, California

Cultural Resources Specialist and co-project coordinator for two proposed solar power stations in southeast California. Colgreen Energy of El Centro, CA initiated development of two 480 acre passive solar power stations, one near the Salton Sea and another northwest of the Quechan Reservation. Led the archaeological surveys with a team of archaeological technicians, and then tested previously recorded and newly discovered archaeological sites. Reports were provided to the County of Riverside and the County of El Centro.

REBEKKA KNIERIM

ARCHAEOLOGIST

YEARS OF EXPERIENCE

5

EDUCATION

- B.A., Anthropology, Humboldt State University, 2007
- M.A., Anthropology, California State University, Los Angeles, 2015

AREAS OF EXPERTISE

> Pedestrian survey
> Site excavation
> Construction monitoring
> Curation and analysis

MILITARY SERVICE

SEMINARS

> Conference Presenter, 2014. Rebekka G. Knierim, René L. Vellanoweth. Residue Analyses from a Ceremonial Stone Mortar on San Nicolas Island, California. 79th Annual Meeting of the Society for American Archaeology, Austin, TX.
> Conference Presenter, 2013. William E. Kendig, Rebekka G. Knierim, Nicholas W. Poister, Lisa Thomas-Barnett, René L. Vellanoweth, Jon M. Erlandson, and Steven J. Schwartz. Documenting the Excavation of the Redwood Box Cache from San Nicolas Island, California. 47th Annual Meeting of the Society for California Archaeology, Berkeley, CA.
> Conference Presenter, 2012. William E. Kendig, Rebekka G. Knierim, Lisa Thomas-Barnett, René L. Vellanoweth, Jon M. Erlandson, and Steven J. Schwartz. (Eighth California Island Symposium) Photographic Documentation of the Discovery and Excavation of the Redwood Box Cache from CA-SNI-14 on San Nicolas Island, California. 8th California Islands Symposium, Ventura, CA.
> Conference Presenter, 2011. Rebekka G. Knierim, Barney G. Bartelle, and René L. Vellanoweth. The Balancing Stone Features of Tule Creek Village, San

EXPERIENCE SUMMARY

Ms. Knierim is experienced in cultural resource management and brings expertise with pedestrian surveys, test excavation and data recovery at prehistoric and historic sites throughout California, Oregon and Montana. Sites have included complex cultural stratigraphy, and a prehistoric ritual locale. She has served as a crew leader involved in coordination and execution of field work. Her laboratory experience includes cleaning, sorting, cataloguing, and curation according to federal requirements. She has experience setting up archival systems and curation methods. Ms. Knierim also brings tribal consultation experience.

Los Angeles Department of Water and Power, Barren Ridge EIS/EIR, California

Archaeologist responsible for conducting pedestrian surveys, site testing, and ongoing monitoring. The project would provide the City with access to wind- and solar-generated power in the Tehachapi Mountain and Mojave Desert areas of southern California. It would improve system reliability and help the City meet its Renewable Portfolio Standard obligations mandated by the State of California and the City of Los Angeles. The project includes new and upgraded double circuit lines over a distance of 200 miles.

Los Angeles Department of Water and Power, Environmental Surveys, Monitoring and Mitigation, Celilo to Sylmar 500 kV DC Transmission Line, California

Archaeologist who participated in the archaeology survey. POWER conducted biological and cultural resource surveys, mitigation monitoring, and revegetation efforts at various sites along the Celilo-Sylmar 500 kV Transmission Line. Twenty-three tower spans on the line had been found to be in violation of new ground-to-conductor separation distance standards by the North American Electric Reliability Corporation, requiring LADWP to either raise the height of existing towers or excavate areas that were in violation. POWER provided preconstruction resource surveys at all 23 sites and, with concurrence from the BLM, provided biological monitoring at five sites and cultural monitoring at one site.

NorthWestern Energy, Jackrabbit to Big Sky 161 kV Transmission Line EIS, Montana

Archaeologist who participated in the survey and testing. POWER prepared an Environmental Impact Statement (EIS) as a third-party contractor to the US Forest Service for the proposed rebuild and upgrade of an existing 69 kV transmission line. POWER prepared an Environmental Impact Statement (EIS) as a third-party contractor to the US Forest Service for the proposed rebuild and upgrade of an existing 69 kV transmission line in Gallatin County, Montana. NorthWestern Energy has applied to the Forest Service to

Nicolas Island, California. 45th Annual Meeting of the Society for California Archaeology, Rohnert Park, CA

> Conference Presenter. 2011. Richard Guttenberg, William Kendig, Rebekka Knierim, Steven Schwartz and René Vellanoweth. GIS as a Tool for Analyzing Intrasite Spatial Variability on San Nicolas Island. 76th Annual Meeting for the Society for American Archaeology, Sacramento, CA.

> Conference Presenter. 2008. Rebekka G. Knierim, Johanna V. Marty, and René L. Vellanoweth. The Significance of Iron-Rich Objects at Tule Creek Village (CA-SNI-25), San Nicolas Island, California. 42nd Annual Meeting of the Society for California Archaeology, Burbank, CA

> Conference Presenter. 2008. Rebekka G. Knierim and René L. Vellanoweth. Buried Brilliance: A Spatial Analysis of Red Ochre from Tule Creek Village (CA-SNI-25). 7th California Island Symposium, Oxnard, CA

> Conference Presenter, 2008. Barney Bartelle, Johanna Marty, Lisbet Husby-Gerry, William E. Kendig, Rebekka G. Knierim, and René Vellanoweth. Analysis of A Newly Discovered Dog Burial from San Nicolas Island, California. 42nd Annual Meeting of the Society for California Archaeology, Burbank, CA

> Conference Presenter, 2007. René L. Vellanoweth, Barney G. Bartelle, William E. Kendig, Rebekka G. Dozier and Amanda C. Cannon. The Role of Animals and Plants in Ritual Contexts at Tule Creek Village, San Nicolas Island, California 41st Annual Meeting of the Society for California Archaeology, San Jose, CA

EQUIPMENT

PUBLICATIONS

> Knierim, Rebekka G., René L. Vellanoweth, William E. Kendig, Barney G. Bartelle, and Richard B. Guttenberg. 2013. Portable Religious Stone Features from a Ceremonial Complex on San Nicolas Island, California. Journal of California and Great Basin Anthropology 33(1):39-51.

> Guttenberg, Richard B., René L. Vellanoweth, William E. Kendig,

amend its existing Special Use Permit for the operation of the transmission line in Gallatin National Forest to allow an upgrade to 161kV. Issues include Gallatin River crossings, Forest Service recreational residences, raptors and other avian species, timber harvesting and vegetation management, cultural resources, and visual impacts.

Renewable Resources Group, Palo Verde Mesa Solar, California

Archaeologist who participated in the survey supporting preparation of a joint EIR and EA (CEQA and NEPA) for a new 485 MW photovoltaic solar project. Duties included site documentation and photographing of sites and isolates. POWER supported Renewable Resources Group and Riverside County in preparing an Environmental Impact Report (EIR) for the 470 MW Palo Verde Mesa Solar PV project, which will connect to Southern California Edison's Colorado River Substation. POWER provided assistance in all phases of the environmental process, including support in preparation of technical reports required for the project, which includes a 3,250-acre solar facility and proposed 14-5 mile 230 kV transmission line.

Los Angeles Department of Water and Power, Southern Owens Valley Solar Ranch EIR, California

Archaeologist who participated in the archaeological survey, testing, and artifact illustration. POWER prepared an Environmental Impact Report (EIR) for an LADWP solar project located on City-owned lands within the Owens Valley in Inyo County, CA. The project will be a 200 MW solar photovoltaic (PV) project on approximately 3,000 acres. POWER prepared technical studies to evaluate proposed and alternative project sites, prepared visual simulations, and performed intensive cultural resource evaluations.

California Pacific and Electric Company (CalPeco), 625 kV and 650 kV Transmission Line Upgrades, Lake Tahoe, California

Archaeologist who participated in the cultural survey from the Truckee substation to the Kings Beach Switching Station for the 650 kV line upgrade and from Kings Beach to the Tahoe City Substation for the 625 kV upgrade. POWER was subcontracted by Ascent Environmental Inc. for this cultural survey. POWER completed the survey and submitted a cultural resources inventory addendum report.

PREVIOUS WORK HISTORY

Bell Ranch Desalter Project Survey, Camarillo, California

Sole surveyor responsible for identifying, photographing, and recording on Trimble GPS cultural resources on an avocado, lemon, and celery ranch covering several hundred acres and including an ephemeral watercourse.

Suncrest Project, San Diego Gas and Electric, California

Sole cultural field technician with biologist, responsible for conducting surface survey of area covering several hundred acres on private land adjacent to the Cleveland National Forest. Also inspected previously recorded bedrock mortar site. Photographed finds and documented finds on Trimble GPS.

Rebekka G. Knierim, and Steven J. Schwartz. 2013. Geographic Information Systems as a Tool for Analyzing Intrasite Spatial Variability on San Nicolas Island, California. In: Small Islands, Big Implications: The California Channel Islands and Their Archaeological Contributions. Jennifer Perry and Christopher Jazwa, editors. University of Utah Press.

Tenderfoot 12kV, Southern California Edison, California

Field technician responsible for monitoring for cultural resources at a historic mining archaeological site for laying of ½ mile long electric line. Recorded on Trimble GPS and photographed trenching activity, and relocated several features and isolates.

YMCA Construction Project Salvage Excavation, Santa Monica, California

Field technician, responsible for screen sifting and identifying human remains and prehistoric artifacts salvaged from bulldozer bucket loads during construction of YMCA building on approximately three acre area. Human bone was bagged and sent for curation.

Trinidad Museum Society, Trinidad, California

Lead archivist and archaeological consultant for museum. Developed archival system, accessioned new acquisitions, and curated artifacts. Researched and curated Native American artifacts from Tsurai site (CA-HUM-169), and currently writing report on Tsurai artifact collection to be housed in museum archives.

Scotia Inn Construction, General Excavation, California

Field technician participating in an open area salvage excavation, wet screening, and mapping of remains of historic hotel destroyed by fire on approximately half an acre. Responsibilities also included teaching grade school children about archaeological methods, specifically identifying historical artifacts and wet screening.

Pacific Gas and Electric Substation Reliability Project, California

Lead monitor responsible for identifying historic or prehistoric cultural resources during excavations for footings for new substation. Recorded and photographed historical finds and completed DPR forms in accordance with federal regulations.

Highway 127 AT&T Fiber Optic Cable Survey and Testing, California

Field technician responsible for identifying, photographing, and recording on Trimble GPS prehistoric and historic sites and isolates along Highway 127 in compliance with installation for fiber optic cable through the BLM, Barstow field office. Responsible for excavating test units using square shovel and breaker bar.

RBF Indio Varner and Jefferson Interchange Project, California

Field technician responsible for monitoring for cultural resources for road widening project. Activity occurred on either side of roads by eight feet and ran about 100 feet in length radiating from junction of Varner Road and Jefferson Road. Construction covered a portion of a known Native American

lakeside fishing camp. A number of surface artifacts were flagged, photographed, recorded on Trimble GPS, and in case of destruction, were collected and bagged for curation.

Terra-Gen Wind Farm, Mojave, California

Field technician responsible for monitoring for paleontological resources. Sediments were collected from several locations, wet-sifted in graded screens, and picked for micro-fossils. Spoils piles from excavators creating pads for wind turbines were inspected for fossils, and surface specimens located anywhere in the project area were collected. Project covered thousands of acres.

United States Navy, Special Excavation, San Nicolas Island, California

Excavation illustrator responsible for drawing contents of two redwood boxes discovered in seaside cliff cache dating to late 1700s – early 1800s by Native American with access to historic resources such as glass and metal. Excavation in accordance with Section 110 of the Code of Federal Regulations for the US Navy.

Redwood National Park, Testing, Hiouchi, California

Field technician responsible for excavating shovel tests in preparation for construction of new sewage system for dormitory for Redwood National Park rangers and interns. Site was mapped using theodolite and finds were bagged and collected. Consultation with Tolowa tribe was conducted and tribal members inspected site.

Santa Susana Field Laboratory, Santa Susana, California

Monitor responsible for identifying cultural resources during soil study at nuclear power plant for California EPA. Duties included inspecting liter-sized samples of soil augured and bagged to be sent to lab to be measured for radiation levels. Vegetation removal was monitored in preparation for large scale ground penetrating radar for measuring radiation levels in preparation for turnover of power plant site to California State Parks and Recreation.

El Segundo Energy Center, NRG Energy Incorporated, California

Monitor responsible for identifying historic and prehistoric cultural resources and paleontological resources for construction of new power plant and upgrading of existing power plant. Historic resources were discovered and photographed and recorded.

Sunshine Canyon Landfill, Sylmar, California

Field technician conducting odor survey around adjacent residential neighborhood on behalf of landfill for public relations purposes. Responsible for monitoring for marine paleontological resources during continual construction and excavation at landfill site covering approximately 1-2 square mile of ground.

Administration and Theatre Building Construction, College of the

Redwoods, Eureka, California

Monitor responsible for identifying cultural resources on behalf of the Bear River Band of the Rohnerville Rancheria during excavations for construction of building on approximately five square acres. Potential finds were photographed and recorded.

Mendocino Redwood Company Timber Harvest Plan, Larrabee Creek, California

Field technician responsible for surveying Native American village site, recording isolates, and mapping rock shelter for timber harvest plan use on behalf of the Bear River Band of the Rohnerville Rancheria.

Graduate Teaching Assistant, California State University, Los Angeles, California

Taught graduate and undergraduate students open-area excavation techniques for San Nicolas Island field school. Responsibilities included teaching mapping techniques, stratigraphic excavation methods, identifying and recording discrete features, as well as artifact and material identification.

EEC ORIGINAL PKG

APPENDIX E – PALEONTOLOGICAL RESOURCES ASSESSMENT AND SURVEY FOR THE ORMAT NEVADA, INC. TRUCKHAVEN 3D SEISMIC PROJECT

Paleontological Resource Assessment and Survey for the Ormat Nevada, Inc. Truckhaven 3D Seismic Project, Imperial County, California

BLM Paleontological Resources Use Permit # CA-15-13P

California Department of Parks and Recreation Paleontological Investigations/Collections Permit

Heather L. Clifford and Jessica L. DeBusk

Prepared By

Applied EarthWorks, Inc.
133 N. San Gabriel Blvd., Suite 201
Pasadena, CA 91107-3414

Prepared For

POWER Engineers, Inc.
Attn: Michael Dice
731 E Ball Rd, Suite 100
Anaheim, CA 92805

And

Bureau of Land Management, El Centro Field Office
Attn: Carrie L. Simmons, Acting Field Manager
1661 S. 4th Street
El Centro, CA 92243

And

CA Department of Parks and Recreation
Attn: Lyndon K. Murray, CDD District Paleontologist
Resource Management Division
P.O. Box 942896
Sacramento, CA 94296

March 2017

EXECUTIVE SUMMARY

At the request of POWER Engineers Inc. (POWER), on behalf of Ormat Nevada, Inc. (Ormat), Applied EarthWorks, Inc. (Æ) was retained to conduct a paleontological resources assessment for the Truckhaven 3D Seismic Data Acquisition Project in Imperial County, California. The study consisted of a museum records search, literature review, field survey, and preparation of this technical report, which provides Project-specific management recommendations.

This assessment included a comprehensive review of published and unpublished literature and museum collections records maintained by the Natural History Museum of Los Angeles County. The purpose of the literature review and museum records search was to identify the geologic units underlying the Project area and to determine whether previously recorded paleontological localities occur either within the Project boundaries or within the same geologic units elsewhere. The museum records search was supplemented by a search of the University of California Museum of Paleontology's online collections database. Using the results of museum records search and literature review, the paleontological resource potential and Potential Fossil Yield Classification (PFYC) of geologic units within the Project area was recommended in accordance with the Society of Vertebrate Paleontology (2010) and BLM (2008) guidelines, respectively.

As a result of this study, the Pliocene to Holocene geologic units underlying the Project area have a recommended paleontological sensitivity of low (PFYC Class 2) to very high (PFYC Class 5), pending concurrence with the BLM. Consequently, the likelihood of impacting scientifically significant vertebrate fossils as a result of Project development is high. Although a review of available online museum records indicated that no paleontological resources have been found within the Project area, geologic units underlying the Project area have been known to yield significant fossils nearby. Therefore, it is recommended that a Management Strategy with Project-specific mitigation measures be established in order to protect paleontological resources from inadvertent damage, including retaining a qualified paleontologist to develop and implement a Paleontological Resource Mitigation Plan and oversee monitoring efforts during ground disturbance. With the successful implementation of the Management Strategy described in Chapter 8 of this report, potential adverse effects to paleontological resources would be reduced, consistent with federal, state, and local laws and regulations, including the National Environmental Policy Act, the Paleontological Resources Preservation Act, and the California Environmental Quality Act, among others.

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FIGURES

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APPENDICES

1
INTRODUCTION

At the request of POWER Engineers Inc. (POWER), on behalf of Ormat Nevada, Inc. (Ormat), Applied EarthWorks, Inc. (Æ) was retained to conduct a paleontological resources assessment and survey for the Truckhaven three-dimensional (3D) Seismic Project in Imperial County, California (Figure 1-1). The study consisted of a museum records search, literature review, field survey, and preparation of this technical report that provides Project-specific management recommendations. This assessment and survey was performed to satisfy the requirements of the National Environmental Protection Act (NEPA) and the California Environmental Quality Act (CEQA) and was conducted in accordance with the professional standards and guidelines set forth by the with Bureau of Land Management (BLM) (1998a, 1998b) and the Society of Vertebrate Paleontology (SVP) (2010).

1.1 PROJECT LOCATION

The Project area is approximately 40 miles south of the City of Indio and 50 miles north of the City of El Centro, along California State Route 86 (SR 86) in unincorporated Imperial County. The Project footprint consists of approximately 16,640 acres on public and privately-held lands. Specifically, the Project area is mapped within portions of Township 10 South, Range 9 East, Sections 25-26 and 35-36; Township 10 South, Range 10 East, Sections 27-34; Township 11 South, Range 9 East, Sections 1-2, 11-14, and 23-24; and Township 11 South, Range 10 East, Sections 3-10 and 15-22 on the Kane Spring NW and Truckhaven, CA 7.5-minute U.S. Geological Survey quadrangles (Figure 1-2).

1.2 PROJECT DESCRIPTION AND BACKGROUND

Ormat proposes to complete a 3D geophysical data acquisition seismic investigation on a block of land along the southwestern shore of the Salton Sea. The purpose of the seismic survey is to evaluate potential subsurface geothermal resources located at the north end of the joint BLM-State of California Truckhaven Geothermal Lease Area (TGLA) and to allow Ormat to locate geothermal test wells at the most ideal location. The geophysical field analysis will be conducted by a specialized contractor, Geokinetics USA, Inc. (Geokinetics), retained by Ormat. Geokinetics will design the on-site data acquisition equipment array, which is required for retrieval of seismic data and will be installed on the ground surface of the Project area.

The Project area encompasses approximately 26 square miles (~16,640 acres) on lands that are managed by public (state and federal) agencies or are privately owned. Portions of the public lands are managed by the U.S. Department of the Interior, BLM, the California Department of Parks and Recreation (DPR) as part of the Ocotillo Wells State Vehicular Recreation Area (SVRA), and California State Lands Commission (SLC). The County of Imperial manages 320 acres of land inside the boundary of the SVRA as a landfill; Ormat holds a mineral lease beneath the landfill. Private land is within unincorporated portions of the County of Imperial. For this Project, the BLM will serve as the Federal Lead Agency and the County of Imperial will serve as

the CEQA Lead Agency. As a result, in order to comply with federal and state law, DPR regulations, and in accordance with BLM (1998a, 1998b) guidelines, the Project area will be subject to a paleontological resource assessment and survey prior to the issuance of permits for any 3D seismic data acquisition work on BLM, State, or County land.

The Ormat/ Geokinetics team has considered various designs for placement of the data acquisition equipment array (e.g., source locations and receiver locations) in order to maximize seismic data quality while minimizing environmental impact. During the design phase of the Project, the Geokinetics field team will be accompanied by a multi-disciplinary environmental survey team in order to evaluate the local environmental conditions in real-time and avoid placing proposed source and receiver locations within sensitive areas. A portion of the seismic array for the Project area has already been designed; over the course of 16 days between April 26 to May 13, 2016, Geokinetics, together with an environmental survey team, mapped approximately 60 percent of the proposed data acquisition equipment array for the Project (refer to Chapter 6 for the survey results). The remaining seismic array design and the environmental survey will be completed at a future, unspecified date.

Following completion of the data acquisition equipment array design, receiver points and source points will be placed generally 200 feet apart along parallel lines spaced approximately 1,200 feet apart. The Project would include approximately 3,168 receiver points distributed over approximately 119.09 linear miles of receiver lines (24 receiver transects) and 3,243 source points distributed over approximately 121.97 linear miles of source lines (23 source transects). Ground disturbance will include insertion of the Geophone Node (Z Land Gen 2 type) holding spike into the ground surface, and surficial disturbance and ground vibration along the Vibroseis truck drive paths, as well as all proposed access routes, work areas, and test well pads. The holding spike is about 4.5 inches long and the wireless node is approximately 5 inches in diameter (POWER Engineers, Inc., 2016).

1.3 PURPOSE OF INVESTIGATION

The purpose of this investigation is to: (1) identify the geologic units within the Project area and assess their paleontological resource potential; (2) determine whether the Project has the potential to adversely impact known scientifically significant paleontological resources; (3) provide Project-specific management recommendations for paleontological resources mitigation, as necessary; and (4) demonstrate compliance with the Paleontological Resources Preservation Act (PRPA), NEPA, and CEQA. All work was conducted in accordance with professional standards and guidelines set forth by the BLM (2008, 1998a, 1998b), Society of Vertebrate Paleontology (SVP) (2010), and meets the requirements of PRPA and all other federal laws and regulations described in Chapter 2.

1.4 REPORT ORGANIZATION

This report documents the results of Æ's paleontological resources assessment of the Project area. Chapter 1 has introduced the scope of work, identified the Project location, described the Project, and defined the purpose of the investigation. Chapter 2 outlines the regulatory framework governing the Project. Chapter 3 presents the paleontological resource guidelines and professional standards used for this study, and Chapter 4 presents the methods. The geology and

paleontology of the Project area are discussed in Chapter 5, and the results of the field survey are presented in Chapter 6. The museum record search and paleontological sensitivity analysis are discussed in Chapter 7. Findings and management recommendations are provided in Chapter 8, followed by conclusions in Chapter 9, with a list of references in Chapter 10.

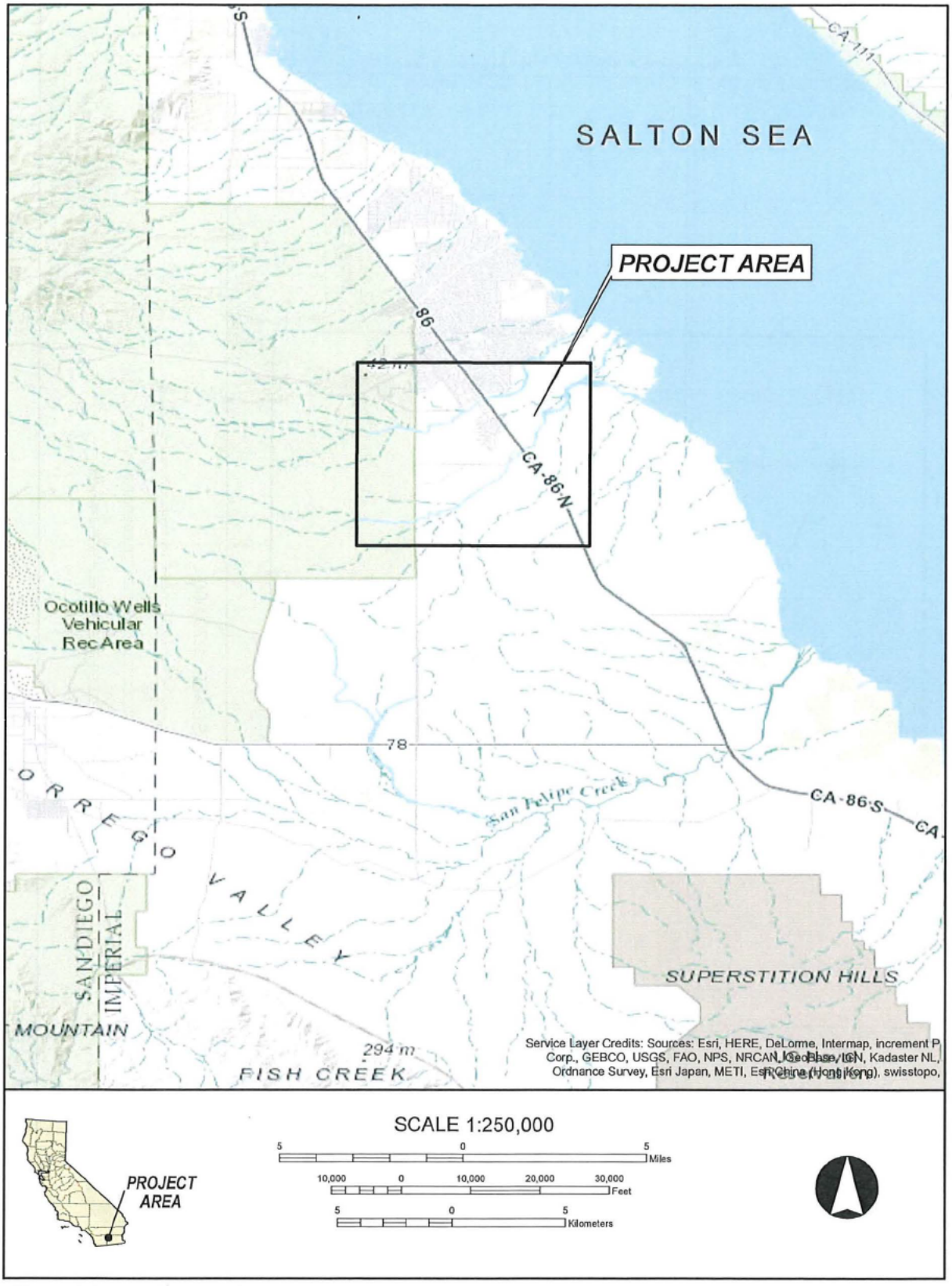


Figure 1-1 Project vicinity map.

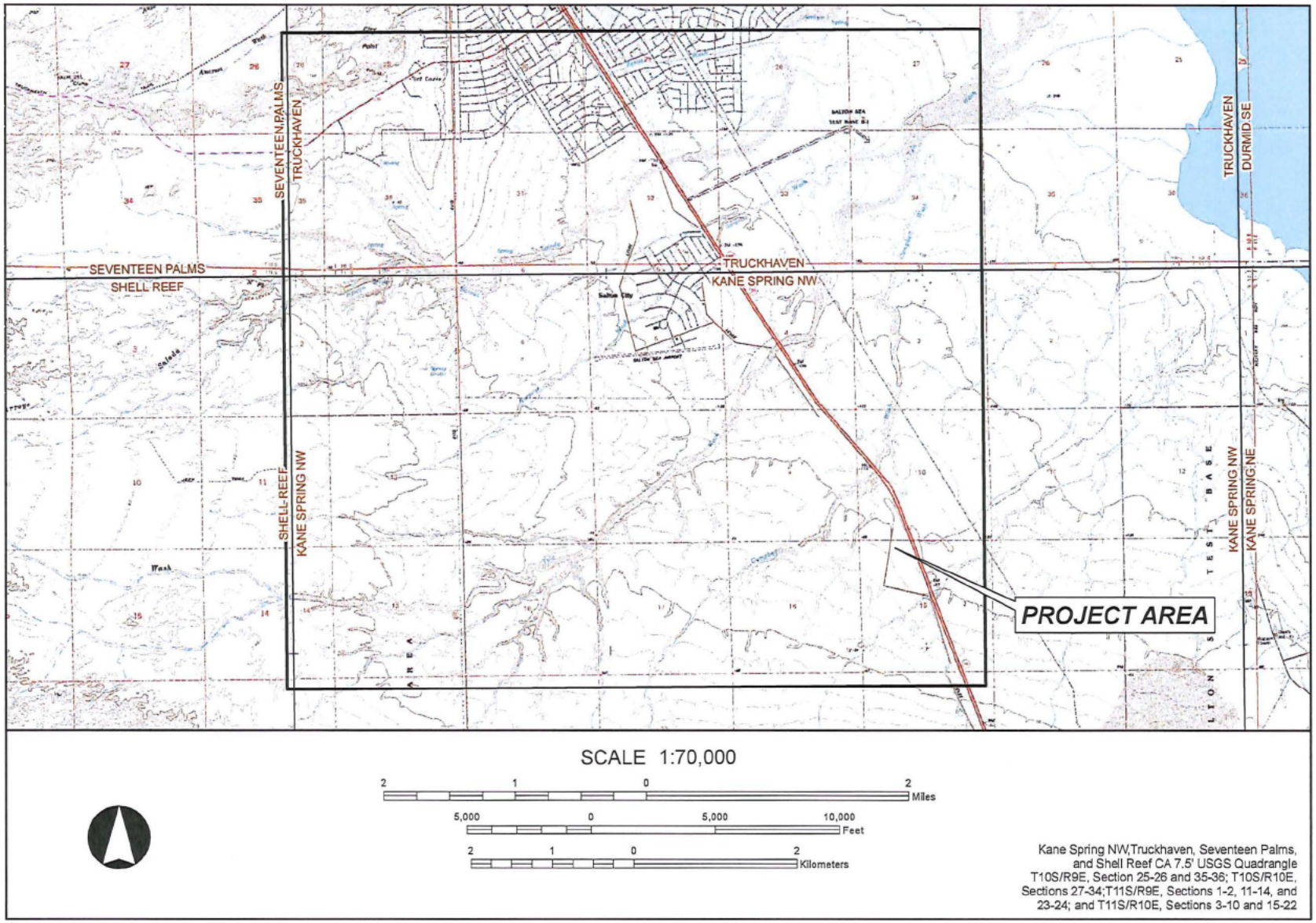


Figure 1-2 Project location map.

2
REGULATORY ENVIRONMENT

Paleontological resources (i.e., fossils) are considered nonrenewable scientific resources because once destroyed, they cannot be replaced. As such, paleontological resources are afforded protection under the various federal, state, and local laws and regulations. Federal laws and regulations apply only when projects are on federal lands or federally managed lands, or when they are federally funded. A portion of this Project is on BLM-managed lands and federal laws will apply. This Project also encompasses lands administered by the California Department of Parks and Recreation, local governments, and privately-held lands; therefore, state and local laws will also apply. This paleontological assessment complies with the guidelines summarized below as well as professional standards set forth by the SVP (2010).

2.1 FEDERAL LAWS, REGULATIONS, AND GUIDELINES

Relevant federal laws include the National Environmental Policy Act of 1969 and the Federal Land Policy and Management Act of 1976. Additionally, the Paleontological Resources Preservation Act was recently enacted as a result of the passage of the Omnibus Public Lands Management Act of 2009. The PRPA requires federal land management agencies to manage and protect paleontological resources and affirms the authority of existing policies already in place. These are discussed in more detail in the following sections. Further, the BLM has set forth guidelines for the management of paleontological resources in BLM Instruction Memorandum (IM) No. 2009-011 (2008), Handbook (H) 8270 (BLM, 1998a), and H-8270-1 (BLM, 1998b).

2.1.1 National Environmental Policy Act of 1969 (42 U.S.C. 4321, 4331–4335)

NEPA was enacted to promote "efforts which will prevent or eliminate damage to the environment and . . . preserve important historic, cultural, and natural aspects of our national heritage" (National Park Service [NPS], 2006, p. 101–102).

Section 102(2)(A) of NEPA requires that all federal agencies "utilize a systematic, interdisciplinary approach" to make informed, publicly supported decisions regarding environmental issues (NPS, 2006, p.101). Section 102 also specifies the cooperation of agencies to:

> (B) identify and develop methods and procedures, which will ensure that presently unquantified environmental amenities and values may be given appropriate consideration in decision making along with economic and technical considerations;
>
> (C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on—
>
> (i) the environmental impact of the proposed action,

(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,

(iii) alternatives to the proposed action,

(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

. . . . . .

(E) study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources.

2.1.2 Paleontological Resources Preservation Act (16 U.S.C. 470aaa)

The Paleontological Resources Preservation Act (16 United States Code [U.S.C.] 470aaa et seq.) was enacted as a result of the passage of the Omnibus Public Lands Management Act (OPLA) of 2009 (Public Law 111-011, Title VI, Subtitle D). The OPLA-PRPA requires federal land management agencies to manage and protect paleontological resources and affirms the authority of existing policies and guidelines already in place (BLM, 2008, 2012; U.S. Forest Service [USFS], 2005). As a result of the recent enactment of the OPLA-PRPA, federal agencies will begin developing "appropriate plans for inventory, monitoring, and the scientific and educational use of paleontological resources in accordance with applicable agency laws, regulations, and policies" (OPLA Section 6302[a]). Specifically, implementation of the OPLA-PRPA shall include programs which increase public awareness of paleontological resources, govern the collection of paleontological resources and curation, define illegal activities (e.g., unauthorized excavation, removal, false labeling, or damage to fossil resources), and set penalties for prohibited acts.

2.1.3 Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701–1782)

The Federal Land Policy and Management Act (FLPMA) of 1976 requires that public lands be managed in a manner that will protect the quality of their scientific values. It was established as a public land policy to "provide for the management, protection, development, and enhancement of the public lands" (BLM and Office of the Solicitor, 2001, p. 60). FLPMA requires federal agencies to manage public lands so that environmental, historic, archeological, and scientific resources are preserved and protected, where appropriate. Although FLPMA does not refer specifically to fossils, the law does protect scientific resources, which includes significant fossils, including vertebrate remains.

FLPMA regulates the use and development of public lands and resources through easements, licenses, and permits. The law requires that public lands be inventoried so that the data can be used to make informed land-use decisions and requires permits for the use, occupancy, and development of the certain public lands, including the collection of significant fossils for scientific purposes.

2.2 STATE

2.2.1 California Environmental Quality Act

Paleontological resources cannot be replaced once they are destroyed. Therefore, paleontological resources are considered nonrenewable scientific resources and are protected under the CEQA. Specifically, in Section V(c) of Appendix G of the CEQA Guidelines, the "Environmental Checklist Form," the question is posed: "Will the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?" In order to determine the uniqueness of a given paleontological resource, it must first be identified or recovered (i.e., salvaged). Therefore, mitigation of adverse impacts to paleontological resources is mandated by CEQA.

2.2.2 California Public Resources Code

PRC 5097.5 affirms that no person shall willingly or knowingly excavate, remove, or otherwise destroy a vertebrate paleontological site or paleontological feature without the express permission of the overseeing public land agency. It further states under PRC 30244 that any development that would adversely impact paleontological resources shall require reasonable mitigation. These regulations apply to projects on land owned by or under the jurisdiction of the state or city, county, district, or other public agency (California Office of Historic Preservation, 2005).

2.3 LOCAL

2.3.1 Imperial County

Imperial County does not have mitigation requirements that specifically address potential adverse impacts to paleontological resources.

3
PALEONTOLOGICAL SIGNIFICANCE AND RESOURCE CLASSIFICATION

3.1 DEFINITION OF PALEONTOLOGICAL RESOURCES

Paleontological resources are the evidence of once-living organisms as preserved in the rock record. They include both the fossilized remains of ancient plants and animals and the traces thereof (trackways, imprints, burrows, etc.). In general, fossils are considered to be older than recorded human history or greater than 5,000 years old (middle Holocene) and are typically preserved in sedimentary rocks. Although rare, fossils also can be preserved in volcanic rocks and low-grade metamorphic rocks formed under certain conditions (SVP, 2010).

Paleontological resources can provide important taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, or biochronological data. These data are important because they are used to examine evolutionary relationships, provide insight on the development of and interaction between biological communities, establish time scales for geologic studies, and for many other scientific purposes (Scott and Springer, 2003; SVP, 2010).

3.2 PALEONTOLOGICAL SENSITIVITY AND RESOURCE CLASSIFICATION

Portions of the Project area traverse federally-managed, state, and local lands; as a result, the both the BLM and SVP paleontological resource significance and sensitivity classification schemes will be used to assess the paleontological sensitivity of each geologic unit in the Project area. The criteria for each sensitivity classification and the corresponding mitigation recommendations are provided in Table 3-1.

3.2.1 Bureau of Land Management Potential Fossil Yield Classification

For projects on BLM lands, typically, the local District Office will assign Potential Fossil Yield Classification (PFYC) values (Class 1–5; Class 5 having the highest management concern) based on the recommendation of the Project Paleontologist (BLM, 2008). These categories include very high, high, moderate or unknown, low, and very low potential for fossilized remains. According to the BLM (2008), geologic units are considered "sensitive" if they are known to contain scientifically significant paleontological resources anywhere in their extent. The BLM defines a significant paleontological resource as follows:

> Any paleontological resource that is considered to be of scientific interest, including most vertebrate fossil remains and traces, and certain rare or unusual invertebrate and plant fossils. A significant paleontological resource is considered to be scientifically important because it is a rare or previously unknown species, it is of high quality and well-preserved, it preserves a previously unknown anatomical or other characteristic, provides new information about the history of life on earth, or has identified educational or recreational value. Paleontological resources that may be considered to not have paleontological significance include those that lack provenience or context, lack physical

integrity because of decay or natural erosion, or that are overly redundant or are otherwise not useful for research [2008, p. 1-18].

3.2.2 Society of Vertebrate Paleontology Standard Procedures

Absent specific agency guidelines, most professional paleontologists in California adhere to guidelines set forth by SVP in "Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources" (SVP, 2010). These guidelines establish detailed protocols for the assessment of the paleontological resource potential (i.e., "sensitivity") of a project area and outline measures to follow in order to mitigate adverse impacts to known or unknown fossil resources during project development. In order to prevent project delays, SVP highly recommends that the owner or developer retain a qualified professional paleontologist in the advance planning phases of a project to conduct an assessment and to implement paleontological mitigation during construction, as necessary. Using baseline information gathered during a paleontological resource assessment, the paleontological resource potential of the geologic unit(s) (or members thereof) underlying a Project area can be assigned to one of four categories defined by SVP (2010). These categories include high, undetermined, low, and no potential.

If one or more geologic formations in a given project area are determined to have high potential for paleontological resources following the initial assessment and the geologic formation(s) cannot be avoided (i.e., the project rerouted or redesigned) then the next step is to develop a mitigation plan (Plan) to be implemented during the construction phase of a project. The Plan describes, in detail, when and where paleontological monitoring will take place and establishes communication protocols to be followed in the event that an unanticipated fossil discovery is made during project development. If significant fossil resources are known to occur within the boundaries of the project and have not been collected, then the Plan will outline the procedures to be followed prior to the commencement of construction (i.e., preconstruction salvage efforts or avoidance measures, including fencing off a locality). Should microfossils be known or suspected to occur in the geologic unit(s) underlying the project area, then the Plan will describe the methodology for matrix sampling and screening. The Plan should be prepared by a qualified professional paleontologist and developed using the results of the initial paleontological assessment and survey. Elements of the Plan can be adjusted throughout the course of a project as new information is gathered and conditions change, so long as the lead agency is consulted and all parties are in agreement.

Table 3-1
Paleontological Sensitivity Classifications

BLM Potential Fossil Yield Classification	SVP Resource Potential	Sensitivity Criteria and Mitigation Recommendations
Class 1: Very Low	No Potential	Rock units of intrusive igneous origin, most extrusive igneous rocks, and medium- to high-grade metamorphic rocks are classified as having no potential for containing significant paleontological resources. No mitigation required.
Class 2 : Low	Low Potential	Sedimentary rock units that have yielded few, if any, vertebrate fossils or significant invertebrate fossils in the past, based upon review of available literature and museum collections records. Geologic units of low potential also include those that yield fossils only on rare occasion and under unusual circumstances; eolian deposits, rock units deposited less than 10,000 years before present; and deposits that exhibit a high degree of diagenetic alteration. Mitigation is not typically required.
Class 3a: Moderate	(SVP has no *moderate* category; therefore, a moderate PFYC would typically correspond to a *high* or *low* SVP potential)	A fossiliferous rock unit with moderate potential is a sedimentary deposit where the significance, abundance, and predictability of recovery of fossils vary. In some cases, available literature on a particular geologic unit will be scarce and a determination of whether or not it is fossiliferous or potentially fossiliferous will be difficult to make. Under these circumstances, the sensitivity is unknown and further study is needed to determine the unit's paleontological resource potential. Examples include marine units with uncommon vertebrate fossils, such as sharks teeth or fish scales, or terrestrial units with inconsistent significant fossils or widespread and well-known plant remains
Class 3b: Unknown	Undetermined Potential	Due to the unknown potential, and moderate or infrequent occurrence of fossils, surface-disturbing activities will require sufficient assessment to determine whether significant paleontological resources occur in the area of a proposed action. Management recommendations may include a preconstruction field survey, monitoring, or avoidance.
Class 4a: High, exposed Class 4b: High, soil or vegetative cover	High Potential	Geologic units with high potential for paleontological resources are those that have been proven to yield vertebrate or significant invertebrate, plant, or trace fossils in the past or are likely to contain new vertebrate materials, traces, or trackways; however, these units may vary in occurrence or predictability, may be obscured by vegetation cover or inaccessible from a road or trail, and may have been degraded by historical fossil-hunting. A unit with high sensitivity is susceptible to surface-disturbing activities and includes fossiliferous sedimentary deposits that are well exposed with little vegetative cover as well as those shallowly covered by soil, alluvium, or vegetation. Typically, a field survey as well as onsite monitoring will be required. Any significant specimens discovered will need to be prepared, identified, and curated into a museum. A final report documenting the significance of the finds will also be required.
Class 5a: Very High, exposed Class 5b: Very High, soil or vegetative cover	High Potential	Geologic units with very high potential for paleontological resources are those that consistently and predictably yield vertebrate or significant invertebrate, plant, or trace fossils. A unit with very high sensitivity is highly susceptible to surface disturbing activities and includes fossiliferous sedimentary deposits that are well exposed with little vegetative cover, as well as those shallowly covered by soil, alluvium, or vegetation. Typically, a field survey as well as onsite monitoring will be required. Any significant specimens discovered will need to be prepared, identified, and curated into a museum. A final report documenting the significance of the finds will also be required.

Sources: BLM (2007, 2008); SVP (2010)

4
METHODS

4.1 MUSEUM RECORDS SEARCH

Paleontological resources are not found in "soil" but are contained within the geologic deposits or bedrock that underlies the soil layer. Therefore, in order to ascertain whether a particular study area has the potential to contain significant fossil resources at the subsurface, it is necessary to review relevant scientific literature and geologic mapping to determine the geology and stratigraphy of the area. Further, in order to delineate the boundaries of an area of paleontological sensitivity, it is necessary to determine the extent of the entire geologic unit, because paleontological sensitivity is not limited to surface exposures of fossil material.

To determine whether fossil localities have been previously discovered within the Project area or a particular rock unit, a search of pertinent local and regional museum repositories for paleontological localities was conducted at the Natural History Museum of Los Angeles County (LACM). The museum records search was supplemented by a review of the University of California Museum of Paleontology's (UCMP's) online database, which contains paleontological records for Imperial County and nearby eastern San Diego County and southern Riverside County.

4.2 FIELDWORK

A paleontological resources field survey was conducted on April 26 through May 13, 2016, during Geokinetics' design of the data acquisition equipment array. The purpose of the field survey was to visually inspect the ground surface for exposed fossils and to evaluate geologic exposures for their potential to contain preserved fossil material at the subsurface. Prior to fieldwork, curation agreements for collection on DPR and BLM lands were obtained from the LACM (Appendix A). All work was conducted in accordance with the terms of Æ's BLM statewide Paleontological Resources Use Permit, # CA-15-13P (Appendix B) and Project-specific DPR Paleontological Investigations/Collections Permit (Appendix C) and was carried out following the protocol described in the BLM- and DPR-approved Paleontological Resource Survey Plan for the Ormat Nevada, Inc. Truckhaven 3D Seismic Data Acquisition Project (Appendix D).

4.3 KEY PERSONNEL

This paleontological resource survey report was prepared under the direction of Æ's Paleontology Program Manager and BLM-permitted Principal Investigator (PI), Jessica DeBusk. Associate Paleontologist Heather Clifford was the primary author of the geology and paleontology sections of this report and produced all graphics. DeBusk has more than 13 years of professional experience and holds statewide BLM paleontological use permits in California, Nevada, Arizona, Utah, and Colorado. The field survey was conducted by the following qualified Paleontologists: BLM-permitted Field Agents Blake Bufford and Clifford

(paleontological Field Director), and Erik Pino, Michele Conrad, and Kathleen Jernigan who served as Field Assistants under the supervision of Clifford. For this Project, each qualified paleontologist met or exceeded the BLM's definition of a Principal Investigator, Field Agent or Field Assistant, as follows:

> A PI (Principal Investigator) must have a minimum of a graduate degree or a bachelor degree with 24 months of professionally supervised experience including the kinds of duties covered in the permitted work. A PI must have 16 months of professional paleontology management experience including project planning and 4 months of experience with comparable paleontological resources in similar environmental settings. A Field Agent must have a bachelor's degree and 12 months professionally supervised experience or 30 months supervised experience leading up to responsibilities similar to those of a Field Agent. A Field Assistant must be under direct, on-site supervision of either the PI or a Field Agent as part of a supervised crew. Field assistants must have at least 4 to 8 hours of training or experience received from a qualified paleontologist in identifying paleontological resources prior to performing field work or when first utilized in this capacity (BLM, 2008; C. Hunter, personal communication, 2015).

5
GEOLOGIC AND PALEONTOLOGY OF THE PROJECT AREA

5.1 REGIONAL GEOLOGY

The Project area is east of the Borrego Badlands and west of the Salton Sea within the Colorado Desert geologic province of California (Norris and Webb, 1976). The Colorado Desert extends from the Mojave Desert to the north, the Colorado River on the east, the Peninsular Ranges on the west, and south into Mexico. Dominant features within the western Colorado Desert include the Salton Trough, the Colorado River, Borrego Badlands, Superstition Hills, and the Orocopia, Chocolate, Palo Verde, Chuckwalla, and Santa Rosa mountains (Norris and Webb, 1976).

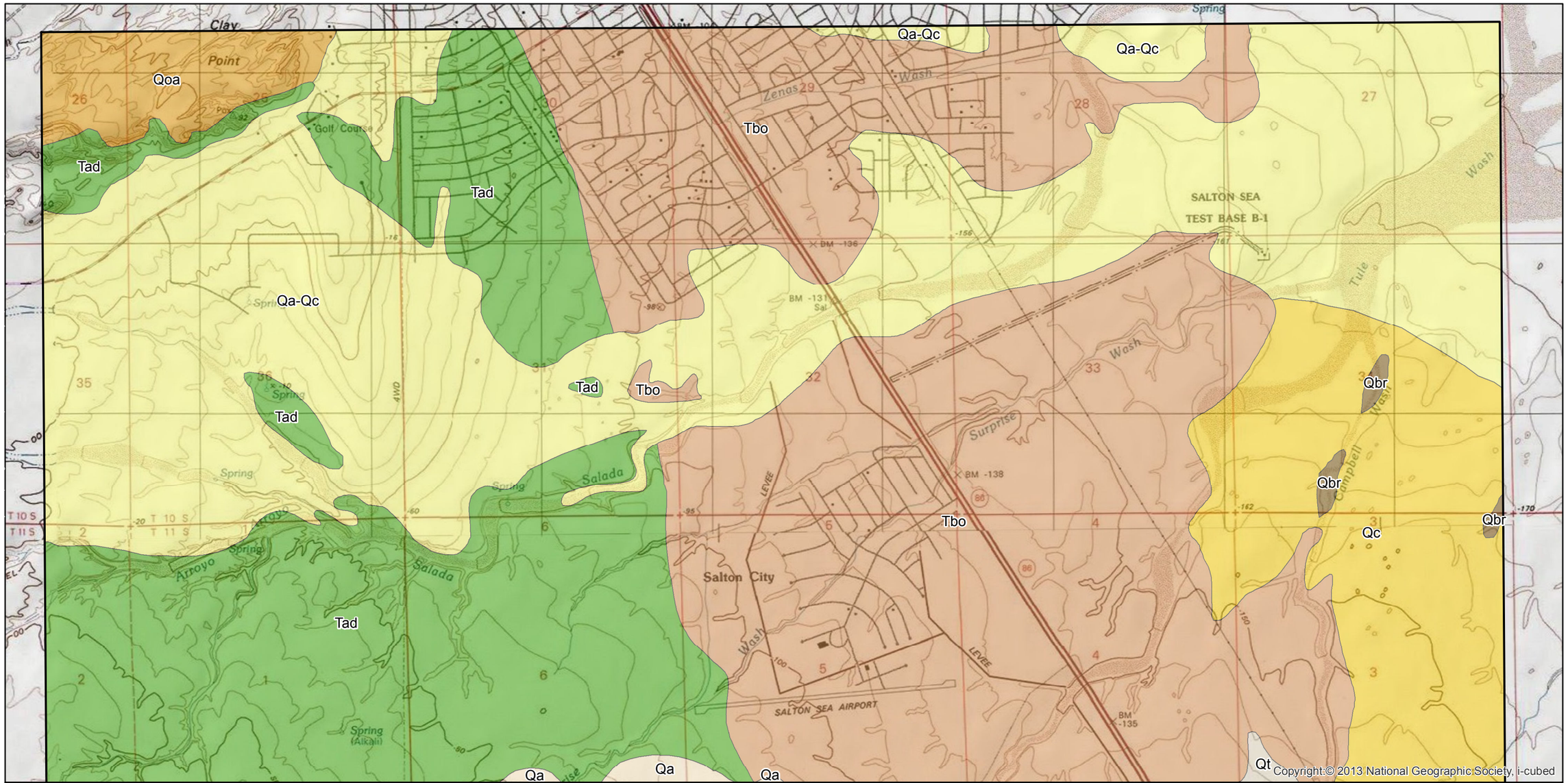
Specifically, the Project is within the Salton Trough; a large structural depression that extends from the San Gorgonio Pass in the north to the Gulf of Mexico in the south. The Salton Trough is a graben structure, bounded by roughly parallel north-west-trending faults, including the San Andreas Fault Zone to the northeast, and the San Jacinto fault zone to the southeast. During the Pliocene, the Salton Trough formed due to spreading and subsidence associated with the rift system that opened the Gulf of California, which still continues to undergo ~ 48 mm/yr of spreading (Alles, 2011). The Salton Trough, which encompasses the Salton Sea and includes the Coachella Valley to the north and the Imperial Valley to the south, would currently be underwater as part of the Gulf of California if not for millions of years of sedimentation derived from the Colorado River and alluvial fan accumulation resulting from regional faulting. During the Pliocene to Early Pleistocene, sedimentation along the Colorado River resulted in the build-up of a substantial delta, which eventually separated the marine waters of the Gulf of California from the brackish and fresh waters of the Salton Trough (Ingwall, 2008). Since the Late Pleistocene, the Salton Trough was periodically occupied by the freshwater Lake Cahuilla. The lake formed, drained, and reformed between approximately 37,000 to 300 years before present (BP) as a result of fluctuations in the course of the Colorado River, and the subsequent diversion of the river's mouth from the Gulf of California to the Salton Trough (Deméré, 2002; Norris, 1979). Lake Cahuilla reached a maximum depth of 300 feet, 105 miles long, and 35 miles across at its last high stand at approximately 45 feet above sea level in the Coachella Valley.

5.2 GEOLOGY AND PALEONTOLOGY OF THE PROJECT AREA

The Project area is mapped at a scale of 1:24,000 by Dibblee and Minch (2008a, 2008b), 1:125,000 by Winker (1987), and 1:100,000 by Kirby et al. (2007). According to these published maps, the Project area is underlain by sedimentary rock units of Pliocene to Holocene age. The geology and paleontology of these units are described in the following sections and the geology is depicted in Figure 5-1.

5.2.1 Palm Spring Group

The Pliocene-Pleistocene Palm Spring Formation was named by Woodring (1932) for its type section near a spring along Vallecito Creek in Anzo-Borrego Desert State Park, within eastern



Legend

- Project Area
- Quaternary Alluvium - Qa (Holocene)
- Quaternary Terrace Deposits - Qt (Holocene)
- Lake Cahuilla/Alluvial Deposits, undifferentiated - Qa-Qc (Quaternary)
- Lake Cahuilla Deposits - Qc (Quaternary)
- Quaternary Older Alluvium - Qoa (Pleistocene)
- Brawley Formation - Qbr (Early Pleistocene)
- Borrego Formation - Tbo (Pliocene to Pleistocene)
- Palm Spring Group (Arroyo Diablo Formation) -Tad (Pliocene to Pleistocene)

SCALE 1:24,000

0.5 0.25 0 0.5 1 Miles

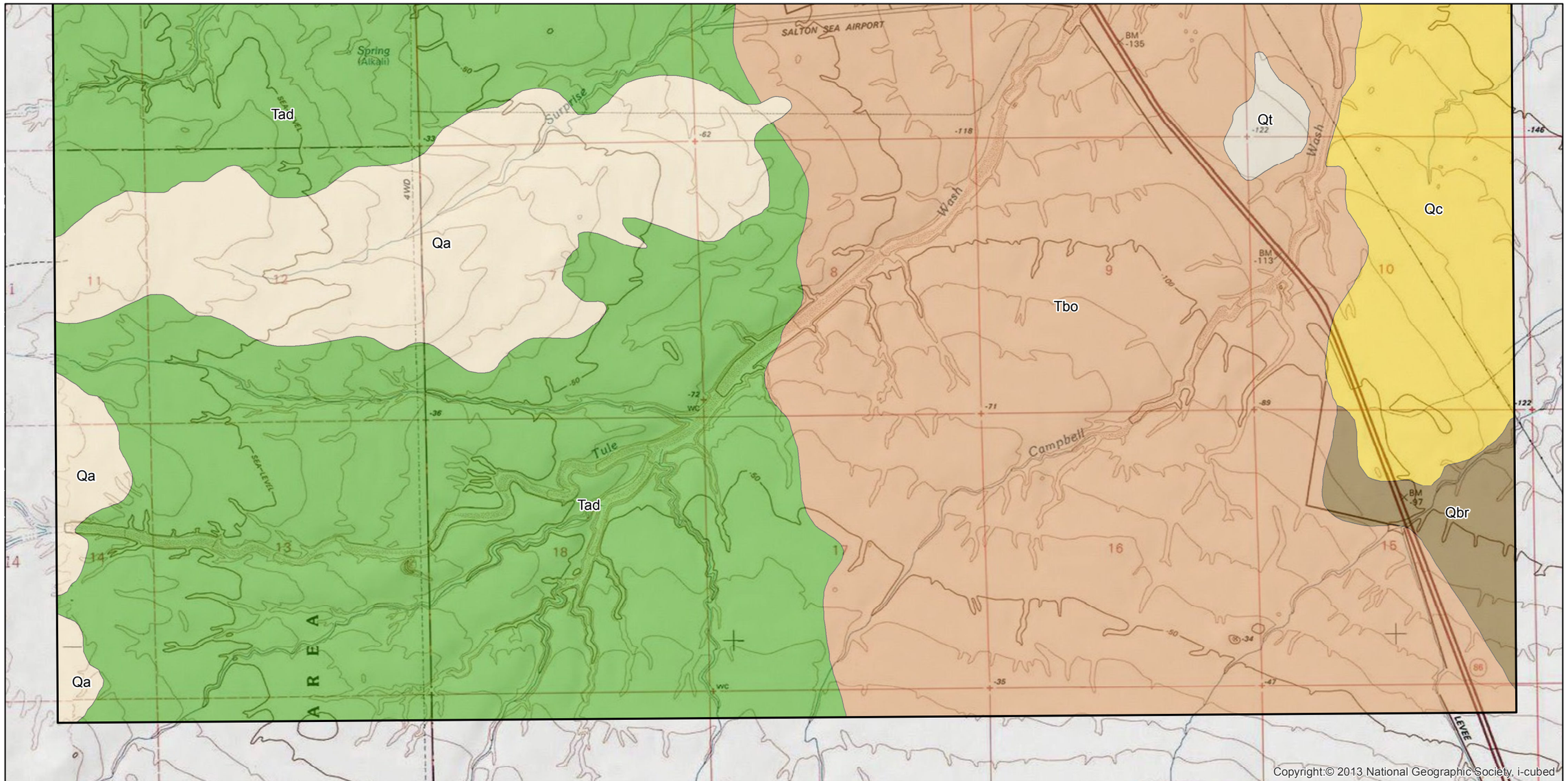
1,000 0 1,000 2,000 3,000 4,000 5,000 Feet

0.5 0.25 0 0.5 1 Kilometers

Kane Spring NW,Truckhaven, Seventeen Palms, and Shell Reef CA 7.5' USGS Quadrangle T10S/R9E, Section 25-26 and 35-36; T10S/R10E, Sections 27-34;T11S/R9E, Sections 1-2, 11-14, and 23-24; and T11S/R10E, Sections 3-10 and 15-22

Geology modified from: Dibblee and Minch (2008) and Winker (1987)

Figure 5-1a Geologic Units in the Project Area.



Legend

- Project Area
- Quaternary Alluvium - Qa (Holocene)
- Quaternary Terrace Deposits - Qt (Holocene)
- Lake Cahuilla/Alluvial Deposits, undifferentiated - Qa-Qc (Quaternary)
- Lake Cahuilla Deposits - Qc (Quaternary)
- Quaternary Older Alluvium - Qoa (Pleistocene)
- Brawley Formation - Qbr (Early Pleistocene)
- Borrego Formation - Tbo (Pliocene to Pleistocene)
- Palm Spring Group (Arroyo Diablo Formation) -Tad (Pliocene to Pleistocene)

SCALE 1:24,000

0.5 0.25 0 0.5 1 Miles

1,000 0 1,000 2,000 3,000 4,000 5,000 Feet

0.5 0.25 0 0.5 1 Kilometers

Kane Spring NW,Truckhaven, Seventeen Palms, and Shell Reef CA 7.5' USGS Quadrangle
T10S/R9E, Section 25-26 and 35-36; T10S/R10E, Sections 27-34;T11S/R9E, Sections 1-2, 11-14, and 23-24; and T11S/R10E, Sections 3-10 and 15-22
Geology modified from: Dibblee and Minch (2008) and Winker (1987)

Figure 5-1b Geologic Units in the Project Area.

San Diego County, and redescribed by Dibblee (1954), Woodard (1963), Winker (1987), and Cassiliano (2002), among others. On the basis of distinct lithologic characteristics observed at Vallecito Creek, Fish Creek, and Carrizo Creek in the Salton Trough of Southern California, the Palm Spring Formation was elevated to the Palm Springs Group (Cassiliano, 2002). The Pliocene-Pleistocene Palm Spring Group was deposited at least 3.58 million years ago (Ma) to 0.78 Ma, based on biostratigraphic correlation (Cassiliano, 1999). Rock units of the Palm Spring Group record sedimentation of the ancient Colorado River delta, and together with other terrestrial deposits in the Colorado Desert, record nearly continuous sedimentation from the Miocene to the Pleistocene (Dibblee, 1954). The Palm Spring Group is well exposed throughout the Salton Trough where it is up to 12,000 feet thick (approximately 4,000 feet thick near the Project area) and is gradational with the underlying Imperial Formation and overlying Borrego Formation (Cassiliano, 2002; Dibblee, 1954; Dibblee and Minch, 2008a, 2008b).

On the basis of lithologic characteristics and depositional environment, the Palm Spring Group has been formally divided into five interbedded and gradational units: the Arroyo Diablo Formation, Olla Formation, Tapiado Claystone, Hueso Formation, and Canebrake Conglomerate (Cassiliano, 1999, 2002; Dibblee, 1954, Winker, 1987; Woodard, 1963). The Olla and Arroyo Diablo Formations primarily consist of Colorado River delta and braided river facies composed of orange, friable, massive to thickly-bedded, fine-grained sandstone and siltstone with interbedded red-brown claystone. The lithology of the Olla and Arroyo Diablo Formations consist of fining upward sandstone sequences with basal conglomerate lag. Clasts within the conglomerate and coarse sandstone consist of lithic pebbles, silicified wood, fossil plant material, and reworked Paleozoic limestone pebbles derived from the Colorado Plateau embedded with bryozoan, brachiopod, and coral invertebrate fossils. The Arroyo Diablo Formation (Tad) is the most widespread unit of the Palm Spring Group and is exposed within the Project area (Kirby et al., 2007; Winker, 1987). The Tapiado Claystone is of lacustrine origin and is predominately composed of green-gray claystone with subordinate limestone and tuff deposits. The Hueso member consists of alluvial plain and fluvial facies composed of tan, buff, and gray arkose, micaceous sandstone and siltstone, with subordinate claystone, limestone, and conglomerate, derived from local streams (Cassiliano, 1999, 2002; Winker, 1987). The Canebrake Conglomerate of Dibblee (1954) consists of coarse alluvial fan deposits that intertongue with the Imperial Formation and the units of the Palm Springs Group (Cassiliano, 2002). The Canebrake Conglomerate is composed of grayish-tan, crudely-bedded, pebble to boulder conglomerate with an arkosic matrix and subrounded to subangular clasts derived primarily from granitic, gneissic, and other metamorphic sources (Winker, 1987).

The rock units within the Palm Spring Group have yielded abundant terrestrial vertebrate specimens from localities within the Colorado Desert (Woodard, 1963). (Many of the previously recorded localities reference the former designation of the *Palm Spring* as a formation with subordinate members; the discussion presented below will use the revised designation for the *Palm Spring* Group, with subordinate formations).The majority of the vertebrate fossils within the Palm Springs Group have been recorded from the Hueso Formation, with smaller quantities identified within the Arroyo Diablo Formation; within the Tapiado Claystone, especially near the contact with the Hueso Formation; and from dark olive, biotite-rich, parallel-laminate siltstones (i.e., banded silts) in the Olla Formation (Cassiliano, 2002). Diversity and abundance of specimens within the Hueso Formation is likely the result of taphonomic processes, whereby sediments within the unit were typically derived from local sources and transported short

distances under relatively quiet conditions (Cassiliano, 1999). Vertebrate fossils have also previously been attributed to the deposits identified as the Canebrake Conglomerate; however, based on stratigraphic revisions by Cassiliano (2002), Winker (1987) and others, those localities are assigned to other units.

Three local faunas (LF) have been recognized from the Palm Spring Group (and uppermost Imperial Formation) in the Fish Creek-Vallecito Creek (FCVC) area of Anzo-Borrego Desert State Park, approximately 30 to 40 miles southwest of the Project area (Downs and White, 1968). The local faunas were identified as the Layer Cake LF (4.38 Ma – 3.58 Ma; early Blancan North American Land Mammal Age [NALMA]), Arroyo Seco LF (3.58 Ma – 2.58 Ma; late Blancan NALMA), and Vallecito Creek LF (2.58 Ma – 0.78 Ma; late Blancan to Irvingtonian NALMA). However, based on revised biostratigraphic analysis, Cassiliano (1999) suggests the local faunas should be abandoned. According to Cassiliano (1999), approximately 100 different species and hundreds of specimens have been identified from the Palm Spring Group in the FCVC area, primarily from the Heuso Formation. Recovered specimens include mammoth, mastodon, horse, tapir, camel, deer, coyote, fox, mountain lion, Jaguar, saber-toothed cat, bobcat, ring-tailed cat, Wheatley's ground sloth, Florida spectacled bear, wolverine, short-faced bear, American black bear, North American badger, long-tailed weasel, raccoon, eastern spotted skunk, shrew, rabbit, squirrel, mole, vesper bat, hare, frog, desert tortoise, whiptail lizard, desert iguana, leopard lizard, red-eared slider turtle, mud turtles, teratorn, white pelican, seabird, sandhill crane, ray-finned fish, sucker fish, and herring. Previously recorded localities in the immediate vicinity of the Project area are limited; however, McLeod (2016) notes several specimens (LACM 7087), including pocket gopher, horse, and pronghorn antelope, that were recovered immediately northwest of the Project area, near the southern flank of the Santa Rosa Mountains

5.2.2 Borrego Formation

The Pliocene to Pleistocene Borrego Formation (Tbo) is well exposed in the central Project area (Dibblee and Minch, 2008a, 2008b; Kirby et al., 2007). The Borrego Formation was named by Tarbet and Holman (1944) for the type section in the Borrego Badlands in eastern San Diego County, where it is up to 6,000 feet thick, thinning to approximately 2,500 feet near the Project area (Deméré and Walsh, 1993; Dibblee, 1954). According to recent structural investigations and geologic mapping in the San Felipe Hills by Kirby et al. (2007), some rock exposures in the Project area that were previously mapped as the Borrego Formation have been informally redefined as a transitional unit between the underlying Arroyo Diablo Formation and the overlying Borrego Formation. For this study, for the sake of conciseness and accordance with previously recorded localities, the transitional unit will be considered as part of the Borrego Formation. Further, due to the gradational lower contact and the interfingering character of the Borrego Formation, Cassiliano (2002) suggests the Borrego Formation could be included within the underlying Palm Spring Group; however, for this study, the Borrego Formation will be treated separately.

Based fieldwork studies by Dibblee (1954), the Borrego Formation is conformable with the overlying Brawley Formation and forms a gradational contact with the underlying units of the Palm Spring Group. In addition to the type section in the Borrego Badlands in the Anzo-Borrego Desert State Park, the Borrego Formation is intermittently exposed in the Salton Trough between Ocotillo Wells and Borrego Springs, and along portions of the northeast and southwest margins

of the Salton Sea. The Borrego Formation consists of commonly rippled lacustrine sediments composed of light-gray, well-bedded mudstone and claystone, with thin interbeds of local and Colorado River-derived siltstone and sandstone, as well as intermittent deposits of sodium sulfate evaporates up to 5 feet thick (Dibblee, 1954; Winker, 1987). The massive siltstone and sandstones are pale orange in color and are locally abundant.

The Borrego Formation has previously yielded numerous localities, which have yielded specimens of terrestrial vertebrate, invertebrate, and microfossils (Winker, 1987). Invertebrate and microfossil specimens recorded at the type section include mollusks, small crustaceans, mussel shrimp, and rare foraminifera (Dorsey, 2006). Vertebrate localities within the fine-grained lacustrine deposits exposed near the Borrego Badlands have yielded abundant well-preserved specimens of terrestrial vertebrates, including specimens of horse, mastodon, mammoth, camel, antelope, cat, short-faced bear, rodent, bird, and fish (Deméré and Walsh, 1993; McLeod, 2016).

5.2.3 Brawley Formation

The Early Pleistocene Brawley Formation (Qbr) is locally exposed near the eastern Project boundary, east of State Route 86 and southeast of Tule Wash (Dibblee and Minch, 2008b; Kirby et al, 2007). The Brawley Formation was first described by Dibblee (1954) for exposures in the Superstition Hills, southwest of the Salton Sea. The Brawley Formation, which is also referred to as the lacustrine facies or "finer-grained lateral equivalent" of the Ocotillo Conglomerate, is conformably underlain by the lithologically similar Borrego Formation in the Project area (Dibblee, 1954; Kirby et al., 2007, 45; Winker, 1987). The Brawley Formation is up to approximately 2,000 feet thick and is intermittently exposed in the region surrounding the Salton Sea, including the Superstition Hills (Dibblee, 1954). The unit is composed of light gray, massive lacustrine claystone with rare ripple structures and crossbeds, and thin interbeds of parallel-bedded, buff fine-sandstone, and local pebble lenses primarily derived from sedimentation along the Colorado River (Dibblee and Minch, 2008b; Winker, 1987).

According to Winker (1987), numerous fossil localities have been previously identified from within the fine-grained sediments of the Brawley Formation and the unit has yielded a freshwater to brackish lacustrine invertebrate fauna similar to that of the underlying Borrego Formation, including specimens of gastropod, algae, and foraminifera (Dibblee, 1954). Vertebrate localities have also been previously identified within the Brawley Formation. During fieldwork within the Brawley Formation in the Superstition Hills (Imperial County), matrix-screening yielded vertebrate fossil specimens of corvina and chub fish, as well as the remains of small mammal fossils preliminarily identified as vole, pocket mouse, and deer mouse (Roeder and Remeika, 2014). In addition, the LACM records the occurrence of at least two localities (LACM 5834, 5850) near the Salton Sea in the Superstition Hills and Mecca Hills that yielded specimens of large land mammals, camel, and horse (McLeod, 2016).

Further, as noted above, the Brawley Formation is also referred to as the lacustrine facies of the Ocotillo Conglomerate. Numerous paleontological resources belonging to the Borrego Local Fauna have been previously identified within the Ocotillo Conglomerate (Dibblee and Minch, 2008c; Jefferson and Remeika, 1994; Remeika and Jefferson, 1993). Remeika and Jefferson (1993) identified localities in the western Borrego Badlands of San Diego County that yielded

vertebrate fragments and articulated specimens of the Borrego LF, including taxa of horse, camel, pronghorn, elk, deer, zebra, oxen, ground sloth, badger, bear, dire, wolf, coyote, mountain lion, sabertooth cat, rabbit, gopher, squirrel, rat, sucker fish, hawk, eagle, duck, vulture, owl, flamingo, tortoise, and pond turtle. In addition, Dibblee and Minch (2008c) report several unidentified vertebrate fossil fragments from the Ocotillo Conglomerate. The location of discovery was not identified, but it was likely recorded within the Indio Hills along the San Andreas fault zone, northeast of the Project area.

5.2.4 Quaternary Surficial Deposits: Lake Cahuilla Deposits, Quaternary Older Alluvium, and Quaternary Alluvium

According to published geologic maps, the Project area is immediately underlain by undifferentiated younger alluvium (Qa), older alluvium (Qoa), lacustrine (Lake Cahuilla) (Qc), and terrace (Qt) deposits of Quaternary age (Dibblee and Minch, 2008a, 2008b). The younger Quaternary alluvium consists of gravel, silt, sand, and clay derived from alluvial fans and streams. The Quaternary older alluvium is composed of weakly indurated, dissected, elevated, gravel, silt, sand, above the ancient shoreline of former Lake Cahuilla. The Lake Cahuilla deposits are composed of undissected to dissected, weakly consolidated silts and clays, with abundant, non-mineralized mollusk fragments, with localized terrace deposits.

Based on previous stratigraphic, archaeological, paleontological, hydrogeological, and tectonic studies, where not explicitly mapped at the surface, Holocene Lake Cahuilla deposits are known to underlie surficial alluvial deposits similar to the younger alluvium deposits in the Project area, at shallow depth (Alles, 2011; Deméré, 2002; Norris, 1979; Scott, 2014; Waters, 1983; Whistler et al., 1995). In turn, older Pleistocene-age ancient Lake Cahuilla deposits underlie the surficial to shallowly-buried Holocene-age lacustrine silt at a moderate depth. The depth of the contact between the Holocene-age and Pleistocene-age Lake Cahuilla deposits in the Project area is unknown; however, the Pleistocene-age ancient Lake Cahuilla sediments are likely to be present at a relatively shallow depth below the Holocene lacustrine deposits (Waters, 1983). The Pleistocene-age Lake Cahuilla deposits are generally composed of weakly consolidated, lacustrine sands, silts and clays, with tufa and travertine rock coatings, coarse alluvial deposits, and beach sands (Norris, 1979; Waters, 1983). The Pleistocene- to Holocene-age Lake Cahuilla sediments range from several feet deep at the margin of the Coachella Valley to as much as 300 feet thick in the center of the Salton Trough (Arnal, 1961; Norris and Webb, 1976).

Late Quaternary-age lacustrine deposits derived from ancient Lake Cahuilla have proven to yield scientifically significant mollusk shells within the Salton Trough (Scott, 2014; Whistler et al., 1995). Fossil specimens of diatoms, spores, pollen, land plants, sponges, ostracods, freshwater gastropods, fresher bivalves, fish, and small terrestrial vertebrate have been recovered from the Pleistocene-age Lake Cahuilla Beds (Scott, 2014). During excavation for the San Diego Gas and Electric Company Sunrise Powerlink Transmission Line in western Imperial County, at least four different taxa of freshwater fish (chub, razorback sucker, threespine stickleback, and an indeterminate bony fish) were recovered from within sediments previously mapped as the Brawley Formation and subsequently determined to be fine-grained sediments of the Pleistocene Lake Cahuilla (Roeder, 2013; Roeder and Calvano, 2014). Further, Holocene-age, non-mineralized (non-fossil) mollusk shells are also found in the Lake Cahuilla silt deposits, their recovery and subsequent dating have helped researchers with studies in archaeology, geology,

and seismology (Norris and Webb, 1976). In addition, Pleistocene-age alluvial deposits similar to those that are mapped in the Project area have proven to yield significant vertebrate fossils throughout the in the inland valley and desert regions of Southern California, including the Salton Trough. Recovered specimens include large land mammals, rodents, birds, reptiles, amphibians, invertebrates, and insects (Springer et al., 2009; UCMP online database, 2016). Holocene age alluvial deposits, particularly those younger than 5,000 years old, are generally too young to contain fossilized material (SVP, 2010), but they may overlie older fossiliferous deposits (e.g., Lake Cahuilla deposits, Quaternary older age alluvium) at an unknown depth.

6
PALEONTOLOGICAL FIELD SURVEY

A field survey of the Project area was conducted April 26 through May 13, 2016, by a team of four Æ Paleontologists, including BLM-permitted Field Agent Heather Clifford, who served as paleontological Field Director; BLM-permitted Field Agent Blake Bufford; and Field Assistants Erik Pino, Michele Conrad, and Kathleen Jernigan (alternate). During the course of fieldwork, a pedestrian survey of a portion of the Project area was accomplished and published geologic maps were verified. Project areas obscured by roads, structures (e.g., residential developments) or otherwise inaccessible were not comprehensively examined due to safety concerns or inaccessibility. Because the paleontological survey was conducted in tandem with the Class III archaeological survey, which was a "no-collection" survey, recovery of any encountered fossils was not approved and no collection occurred.

Approximately 1,117 acres were intensively surveyed for paleontological resources within the 50 to 164-foot-wide source transect alignment (the other resource surveys may have resulted in modestly different acreage totals due to varying methodology). During the course of the survey, the paleontological survey crew conducted a pedestrian walkover of areas of proposed ground disturbance within the Vibroseis drive paths, including proposed source points, access routes, work areas, and test well pads. The receiver points were not subject to a paleontological resource survey. In the field, the paleontological survey team utilized a Trimble GeoXT Global Positioning System (GPS) receiver, Garmin eTrex 10 GPS receiver, a mobile tablet with GPS capability, topographic and geologic maps, and aerial photographs to locate geologic formation boundaries. When a bedrock outcrop was encountered, the surface of the exposure was visually examined for the evidence of paleontological resources. Notes were taken on the geology and lithology of geologic units encountered and photographs were taken to document the survey (Figure 6-1). Refer to Figure 6-2 for a map of the paleontological survey extent in the Project area.

Figure 6-1 Typical topography and geologic exposure in the Project area: the Borrego Formation is well exposed on the cutbank of Tule Wash in the Project area, view to the south.

The pedestrian survey was conducted in accordance with the BLM's paleontology guidelines (1998a, 1998b, 2008) and the DPR's requirements, and was carried out simultaneously with other resource specialists undertaking the Class III archaeological survey, as well as biological and botanical surveyors, Native American monitors, and unexploded ordinance (UXO) specialists (POWER Engineers, Inc., 2016). Each of the paleontological survey crew members accompanied one of the four teams of resource specialists, with two teams surveying within the SVRA boundary (Crew #1 and Crew #2) and two teams surveying within non-SVRA (BLM/ County) lands (Crew #3 and Crew #4). Each paleontologist followed behind the archaeological survey crew and visually inspected the area of direct effect along the survey route (i.e., the Vibroseis path, source points, and route centerline). As needed, the paleontologists employed zig-zag transects and moved freely within the survey route in order to pay particular attention to rock outcrops of paleontologically sensitive strata as well as any areas where geologic sediments are well exposed.

The terrain within the Project area consists of dissected badlands and low mesas bisected by ephemeral washes (Figure 6-3). Although the fine-grained terrestrial deposits of the Arroyo Diablo Formation, Borrego Formation, Brawley Formation, Lake Cahuilla deposits, and Quaternary older alluvium are mapped at the surface of the Project area by Dibblee and Minch (2008a, 2008b), Winker (1987), and Kirby et al. (2007), the units are mostly obscured at the ground surface by recent alluvium, playa, and Lake Cahuilla deposits (Figure 6-4). However, the units are well exposed in the wash cutbanks and steep gullies. Soil development is absent. Approximately five percent of the ground surface is obscured by scant low desert scrubbrush vegetation, including widespread creosote, 2-6 feet high on average, and large well-established, invasive tamarisk.

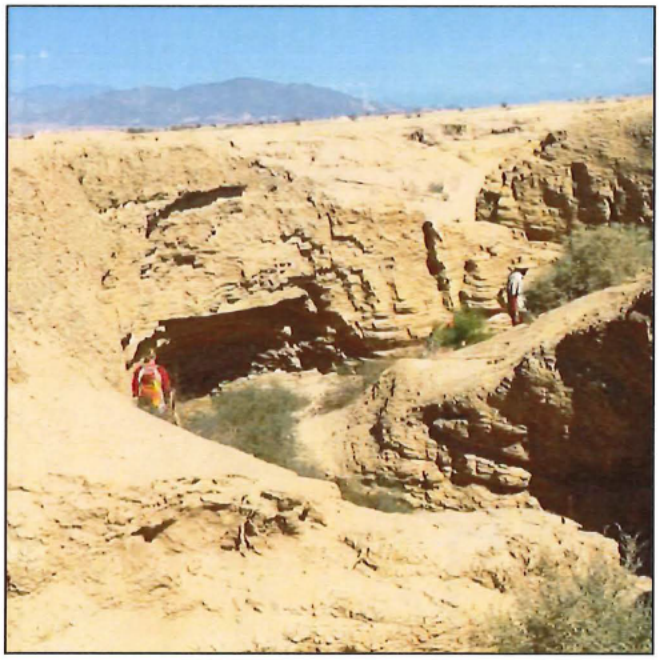


Figure 6-3 Badland topography with sparse vegetation in the fine-grained Borrego Formation in the Project area, view to the north.

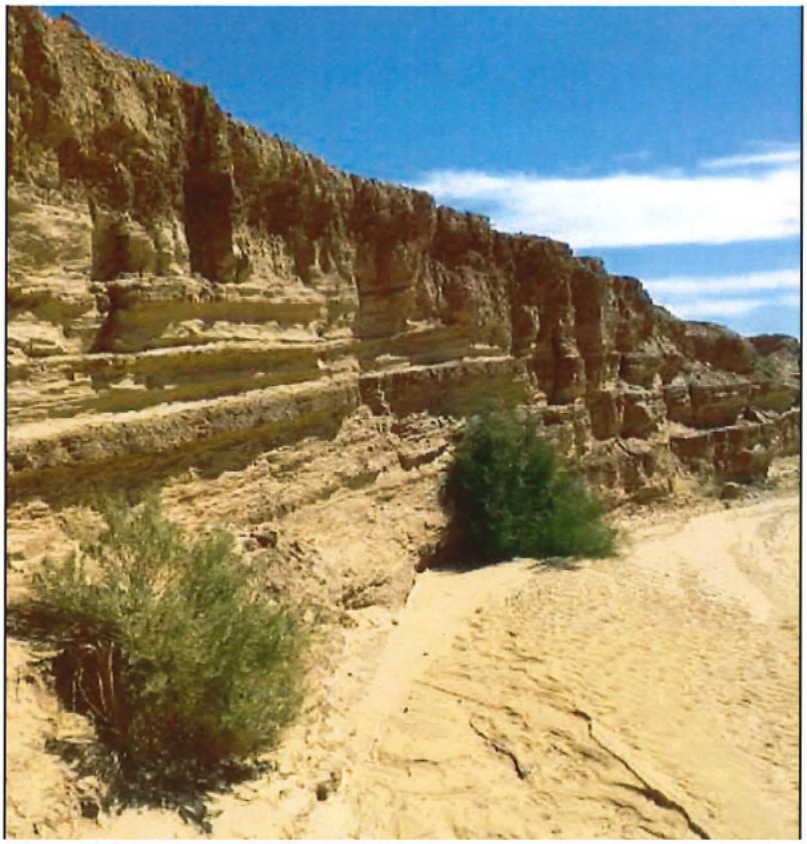


Figure 6-4 Quaternary Lake Cahuilla deposits cap the shallowly dipping Plio-Pleistocene Borrego Formation deposits in the eastern Project area, view to the east.

Numerous braided ephemeral washes and flood channels bisect the friable to semi-friable Plio-Pleistocene deposits in the Project area. The washes have been incised approximately 5-30 feet below ground surface (bgs) and are 20 to 200 feet wide, with several deep, gullied channels as narrow as 1 foot in width and several feet deep (Figure 6-5). The ephemeral streams contain channel deposits of moderately well-sorted coarse angular sand; very steeply eroded cutbanks indicative of intervals of high energy conditions; clay and silt deposits (shallow pool) suggesting quieter intervals; coarse pebble gravel bars and riffles, and sand dunes. The freshly cut banks of the erosive channels expose a cross-section view of the sensitive Pliocene to Pleistocene Arroyo Diablo, Borrego, and Brawley Formations.

Figure 6-5 The Arroyo Diablo Formation is well exposed along the vertical cliffs of Arroyo Salada, view to the northeast.

During field reconnaissance, the grey-tan to pink mudrock and siltstone terrestrial deposits of the Arroyo Diablo Formation (Palm Spring Group) was well-exposed along the cutbank of Arroyo Salado wash. The siltstone is well-sorted and laminated to thin-bedded (<1centimeter [cm] to 3cm) with alternating layers of tan and red beds in approximately 10 cm-thick cycles. Coarse clasts are absent, except in local lenses. A small permineralized abraded fossil mammal bone fragment was identified within transported and eroded detritus of the Arroyo Diablo Formation in the western Project area, [redacted]. The fossil fragment was recorded (see Appendix E for the BLM Locality Form); however, the fossil was determined to be non-significant due to its lack of context and poor preservation (Figure 6-6). In addition, small petrified wood fragments 9-24 cm in length and 3-9 cm in width were found scattered on the ground surface in Project areas mapped as the Arroyo Diablo Formation. The fossilized plant fragments are brownish-grey and very hard, with moderately well-preserved exterior woody morphology (Figure 6-7). The petrified wood was encountered *ex situ* and was not recorded or recovered because they are very common in the Project area and not considered to be scientifically significant.

Figure 6-6 A small highly abraded fossilized mammal bone fragment was found eroded out of the Arroyo Diablo Formation [redacted], view down. The fossil was without stratigraphic context and poorly preserved, therefore it was determined to be unidentifiable and non-significant.

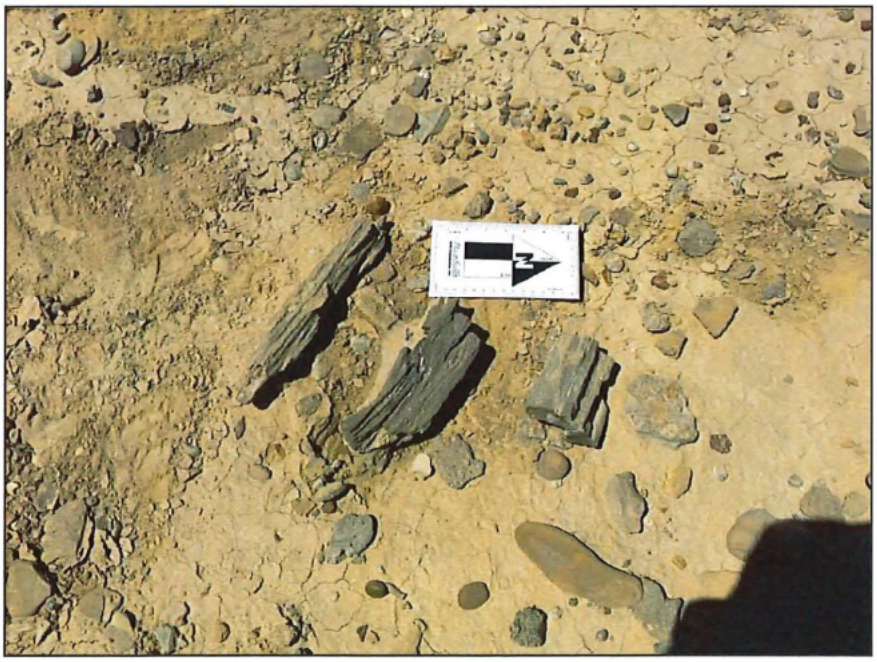


Figure 6-7 Petrified wood fragments found as float on the ground surface in an area underlain by the Arroyo Diablo Formation; the largest fragment is approximately 24 cm by 5 cm, view down.

The Borrego Formation is well exposed along the steep cutbanks of Tule Wash and is composed of intercalated beds (1-10 cm thick, 2 cm on average) of buff and red mudstone to claystone (1-20 cm thick, 7 cm on average), dipping at approximately 15E. The mudstone is locally interbedded with alternating fine-grained, well-bedded red-tan sandstone and resistant buff shale and is shallowly overlain by younger Lake Cahuilla deposits. The sandstone is fine-grained, very well-sorted, exhibits planar bedding up to 2-4 cm thick, and contains rare gravel lenses up to 5-10cm thick. The resistant buff shale is well indurated and weathers dark brown. Within Tule Wash, the fine-grained deposits of the lacustrine Borrego Formation commonly exhibit a popcorn texture due to the deposit's high clay composition. According to Dibblee and Minch (2008b) and Kirby et al (2007), the Brawley Formation is restricted to the eastern portion of the Project area; however, during the course of the limited survey in the eastern Project area, the Brawley Formation was obscured at the surface by Holocene lake Cahuilla deposits and was not observed.

Lake Cahuilla deposits and Quaternary alluvium are widespread on the ground surface of the Project area, where they commonly obscure the older Pliocene to Pleistocene deposits. The Lake Cahuilla deposits are composed of tan-brown, fine-grained sand and silt with surface mud cracks, and 3 to 5 percent fragmented and whole, non-mineralized mollusks (predominantly bivalves, with rare gastropods) up to 5cm wide, and 3mm-1cm long (Figure 6-8). These invertebrate remains are ubiquitous in the Project area and were not recorded because they are non-mineralized and are not scientifically significant. Weathered siltstone concretions, which are cemented rock masses likely formed due mineral precipitation related to nearby springs, are common. The light-brown concretions are resistant, up to 10 cm to 3 meters (m) long and 5cm to 1m wide, and covered with desert varnish. The alluvial deposits also include granodiorite, metamorphic, and travertine pebble to cobble clasts; common gypsum deposits; and scant (1-3 percent) eolian dune and windblown deposits.

Figure 6-8 Non-mineralized mollusks, such as this 5 cm by 2.5 cm bivalve, are abundant within the Lake Cahuilla deposits. Gastropods are present but rare. These invertebrate remains are ubiquitous and were not recorded or recovered because they are not scientific

Although approximately 80 percent of the surveyed area was obscured by thin, recent alluvial, playa, and lacustrine deposits, the underlying geologic units were well represented where exposed. The observations made during the course of field reconnaissance led to several key findings:

1. No significant fossil resources were discovered during the course of fieldwork. Abundant non-mineralized modern mollusks, common petrified wood, and one unidentifiable fragment of a mammal long bone fossil lacking stratigraphic context were encountered during the survey and determined to be non-significant.

2. Although generally obscured at the surface by lacustrine, playa, and alluvial deposits, the lithology observed in the Project area is consistent with the reviewed literature of Dibblee and Minch (2008a, 2008b), Winker (1987), Kirby et al. (2007), which states that the Arroyo Diablo Formation, Borrego Formation, Brawley Formation, Lake Cahuilla deposits, and Quaternary older alluvium are characterized by fine-grained, fluvial, alluvial, and lacustrine deposits. These formations have proven to be conducive to the preservation of vertebrate remains; therefore, there is a high to very high potential for buried fossils within the Project area.

3. The field survey was conducted to record and identify significant fossils observed on the ground surface; verify the mapped geology; and analyze the preservation potential at the subsurface. In general, abundant significant fossils were not expected to be encountered on the ground surface due to the common destruction of fossil resources by weathering, erosion, and transport, which often precludes the presence of surficial fossils in the Colorado Desert environment. As such, significant fossils were not encountered at the ground surface in the Project area during the survey; however, one unidentifiable mammal fossil and common fossilized wood fragments were observed during the survey, strongly suggesting that additional fossils may be present at the subsurface of the Project area. Additionally, observed lithologic characteristics as well as published mapping, literature, and museum records results, indicate that these geologic units may contain an unknown number of fossil resources at the subsurface and the ground surface of unsurveyed Project areas, although their significance, abundance, and predictability of occurrence may vary.

7
ANALYSIS AND RESULTS

7.1 MUSEUM RECORDS SEARCH RESULTS

To determine whether fossil localities have been previously discovered within the Project area, a museum records search was performed at the Natural History Museum of Los Angeles County. A supplemental review was conducted using the UCMP online database. The results of the LACM and UCMP records searches yielded no records for previously identified vertebrate localities within the Project area; however, at least 50 have been recorded nearby (McLeod, 2016; UCMP online database, 2016)

A review of fossil records maintained by the LACM returned records for 43 vertebrate localities in the vicinity of the Project area from within the Palm Spring Group (formation not identified), Borrego Formation, Brawley Formation, Lake Cahuilla Deposits, and Quaternary older alluvium (McLeod, 2016). Rock units of the Palm Spring Group yielded a rich suite of vertebrate fossils from the Borrego Badlands and Santa Rosa Mountains in Imperial County and eastern San Diego County, including specimens of horse, antelope, cat, sloth, deer, camel, rodent, bird, and fish. Numerous vertebrate specimens have been recorded within the Borrego Formation in the Borrego Badlands, including taxa of horse, mastodon, mammoth, camel, antelope, cat, short-faced bear, rodent, bird, and fish. Near the Superstition Hills, at least two vertebrate localities have been previously recorded in the Brawley Formation, which yielded vertebrate fossil specimens of horse and camel. Lastly, Quaternary Lake Cahuilla deposits have yielded fossils throughout the Salton Trough; McLeod (2016) reports that a particularly significant fauna of terrestrial and freshwater vertebrates, diatoms, land plants, clams, snails, and crustaceans was recovered during excavations for the PGA West Tom Weiskopf Signature Golf Course, near the Lake Cahuilla County Park, southeast of La Quinta. These localities yielded numerous vertebrate specimens of small mammal, bird, reptile, and fish. Depth for each vertebrate and invertebrate locality is unreported.

A supplemental review of the online database maintained by the UCMP (2016) indicated that at least seven additional localities have been recorded near the Project area from within the Palm Spring Group (formation not identified), Borrego Formation, and Quaternary Lake Cahuilla and older alluvial deposits. The localities yielded fossil specimens of horse, deer, camel and other unspecified vertebrates. The results of the museum records search are presented in Table 7-1.

Table 7-1
Vertebrate Localities Reported in the Vicinity of the Project Area

Locality No.	Geologic Unit	Age	Taxa
LACM 7087	Palm Spring Group[1]	Pliocene to Pleistocene	*Geomys anzensis* (pocket gopher), *Equus* (horse), and *Tetrameryx* (pronghorn antelope)
LACM 1499-1500, 1911, 1913-1917, 3794, 6763, 6915, and 67113 (12)	Palm Spring Group[1]	Pliocene to Pleistocene	*Xyrauchen texanus* (duck), Anserinae (goose), *Gymnogyps* (condor), Proboscidea (undetermined elephant), Canidae (dog), *Felis* (cat), *Lepus* (rabbit), *Neotoma* (wood rat), *Geomys garbanii* (pocket gopher), *Nothrotheriops* (ground sloth), *Equus*, Cervidae (deer), Antilocapridae, and *Camelops* (camel).
UCMP V5210	Palm Spring Group[1]	Pliocene to Pleistocene	Unspecified vertebrates
UCMP V6847	Palm Spring Group[1]	Pliocene to Pleistocene	*Equus*
UCMP V65686	Palm Spring Group[1]	Pliocene to Pleistocene	Unspecified vertebrates
UCMP V78104	Palm Spring Group[1]	Pliocene to Pleistocene	*Odocoileus casensis* (deer)
LACM 4120-4128,4142-4153, 4207-4210, 4212-4217, and 4222 (33)	Borrego Formation	Pliocene to Pleistocene	*Xyrauchen texanus* (minnow), *Clemmys* (pond turtle), Testudinidae (tortoise), Aves (bird), Mammutidae (mastodon), *Mammuthus* (mammoth), Felidae (cat), *Arctodus* (short-faced bear), Rodentia (rodent), *Equus*, *Plesippus* (horse), Tayassuidae (peccary), Antilocapridae (pronghorn antelope), and Camelidae (camel).
LACM 1188	Borrego Formation	Pliocene to Pleistocene	*Plesippus* and *Equus*.
UCMP V5209	Borrego Formation	Pliocene to Pleistocene	Unspecified vertebrates
LACM 5850	Brawley Formation	Pleistocene	Lamini (camel)
LACM 5834	Brawley Formation	Pleistocene	*Equus*
LACM 6256	Lake Cahuilla Deposits	Quaternary	*Ovis canadensis* (bighorn sheep)

Table 7-1
Vertebrate Localities Reported in the Vicinity of the Project Area

Locality No.	Geologic Unit	Age	Taxa
LACM 6252, 6253, 6255 (3)	Lake Cahuilla Deposits	Quaternary	*Xyrauchen texanus* (razorback sucker), *Gila elegans* (bonytail), *Cyprinodon macularius* (desert pupfish), *Sceloporus magister* (desert spiny lizard), *Uma inornata* (Coachella Valley fringe-toed lizard), *Urosaurus graciosus* (long-tailed brush lizard), *Hypsiglena torquata* (night snake), *Pituophis melanoleucus* (gopher snake), *Sonora semiannulata* (western ground snake), *Crotalus cerastes* (sidewinder rattlesnake), Passeriformes (advanced land birds), *Sylvilagus* (cottontail rabbit), *Neotoma lepida*, *Dipodomys* (kangaroo rat), *Perognathus longimembris* (pocket mouse), *Ammospermophilus leucurus* (antelope ground squirrel).
UCMP V5303	Lake Cahuilla/Quaternary older Alluvial Deposits	Quaternary	Camelidae
UCMP V5931	Lake Cahuilla/Quaternary older Alluvial Deposits	Quaternary	Unspecified vertebrates

Sources: McLeod, 2016; UCMP online database, 2016;

Notes: [1] identified in collection records as the Palm Spring Formation

7.2 RECOMMENDATION OF PALEONTOLOGICAL RESOURCE POTENTIAL FOR GEOLOGIC UNITS WITHIN THE PROJECT AREA

In accordance with BLM guidelines (2008), this report utilizes the PFYC system (BLM, 2007) to assess paleontological sensitivity and the level of effort required to manage potential impacts to significant fossil resources. Using this ranking system, the sensitivity of geologic units in the Project area was recommended on the basis of the relative abundance and risk of adverse impacts to significant fossils. In addition, the paleontological sensitivity of the Project area was determined according to the SVP (2010) classification scheme, which, absent specific agency guidelines, is typically used for the assessment of paleontological resources in California.

On the basis of the findings of the literature review, museum records search results, and the field survey, the geologic units underlying the Project area have a recommended paleontological sensitivity ranging from low to very high. The Palm Spring Group (Arroyo Diablo Formation) and Borrego Formation, which are well exposed in the Project area, have a very high recommended paleontological resource potential (PFYC Class 5a) because the units have yielded significant vertebrate fossils in the vicinity of the Project area that, according to Cassiliano (2002, 1), provide important information on the "evolution and diversification of paleocommunities characteristic of the Blancan and Irvingtonian NALMA" and "have the potential to...define the Blancan-Irvingtonian boundary" (Cassiliano, 1999). The Brawley Formation and Lake Cahuilla deposits are mapped within the eastern Project area and have a high recommended paleontological resource potential (PFYC Class 4) because they have proven to yield significantly in the western Colorado Desert. The Quaternary older alluvial deposits are known to yield intermittent vertebrate fossils in the western Colorado Desert, and as a result, a moderate paleontological resource potential (PFYC Class 3) is recommended. Quaternary alluvial deposits have a low paleontological resource potential recommendation (PFYC Class 2) because they are generally too young to preserve fossilized remains; however, these alluvial deposits may shallowly overlie older sensitive units at an unknown depth. The geologic units underlying the Project area and their recommended sensitivity ratings are shown in Table 7-2 and depicted in Figure 7-1.

Table 7-2
Geologic Units in the Project Area – SVP Paleontological Sensitivity and PFYC Rankings

Geologic Unit	Age	Typical Fossils	Potential Fossil Yield Classification (PFYC)	SVP Paleontological Sensitivity
Palm Spring Group (Arroyo Diablo Formation) (Tad)	Pliocene-Pleistocene	Mammals, fish	Very High (Class 5)	High
Borrego Formation (Tbo)	Pliocene-Pleistocene	Mammals, fish	Very High (Class 5)	High
Brawley Formation (QBr)	Pleistocene	Mammals	High (Class 4)	High
Quaternary older alluvium (Qoa)	Pleistocene	Mammals	Moderate (Class 3)	High
Lake Cahuilla deposits (Qc)	Quaternary	Invertebrates, Vertebrates	High (Class 4)	High
Quaternary alluvium (Qa, Qt)	Holocene	None	Low (Class 2)	Low

Source: BLM (2007, 2008); Dibblee and Minch (2008a, 2008b); Kirby et al. (2007); SVP (2010)

8
FINDINGS AND RECOMMENDATIONS

In general, the potential for a given project to result in adverse impacts to paleontological resources is directly proportional to the amount of ground disturbance associated with the project. Since this Project entails the installation of a temporary array of seismic equipment for geophysical field analysis, surficial to shallow ground disturbances are anticipated and the likelihood of impacting fossils is related to both to the type and extent of disturbance and the geologic unit in which the disturbance occurs. Ground disturbances are proposed along the source and receiver arrays within portions of the Project area underlain by the previously undisturbed Arroyo Diablo Formation, Borrego Formation, Brawley Formation, Lake Cahuilla deposits, and Quaternary older alluvium, which have proven to yield vertebrate remains throughout the western Colorado Desert, including Imperial County, eastern San Diego County, and southern Riverside County. Ground disturbance is also planned for portions of the Project area that are underlain Quaternary alluvium, which will likely impact previously undisturbed lithology in those deposits. Significant fossils have not been reported within these deposits, but they may shallowly overlie older sensitive units at an unknown depth. With the successful implementation of the recommended Management Strategy and Project-specific mitigation measures described below in Sections 8.1.1 through 8.1.4, potential adverse effects to paleontological resources would be reduced to a less than significant level as required by NEPA, the PRPA, and CEQA, and would also be consistent with other federal and local laws and regulations.

8.1 MANAGEMENT STRATEGY

Based in this assessment, there is a low to very high potential that fossils may be present at the surface or subsurface in the Project area; therefore, it is recommended that a Management Strategy be established that (1) sets forth protocol for a pre-construction field survey that should be conducted when the on-site seismic array design and source placement resumes in order to assess the Project area for the potential for surface fossils and buried paleontological resources; (2) provides avoidance protocol for paleontological resources, if encountered; (3) protects fossils from inadvertent damage by monitoring the installation of the geophones during receiver point placement; and (4), promotes the preservation of fossils through awareness training and curation.

The DPR does not set forth specific guidelines for the treatment of paleontological resources; therefore, this Management Strategy should be carried out in accordance with CEQA guidelines and the BLM's *General Procedural Guidance for Paleontological Resource Management Handbook* (H-8270, H-8270-1) (1998a, 1998b) and *Instruction Memorandums 2008-009* and *2009-011* (2007a, 2008), which establish criteria for the sensitivity and significance assessment and mitigation of sensitive fossil resources. Impacts from Project-related ground disturbing activities could be mitigated to an acceptable level with appropriate measures provided in H-8270, H-8270-1, IM2008-009, and IM2009-011 (BLM, 1998a, 1998b, 2007a, 2008), including the creation of a worker training, avoidance, construction monitoring procedures, and curation.

8.1.1 Worker Training

It is recommended that all Project personnel and other on-site workers shall receive environmental awareness training on paleontological resources prior to the start or continuation of any elements (i.e., on-site array design survey, source placement, and receiver installation) of the Project. The training will be conducted by a qualified, BLM- and DPR-permitted paleontologist and will provide a description of the fossil resources that may be encountered in the Project area, outline steps to follow in the event that a fossil discovery is made, and provide contact information for the Project Paleontologist. The training may be conducted concurrent with other environmental training (e.g., cultural and natural resources awareness training, safety training, etc.) and may also be videotaped or presented in an informational brochure for future use by field personnel not present at the start of the Project. The workers should be informed that any unlawful collection of paleontological resources may be subject to a misdemeanor, a fine, or both. By implementing worker awareness of the value and importance of scientifically significant fossils, adverse effects can be reduced.

8.1.2 Pre-construction Paleontological Field Survey

Since this Project entails the installation of a temporary array of seismic equipment for geophysical field analysis, very shallow and surficial ground disturbances are anticipated; as a result, a paleontological reconnaissance survey is necessary in order to determine the presence or absence of significant surface paleontological resources and potential subsurface fossils and develop avoidance protocol for paleontological resources. A portion of the Project area was previously surveyed during the initial phases of the on-site array design phase, April 26 through May 13, 2016. Additional paleontological survey work will be required during any further on-site array design fieldwork conducted by Ormat/ Geokinetics. The survey shall be conducted by BLM- and DPR- permitted qualified paleontologists in accordance with the protocol outlined in the approved survey plan (refer to Appendix D). Any collected paleontological resources should be curated at an accredited regional museum repository and a curation agreement should be obtained prior to the start of the survey.

8.1.3 Monitoring

Prior to the commencement of ground-disturbing activities, a qualified professional paleontologist should be retained to prepare and implement a Paleontological Resource Mitigation Plan (Plan) for the Project. The Plan should address the recommended approach to additional specimen collection, the specific locations and intensity of monitoring recommended for each geologic unit, and monitoring intensity.

In accordance with criteria set forth by BLM (2012) and SVP (2010), full-time monitoring is recommended for all ground disturbing activities within the previously undisturbed Arroyo Diablo Formation, Borrego Formation, Brawley Formation, Lake Cahuilla deposits, and Quaternary older alluvium, which underlies the Project area. Monitoring will entail the visual inspection of excavated or graded areas and trench sidewalls. In the event that a paleontological resource is discovered, the monitor will have the authority to divert temporarily the construction equipment around the find until it is assessed for scientific significance and collected. All

collected paleontological resources should be curated at an accredited regional museum repository and a curation agreement should be obtained prior to the start of monitoring activities.

8.1.4 Curation and Reporting

Upon completion of fieldwork, all significant fossils collected will be prepared in a properly equipped paleontology laboratory to a point ready for curation. Preparation will include the careful removal of excess matrix from fossil materials and stabilizing and repairing specimens, as necessary. Following laboratory work, all fossils specimens will be identified to the lowest taxonomic level, cataloged, analyzed, and curated. Fossil specimens collected from BLM-managed land remain the property of the Federal government and they must be placed in the approved museum repository identified on the Paleontological Resource Use Permit. Fossil specimens collected from DPR-managed land remain the property of the State of California and must also be delivered to an accredited regional museum repository for permanent curation and storage. The cost of curation is assessed by the repository and is the responsibility of Ormat.

At the conclusion of laboratory work and museum curation, a final report will be prepared to describe the results of the paleontological mitigation monitoring efforts associated with the Project. The report will include a summary of the field and laboratory methods, an overview of the Project area geology and paleontology, a list of taxa recovered (if any), an analysis of fossils recovered (if any) and their scientific significance, and recommendations. If the monitoring efforts produced fossils, then a copy of the report will also be submitted to the curation facility.

9
CONCLUSIONS

This assessment is based on the results of a museum records search, review of available geologic and paleontologic literature, and a pedestrian survey of exposed geologic units within a portion of the Project area. No significant fossils were observed during the field survey; therefore, only fossils that have already been inventoried or collected are available for this analysis. Based on this study, there is a low to very high potential that fossils may be present at the surface or subsurface of the Project area; consequently, the likelihood of impacting significant buried fossils within the Project area is low to high, based on the location and type of ground disturbance. Although the ground-disturbing Project activities proposed under the current Project design will mostly be restricted to the surface, shallow subsurface disturbance is anticipated and sensitive geologic units could be impacted; as a result, without proper mitigation, these nonrenewable scientific resources may be at risk of being adversely impacted by the implementation of the Project. With the successful implementation of the Management Strategy described in Chapter 8, potential adverse impacts to paleontological resources would be reduced to a less than significant level as required by NEPA, the PRPA, and CEQA, and would also be consistent with other federal and local laws and regulations.

10
REFERENCES

Alles, D. L., 2011, Geology of the Salton Trough. Western Washington University, Unpublished manuscript, 31 p., http://fire.biol.wwu.edu/trent/alles/GeologySaltonTrough.pdf (accessed October 2016).

Arnal, Robert E., 1961, Limnology, Sedimentation, and Microorganisms of the Salton Sea, California. Geological Society of America Bulletin, v. 72, no. 3. p. 427–478.

Bureau of Land Management (BLM), 1998a, General Procedural Guidance for Paleontological Resource Management Manual H-8270. Department of the Interior, Washington, D.C.

_____, 1998b , Paleontological Resources Management Manual H-8270-1. Department of the Interior, Washington, D.C.

_____, 2007, Potential Fossil Yield Classification (PFYC) System for Paleontological Resources on Public Lands. Instruction Memorandum No. 2008-009. Department of the Interior, Washington, D.C.

_____, 2008, Assessment and Mitigation of Potential Impacts to Paleontological Resources. Instruction Memorandum No. 2009-011. Department of the Interior, Washington, D.C.

_____, 2012, The Omnibus Public Land Management Act, Subtitle D—Paleontological Resources Preservation, 16 USC 470aaa, SEC. 630. http://www.blm.gov/pgdata/etc/medialib/blm/wo/Planning_and_Renewable_Resources/coop_agencies/paleontology_library/paleon_legis.Par.45651.File.dat/PL-111-011-prpa.pdf, (accessed October 2016).

BLM and Office of the Solicitor, 2001, The Federal Land Policy and Management Act of 1976, As Amended. Compiled by U.S. Department of the Interior Bureau of Land Management and Office of the Solicitor, Washington, D.C.

California Office of Historic Preservation, 2005, California State Law & Historic Preservation – Statutes, Regulations & Administrative Policies Regarding the Preservation & Protection of Cultural & Historical Resources. California Office of Historic Preservation, Department of Parks and Recreation Technical Assistance Series 10.

Cassiliano, M. L., 1999, Biostratigraphy of Blancan and Irvingtonian Mammals in the Fish Creek-Vallecito Creek Section, Southern California, and a Review of the Blancan-Irvingtonian Boundary. Journal of Vertebrate Paleontology, v. 19, no. 1, p. 169-186.

Cassiliano, M.L., 2002, Revision of the stratigraphic nomenclature of the Plio-Pleistocene Palm Spring Group (new rank), Anza-Borrego Desert, southern California. Proceedings of the San Diego Society of Natural History 38, p. 1-30.

APPENDIX A

Natural History Museum of Los Angeles County Curation Agreements

Natural History Museum
of Los Angeles County
900 Exposition Boulevard
Los Angeles, CA 90007

tel 213.763.DINO
www.nhm.org

NATURAL HISTORY MUSEUM
LOS ANGELES COUNTY

Vertebrate Paleontology Section
Telephone: (213) 763-3325
Fax: (213) 746-7431
e-mail: smcleod@nhm.org

5 February 2016

Applied EarthWorks, Inc.
133 North San Gabriel Boulevard, Suite 201
Pasadena, CA 91107

Attn: Heather Clifford, Associate Paleontologist / Geologist

Subject: Acceptance of fossil vertebrate remains from Paleontological Mitigation Related Projects on California Department of Parks and Recreation properties in California

Dear Heather:

This letter will confirm our conditions regarding acceptance of the fossil vertebrate remains from Paleontological Mitigation Related Projects on California Department of Parks and Recreation properties in California by the Department of Vertebrate Paleontology of the Natural History Museum of Los Angeles County [LACM-VP]. The Department is willing to consider accepting the collection(s) if all the following conditions are met:

All localities must be described according the standard format used on the LACM-VP locality form, including a description of the geographic position, lithology, stratigraphy, and depositional environment if known.

All localities must be plotted on standard USGS topographic maps.

All specimens must be fully stabilized and prepared.

All specimens must be designated in such a way as to directly tie them to the localities described above.

All specimens must be identified to the lowest taxonomic level possible.

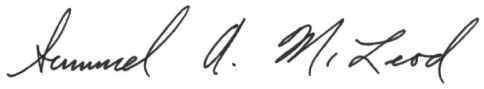
The collection must be accompanied by both printed and digital copies of any field notes and mitigation or salvage reports.

The collection must be accompanied by a deed-of-gift or letter of transmittal giving free and clear title of the collection to the Natural History Museum of Los Angeles County, or if the collection was obtained from government lands it must be accompanied by a copy of the official permit granting collecting.

The collection must be accompanied by specimen cabinets, drawers and trays similar to those used by the LACM-VP. This requirement is waved for a relatively small collection.

We estimate our costs for curation tasks for the localities described above, as well as the actual cataloguing of the specimens including placing the numbers on the bones, at $20 per locality and $15 per specimen. We further estimate our costs for the permanent storage and maintenance of a collection at $300 per cubic foot of fully prepared vertebrate fossils. If the equipment and supplies, including specimen cabinets, drawers, and trays, as well as the curation tasks for localities and specimens, are not provided by the donor, then we would greatly appreciate a donation to offset our costs. Any donation must be accompanied by a letter clearly stating that the donation is to be used solely for the permanent curation and storage of a specific collection of vertebrate fossils.

Sincerely,



Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

Natural History Museum
of Los Angeles County
900 Exposition Boulevard
Los Angeles, CA 90007

tel 213.763.DINO
www.nhm.org

NATURAL HISTORY MUSEUM
LOS ANGELES COUNTY

Vertebrate Paleontology Section
Telephone: (213) 763-3325
Fax: (213) 746-7431
e-mail: smcleod@nhm.org

15 July 2015

Applied EarthWorks, Inc.
133 North San Gabriel Boulevard, Suite 201
Pasadena, CA 91107

Attn: Heather Clifford, Associate Paleontologist / Geologist

Subject: Acceptance of fossil vertebrate remains from Paleontological Mitigation Related Projects on Bureau of Land Management properties in California

Dear Heather:

This letter will confirm our conditions regarding acceptance of the fossil vertebrate remains from Paleontological Mitigation Related Projects on Bureau of Land Management properties in California by the Department of Vertebrate Paleontology of the Natural History Museum of Los Angeles County [LACM-VP]. The Department is willing to consider accepting the collection(s) if all the following conditions are met:

All localities must be described according the standard format used on the LACM-VP locality form, including a description of the geographic position, lithology, stratigraphy, and depositional environment if known.

All localities must be plotted on standard USGS topographic maps.

All specimens must be fully stabilized and prepared.

All specimens must be designated in such a way as to directly tie them to the localities described above.

All specimens must be identified to the lowest taxonomic level possible.

The collection must be accompanied by both printed and digital copies of any field notes and mitigation or salvage reports.

The collection must be accompanied by a deed-of-gift or letter of transmittal giving free and clear title of the collection to the Natural History Museum of Los Angeles County.

The collection must be accompanied by specimen cabinets, drawers and trays similar to those used by the LACM-VP. This requirement is waved for a relatively small collection.

We estimate our costs for curation tasks for the localities described above, as well as the actual cataloguing of the specimens including placing the numbers on the bones, at $20 per locality and $15 per specimen. We further estimate our costs for the permanent storage and maintenance of a collection at $300 per cubic foot of fully prepared vertebrate fossils. If the equipment and supplies, including specimen cabinets, drawers, and trays, as well as the curation tasks for localities and specimens, are not provided by the donor, then we would greatly appreciate a donation to offset our costs. Any donation must be accompanied by a letter clearly stating that the donation is to be used solely for the permanent curation and storage of a specific collection of vertebrate fossils.

Sincerely,

Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

APPENDIX B

Bureau of Land Management Paleontological Resources Use Permit and Personnel Amendment

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
California State Office
2800 Cottage Way, Suite W1623
Sacramento, CA 95825
www.blm.gov/ca

September 14, 2015

In Reply Refer To:
8151(P)
CA-930.5

Jessica DeBusk, Paleontology Program Manager
Applied Earthworks, Inc.
133 North San Gabriel Boulevard, Suite 201
Pasadena, CA 91107-3414

Dear Ms. DeBusk:

The Bureau of Land Management (BLM) is pleased to issue a 3-year Scientific Paleontological Permit (*CA-15-013P*) to Applied Earthworks for use on Public Lands managed by California BLM as specified in your permit. This permit is issued under the authority of the Federal Land Policy and Management Act (FLPMA) and the Antiquities Act of 1906. Keep a copy with you at all times in the field.

This permit authorizes the permit holder to conduct and collect paleontological resources pertaining to both scientific research and commercial projects. BLM would like to emphasize a few points. First, this permit assigns to your firm the responsibility to submit reports and other documents in a timely fashion and such submittal will be a major point of review of your firm's performance under this permit. Second, you are required to contact the appropriate Field Office to obtain a Field Use Authorization before you begin any fieldwork. Please allow the Field Office sufficient lead-time to process your application for a Field Use Authorization. The Field Office may impose additional conditions and stipulations at that time. Third, please be mindful that it is your firm's responsibility to ensure assignment of supervisory field personnel (crew chiefs) to projects that have at least four months' local experience and who otherwise meet the standards of the Bureau.

Our office is enclosing a map of California BLM Field Offices with phone numbers of cultural heritage staff and a copy of your permit with attached National special permit conditions. BLM draws your attention to these stipulations and encourages you to read and understand them. Please sign page 5, as indicated, and **return a copy of this signature page to the California BLM State Office within 30 days of your receipt of the permit**. Your permit will be valid after your signature is received.

Should you have any questions contact Tony Overly at 916-978-4684 via email at soverly@blm.gov.

Sincerely,

Tom Pogachnik
Deputy State Director
Natural Resources Division

Enclosures as stated

EEC ORIGINAL PKG

DI Form 1991 (Rev Sept 2004)
OMB No. 1024-0037
Exp. Date (01/31/2008)

United States Department of the Interior

PERMIT FOR PALEONTOLOGICAL INVESTIGATIONS

To conduct archeological work on Department of the Interior lands and Indian lands under the authority of:

- ☒ The Archaeological Resources Protection Act of 1979 (16 U.S.C. 470aa-mm) and its regulations (43 CFR 7).
- ☐ The Antiquities Act of 1906 (P.L. 59-209; 34 Stat. 225, 16 U.S.C. 431-433) and its regulations (43 CFR 3).
- ☐ Supplemental regulations (25 CFR 262) pertaining to Indian lands.
- ☒ Bureau-specific statutory and/or regulatory authority: Federal Land Policy and Management Act of 1976 (Public Law 94-570), and Section 302 of Public Law 94-4579

Please use this number when referring to this permit
No.: CA-15-13P

1. Permit issued to Applied Earthworks, Inc.	2. Under application dated July 17, 2015
3. Address 133 North San Gabriel Boulevard, Suite 201, Pasadena, CA 91107-3414	4. Telephone number(s) (626) 578-0119 5. E-mail address(es) jdebusk@appliedearthworks.com

6. Name of Permit Administrator Jessica DeBusk Telephone number(s): (626) 578-0119 Email address(es): jdebusk@appliedearthworks.com	7. Name of Principal Investigator(s) Jessica DeBusk Telephone number(s): (626) 578-0119 Email address(es): jdebusk@appliedearthworks.com
8. Name of Field Director(s) authorized to carry out field projects Jessica DeBusk, Stephanie Lukowski, Heather Clifford, Kristin McCallister, Joshua Bonde	Telephone number(s): (626) 578-0119 Email address(es):

9. Activity authorized
Survey and limited surface collection

10. On lands described as follows
All lands administered by the Bureau of Land Management-California

11. During the duration of the project From September 14, 2015 To September 14, 2018

12. Name and address of the curatorial facility in which collections, records, data, photographs, and other documents resulting from work under this permit shall be deposited for permanent preservation on behalf of the United States Government.
Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, CA 90007

13. Permittee is required to observe the listed standard permit conditions and the special permit conditions attached to this permit.

14. Signature and title of approving official Tom Pogacnik, Deputy State Director, Natural Resources Division	15. Date 09/14/2015

EEC ORIGINAL PKG

15. Standard Permit Conditions

a. This permit is subject to all applicable provisions of 43 CFR Part 3, 43 CFR 7, and 25 CFR 262, and applicable departmental and bureau policies and procedures, which are made a part hereof.

b. The permittee and this permit are subject to all other Federal, State, and local laws and regulations applicable to the public lands and resources.

c. This permit shall not be exclusive in character, and shall not affect the ability of the land managing bureau to use, lease or permit the use of lands subject to this permit for any purpose.

d. This permit may not be assigned.

e. This permit may be suspended or terminated for breach of any condition or for management purposes at the discretion of the approving official, upon written notice.

f. This permit is issued for the term specified in 11 above.

g. Permits issued for a duration of more than one year must be reviewed annually by the agency official and the permittee.

h. The permittee shall obtain all other required permit(s) to conduct the specified project.

i. Archeological project design, literature review, development of the regional historic context framework, site evaluation, and recommendations for subsequent investigations must be developed with direct involvement of an archeologist who meets the Secretary of the Interior's Standards for Archeology and Historic Preservation; fieldwork must be generally overseen by an individual who meets the Secretary of the Interior's Standards for Archeology and Historic Preservation.

j. Permittee shall immediately request that the approving official (14. above) make a modification to accommodate any change in an essential condition of the permit, including individuals named and the nature, location, purpose, and time of authorized work, and shall without delay notify the approving official of any other changes affecting the permit or regarding information submitted as part of the application for the permit. Failure to do so may result in permit suspension or revocation.

k. Permittee may request permit extension, in writing, at any time prior to expiration of the term of the permit, specifying a limited, definite amount of time required to complete permitted work.

l. Any correspondence about this permit or work conducted under its authority must cite the permit number. Any publication of results of work conducted under the authority of this permit must cite the approving bureau and the permit number.

m. Permittee shall submit a copy of any published journal article and any published or unpublished report, paper, and manuscript resulting from the permitted work (apart from those required in items q. and s., below), to the approving official and the appropriate official of the approved curatorial facility (item 12 above).

n. Prior to beginning any fieldwork under the authority of this permit, the permittee, following the affected bureau's policies and procedures, shall contact the field office manager responsible for administering the lands involved to obtain further instructions.

o. Permittee may request a review, in writing to the official concerned, of any disputed decision regarding inclusion of specific terms and conditions or the modification, suspension, or revocation of this permit, setting out reasons for believing that the decision should be reconsidered.

p. Permittee shall not be released from requirements of this permit until all outstanding obligations have been satisfied, whether or not the term of the permit has expired. Permittee may be subject to civil penalties for violation of any term or condition of this permit.

15. Standard Permit Conditions (continued)

q. Permittee shall submit a preliminary report to the approving official within a timeframe established by the approving official, which shall be no later than 6 weeks after the completion of any episode of fieldwork, setting out what was done, how it was done, by whom, specifically where, and with what results, including maps, GPS data, an approved site form for each newly recorded archeological site, and the permittee's professional recommendations, as results require. If other than 6 weeks, the timeframe shall be specified in Special Permit Condition p. Depending on the scope, duration, and nature of the work, the approving official may require progress reports, during or after the fieldwork period or both, and as specified in Special Permit Condition r.

r. Permittee shall submit a clean, edited draft final report to the agency official for review to insure conformance with standards, guidelines, regulations, and all stipulations of the permit. The schedule for submitting the draft shall be determined by the agency official.

s. Permittee shall submit a final report to the approving official not later than 180 days after completion of fieldwork. Where a fieldwork episode involved only minor work and/or minor findings, a final report may be submitted in place of the preliminary report. If the size or nature of fieldwork merits, the approving official may authorize a longer timeframe for the submission of the final report as specified in Special Permit Condition q.

t. Two copies of the final report, a completed NTIS Report Documentation Page (SF-298), available at http://www.ntis.gov/pdf/rdpform.pdf, and a completed NADB-Reports Citation Form, available at http://www.cr.nps.gov/aad/tools/nadbform_update.doc, will be submitted to the office issuing the permit.

u. The permittee agrees to keep the specific location of sensitive resources confidential. Sensitive resources include threatened species, endangered species, and rare species, archeological sites, caves, fossil sites, minerals, commercially valuable resources, and sacred ceremonial sites.

v. Permittee shall deposit all artifacts, samples and collections, as applicable, and original or clear copies of all records, data, photographs, and other documents, resulting from work conducted under this permit, with the curatorial facility named in item 12, above, not later than 90 days after the date the final report is submitted to the approving official. Not later than 180 days after the final report is submitted, permittee shall provide the approving official with a catalog and evaluation of all materials deposited with the curatorial facility, including the facility's accession and/or catalog numbers.

w. Permittee shall provide the approving official with a confirmation that museum collections described in v. above were deposited with the approved curatorial facility, signed by an authorized curatorial facility official, stating the date materials were deposited, and the type, number and condition of the collected museum objects deposited at the facility.

x. Permittee shall not publish, without the approving official's prior permission, any locational or other identifying archeological site information that could compromise the Government's protection and management of archeological sites.

y. For excavations, permittee shall consult the OSHA excavation standards which are contained in 29 CFR §1926.650, §1926.651 and §1926.652. For questions regarding these standards contact the local area OSHA office, OSHA at 1-800-321-OSHA, or the OSHA website at http://www.osha.gov.

z. Special permit conditions attached to this permit are made a part hereof.

16. Special Permit Conditions

☒ a. Permittee shall allow the approving official and bureau field officials, or their representatives, full access to the work area specified in this permit at any time the permittee is in the field, for purposes of examining the work area and any recovered materials and related records.

☒ b. Permittee shall cease work upon discovering any human remains and shall immediately notify the approving official or bureau field official. Work in the vicinity of the discovery may not resume until the authorized official has given permission.

☒ c. Permittee shall backfill all subsurface test exposures and excavation units as soon as possible after recording the results, and shall restore them as closely as reasonable to the original contour.

☒ d. Permittee shall not use mechanized equipment in designated, proposed, or potential wilderness areas unless authorized by the agency official or a designee in additional specific conditions associated with this permit.

☒ e. Permittee shall take precautions to protect livestock, wildlife, the public, or other users of the public lands from accidental injury in any excavation unit.

☒ f. Permittee shall not conduct any flint knapping or lithic replication experiments at any archeological site, aboriginal quarry source, or non-site location that might be mistaken for an archeological site as a result of such experiments.

☒ g. Permittee shall perform the fieldwork authorized in this permit in a way that does not impede or interfere with other legitimate uses of the public lands, except when the authorized officer specifically provides otherwise.

☒ h. Permittee shall restrict vehicular activity to existing roads and trails unless the authorized officer provides otherwise.

☒ i. Permittee shall keep disturbance to the minimum area consistent with the nature and purpose of the fieldwork.

☒ j. Permittee shall not cut or otherwise damage living trees unless the authorized officer gives permission.

☒ k. Permittee shall take precautions at all times to prevent wildfire. Permittee shall be held responsible for suppression costs for any fires on public lands caused by the permittee's negligence. Permittee may not burn debris without the authorized officer's specific permission.

☒ l. Permittee shall conduct all operations in such a manner as to prevent or minimize scarring and erosion of the land, pollution of the water resources, and damage to the watershed.

☒ m. Permittee shall not disturb resource management facilities within the permit area, such as fences, reservoirs, and other improvements, without the authorized officer's approval. Where disturbance is necessary, permittee shall return the facility to its prior condition, as determined by the authorized officer.

☒ n. Permittee shall remove temporary stakes and/or flagging, which the permittee has installed, upon completion of fieldwork.

☒ o. Permittee shall clean all camp and work areas before leaving the permit area. Permittee shall take precautions to prevent littering or pollution on public lands, waterways, and adjoining properties. Refuse shall be carried out and deposited in approved disposal areas.

☐ p. Permittee shall submit the preliminary report within _____ days/weeks of completion of any episode of fieldwork..

☐ q. Permittee shall submit the final report within _____ days/weeks/months after completion of fieldwork..

☐ r. Permittee shall submit progress reports every _____ months over the duration of the project.

☒ s. California special permit conditions are attached.

Special Permit Conditions Continuation Sheet: California Conditions

- a. Work under this permit is limited to specific service approved for each permit. This may consist of non-collection survey, limited testing to determine site content and limits or extensive testing emergency excavation and/or salvage projects. Testing/ excavation projects may be conducted under the authority of this permit only upon completion of ARPA consultation with Native American Groups and written approval from the Bureau for such work. (CARIDAPs for the purpose of the identification of archaeological resources are authorized under a FLPMA/ARPA Permit).
- b. Permittees shall verbally and subsequently in writing contact the appropriate BLM Field Manager prior to the beginning of each of his field operations (with follow-up written notification) to inform the BLM of specific work to be conducted. At this time, the BLM Field Manager may impose additional stipulation as deemed necessary to provide for the protection and management of resource values in the general site or project area.
- c. All cultural artifacts and other related materials such as notes, photographs, etc., acquired under the provisions of this permit **remain the property of the United States Government and may be recalled at any time for the use of the Department of the interior or other agencies of the Federal Government.** Cultural materials collected under the provisions of this permit must be curated at a repository approved by the BLM. Curation shall be at a local qualified repository, if feasible, and an approved curation facility shall be designated prior to all field projects. An itemized list of all materials with accession numbers, curated at the repository will be submitted to the State Office and to the appropriate Field Office within 180 days of the completion of individual field projects. A copy of a receipt from the curation facility must be submitted with the list or catalogue.
- d. Permittees shall acquire a primary number from the appropriate Information Center for each cultural resource documented while undertaking work authorized by this permit.
- e. The BLM Field Manager or authorized representative may require a monthly letter progress report outlining what was accomplished. This report, if required, is due by the fifth day of the following month, unless different arrangements are approved.
- f. The individual(s) in direct charge must be academically qualified and possess adequate field experience. At least two weeks prior to initiation field work, the permittees must provide the BLM Field Manager with the vitae of individuals proposed to be in direct charge if not approved at the time of permit issuance. A list of field crew members should be submitted at the same time. Only the individual(s) listed in Item No. 8 of the permit is/are authorized to be in direct charge of field work conducted under this permit.
- g. The person(s) in direct charge of field work, shall be on site at all times when work is in progress. Failure to comply with permit stipulations will result in removal of subject's name(s) from the approved list of person-in-direct-charge.
- h. Care should be exercised to avoid directly or indirectly increasing access or potential vandalism to sensitive sites.
- i. All National Permit Stipulations are binding. The authority for issuing permits in the Bureau of Land Management rests solely with the State Director as Delegated by the Secretary of the Interior and all further delegation is prohibited by Secretarial Order. No Modification of National Permit Conditions 8 or 9 or of the California Special Permit Conditions may occur except by written decision of the State Director.
- j. The Bureau of Land Management shall be cited in any report of work done under this permit, including publications such as books, news articles and scientific publications, as well as oral reports, films, television programs, and presentations in other media.

By signing below, I, the Principal Investigator, acknowledge that I have read and understand the Permit for Archeological Investigations and agree to its terms and conditions as evidenced by my signature below and initiation of work or other activities under the authority of this permit.

Signature and title: Jessica DeBuck	Date: 09/14/2015

Paperwork Reduction Act and Estimated Burden Statement: This information is being collected pursuant to 16 U.S.C. 470cc and 470mm, to provide the necessary facts to enable the Federal land manager (1) to evaluate the applicant's professional qualifications and organizational capability to conduct the proposed archeological work; (2) to determine whether the proposed work would be in the public interest; (3) to verify the adequacy of arrangements for permanent curatorial preservation, as United States property, of specimens and records resulting from the proposed work; (4) to ensure that the proposed activities would not be inconsistent with any management plan applicable to the public lands involved; (5) to provide the necessary information needed to complete the Secretary's Report to Congress on Federal Archeology Programs; and (6) to allow the National Park Service to evaluate Federal archeological protection programs and assess compliance with the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470). Submission of the information is required before the applicant may enjoy the benefit of using publicly owned archeological resources. To conduct such activities without a permit is punishable by felony-level criminal penalties, civil penalties, and forfeiture of property. A federal agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a valid OMB control number. Public reporting for this collection of information is estimated to average one hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Departmental Consulting Archeologist; NPS; 1849 C Street, NW (2275); Washington, DC 20240-0001.

APPENDIX C

California Department of Parks And Recreation Paleontological Resources Investigations/ Collections Permit

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
Resource Management Division
P.O. Box 942896 — Sacramento, CA 94296
(916) 653-6725

DPR USE ONLY
APPLICATION NO.
DATE RECEIVED
DISTRICT
CEQA

APPLICATION AND PERMIT TO CONDUCT PALEONTOLOGICAL INVESTIGATIONS/COLLECTIONS

Instructions: **Application must be TYPEWRITTEN with original signatures. USGS topographic map and other maps showing precise location of proposed work must be attached.**

ORGANIZATION APPLICANT NAME
Applied EarthWorks, Inc.

PHONE NO.
626-578-0119

ADDRESS
133 N. San Gabriel Blvd, Suite 201 Pasadena, CA 91107-3414

The above applicant hereby applies to the Department of Parks and Recreation for a Permit under the Public Resources Code 5097.5 to conduct paleontological investigations on lands of the State of California as follows:

STATE PARK SYSTEM UNIT
Ocotillo Wells State Vehicular Recreation Area

COUNTY
Imperial

GEOLOGICAL FORMATION
Palm Spring Fm., Borrego Fm., Brawley Fm., Quaternary Lake Cahuilla deposits, Quaternary alluvium

USGS QUADRANGLE(S)
Kane Spring NW and Truckhaven, CA 7.5-minute U.S. Geological Survey quadrangles

SECTION	TOWNSHIP	RANGE	BASE AND MERIDIAN	UTMS
1-36	10S, 11S	9E, 10E	San Bern B&M	

1. The aims, purposes, and methods of this investigation will be as follows (Attach continuation sheets as necessary. For excavations, provide a research design and an outline of the report to be provided.): Please see the enclosed Paleontological Resources Survey Plan for the Ormat Nevada, Inc. Truckhaven 3D Seismic Data Acquisition Project

2. Approximate amount of material to be collected (number of specimens, weight, etc.)
Please see the enclosed Paleontological Resources Survey Plan

3. Expected duration of the project (Specify dates of field investigations, laboratory study, and report completion):
The survey will be conducted during a total of 11 to 15 consecutive days. Project mobilization will occur on April 18.

4. General scope and nature of applicant organization's activities and goals:
Please see the enclosed Paleontological Resources Survey Plan

5. Name, title, address, telephone, and affiliation of principal investigator (Attached resume or curriculum vitae):
Jessica DeBusk, Paleontology Program Manager, Applied EarthWorks

133 N. San Gabriel Blvd. Pasadena, CA 91107, 626-578-0119

Please see the enclosed Paleontological Resources Survey Plan

EEC ORIGINAL PKG

6. Name, address, affiliation and telephone number of person in actual direct charge of field work (Attach resume and curriculum vitae if different from No. 4): Heather Clifford (Field Agent), Associate Paleontologist/Geologist, Applied EarthWorks

Pasadena, CA 91107, 626-578-0119. Please see the enclosed Paleontological Resources Survey Plan

7. Names and titles of field and laboratory assistants:
Qualified Paleontologists - Field Agent: Blake Bufford; Field Assistants: Michelle Conrad, Erik Pino

8. Laboratory work will take place at (institution, address, phone numbers, person to contact):
Applied EarthWorks, 133 N. San Gabriel Blvd. Pasadena, CA 91107

626-578-0119, Jess Debusk (Laboratory contact)

9. Name and location of facility that has agreed to curate materials collected under this permit (must meet requirements under Standard Conditions and Restrictions): This will be a "no collection" survey; fossils will not be collected and no matrix sampling will occur.

10. List previous and currently held permits with the Department of Parks and Recreation.
No previous or current permits held.

I have read and agree to adhere to the Standard Conditions and Restrictions attached to this Application and Permit.

APPLICANT'S SIGNATURE ▶ Jessica DeBusk	APPLICANT'S NAME (Print or type) Jessica L. DeBusk	DATE 4/12/2016

REVIEWED BY	SIGNATURE	DATE
Environmental Scientist RESOURCE ECOLOGIST OR PALEONTOLOGIST	Sara Lockett	4/18/2016
DISTRICT SUPERINTENDENT	Garratt Aitchison	4/18/2016
SENIOR GEOLOGIST		

NATURAL HERITAGE SECTION SUPERVISOR'S APPROVAL SIGNATURE ▶	DATE

APPLICANT MUST CARRY THIS PERMIT AT ALL TIMES WHILE COLLECTING

PERMIT VALID FROM 4/25/2016 **TO** 5/31/2016

PERMIT CONDITIONS:

California State Parks will be provided with a digital copy of all collected data from within State Park boundaries including GPS shapefiles, photographs, and final report of findings. Digital data should be sent to Sara Lockett, Ocotillo Wells Environmental Scientist.

Confidentiality agreements will be required for all field crew due to access to sensitive cultural resources. Training for handling confidential information may be requested by BLM/State Parks.

The Permit Holder (and his/her field assistants) agrees to abide by all park rules and regulations, including, but not limited to vehicle use restrictions, and posted area closures necessary to protect sensitive species (including barricades and fencing).

The Permit Holder is responsible for obtaining any additional permits or approvals required for research or collecting activities conducted beyond State Park System boundaries.

EEC ORIGINAL PKG

STANDARD CONDITIONS AND RESTRICTIONS
(PALEONTOLOGICAL PERMITS)

Only paleontological material may be collected under issuance of this permit. *All specimens collected remain the property of the State of California, Department of Parks and Recreation (DPR).* The applicant is responsible for arranging for the curation, accession, safeguarding and preservation of all materials collected in accordance with accepted museum standards. These arrangements must address the continuing availability of the collection for public observation, scientific study and display if curated (on loan) to institutions outside of DPR facilities. It is the responsibility of the permit holder to provide DPR with three (3) copies of all catalogs, field notes, photographs and reports, even if curation is arranged in a facility not under the control of DPR. Collection should be accomplished by methods that conserve resources and must be of some tangible benefit to the State Park System. The collections shall be used for scientific and educational purposes dedicated to public benefit only and shall in no case be used for commercial purposes or personal profit.

All work to be accomplished shall be discussed with the District Superintendent or designee prior to beginning field work. The District Superintendent may specify additional restrictions or conditions due to site sensitivity, natural hazards in the area, visitor traffic patterns, etc. Field work shall be scheduled with the District Superintendent or designee, who shall be contacted immediately upon arrival in the park unit. Should unanticipated changes in conditions occur during the course of the field work, additional restrictions may be required for reasons of health, safety and resource protection. Direct any questions regarding this permit to the District Resource Ecologist. This permit may be cancelled by the District Superintendent.

Plant life and other features shall not be disturbed without permission of DPR staff. After excavation, restore the area to as near its former condition as possible. Park unit staff should be consulted before and after backfilling, for suggestions and approval.

Permits are issued for one year or a portion thereof. Within six months of permit expiration and at least thirty (30) days prior to filing final reports with any other agency, permittee agrees to provide DPR with three (3) copies of all site survey records, survey and excavation reports, photographs, and specimen catalogs for review. A final report is required within a year. One (1) set of the above specified documents will be sent to the District Resource Ecologist and two to the Natural Heritage Supervisor. Copies of any materials published shall be submitted to DPR and should include an acknowledgment of the Department of Parks and Recreation. For continuing studies, submit a new application with four (4) copies of a progress report.

Applicant agrees to indemnify, save harmless, and defend the State of California, its officers, agents, and employees against any and all claims, demands, damages, losses or liability of its officers, agents, and employees due or incident to, either in whole or in part, whether indirectly or directly connected with, the activities described in this permit or arising out of or in any way connected with or incident to the permit issued from this application. In the event State is named as codefendant under the provisions of Government Code Sections 895 et seq., the Permittee shall notify State of such fact and shall represent State in such legal action unless State undertakes to represent itself as codefendant in such legal action, in which event State shall bear its own litigation costs, expenses, and attorney's fees. The applicant, its officers, agents, employees, or others holding permits under this application, acting in the performance of this agreement, are not officers, agents or employees of the State.

APPENDIX D

Truckhaven Seismic Data Acquisition Project Paleontological Resources Survey Plan

April 12, 2016

Mr. Thomas R. James
Archaeologist
Bureau of Land Management
El Centro Field Office
1661 S. 4th Street
El Centro, CA 92243
Transmitted via email to tjames@blm.gov

RE: *Paleontological Resource Survey Plan for the Ormat Nevada, Inc. Truckhaven 3D Seismic Data Acquisition Project*

Dear Mr. James:

This letter report provides the Survey Plan for the paleontological resource field survey to be conducted by Applied EarthWorks, Inc. (Æ) for the Ormat Nevada, Inc. (Ormat) Truckhaven 3D Seismic Data Acquisition Project (Project) within the Bureau of Land Management (BLM), California Desert District, El Centro Field Office area and Ocotillo Wells State Vehicular Recreation Area (SVRA). On the basis of a review of published literature, geologic mapping, and museum records, this Survey Plan will: (1) identify the need for a paleontological survey of the Project area, (2) outline Project areas to be surveyed, (3) note potentially fossiliferous areas within the Project area, (4) describe surveying methods, (5) identify the qualified paleontologists who will conduct the survey, and (6) present a timeline for completion of the survey.

Paleontological resources (i.e., fossils) are the prehistoric remains of once-living organisms and are considered to be nonrenewable scientific resources. As such, they are protected under federal laws and regulations including the National Environmental Policy Act of 1969, Federal Land Management and Policy Act of 1976, Paleontological Resources Preservation Act of 2009, and National Historic Preservation Act (Section 106; 36 CFR Part 800) as well as state laws and regulations including the California Environmental Quality Act (CEQA) among others. All paleontological tasks will be performed by qualified and BLM-permitted paleontologists under Paleontological Resources Use Permit No. CA-15-13P and in accordance with the guidelines described in the BLM Instruction Memorandum No. 2009-011 (2008), Handbook (H) 8270 (BLM, 1998a), H-8270-1 (BLM, 1998b), California Department of Parks and Recreation (DPR) requirements, and professional standards set forth by the Society of Vertebrate Paleontology (SVP, 2010).

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PROJECT BACKGROUND AND DESCRIPTION

The Project area is located approximately 40 miles south of the city of Indio and 50 miles north of the city of El Centro, along California State Route 86 (SR 86) in unincorporated Imperial County. Specifically, the Project area is mapped within portions of Township 10 South, Range 9 East, Sections 25-26 and 35-36; Township 10 South, Range 10 East, Sections 27-34; Township 11 South, Range 9 East, Sections 1-2, 11-14, and 23-24; and Township 11 South, Range 10 East, Sections 3-10 and 15-22 on the Kane Spring NW and Truckhaven, CA 7.5-minute U.S. Geological Survey quadrangles. Ormat proposes to conduct a 3D geophysical data acquisition seismic survey on a block of land located along the southwestern shore of the Salton Sea. The data acquisition seismic project will be conducted by a specialized contractor retained by Ormat after all permits are received. The purpose of the seismic project is to evaluate potential subsurface geothermal resources located at the north end of the U.S. Department of the Interior, Bureau of Land Management (BLM) Truckhaven Geothermal Lease Area (TGLA), and to allow Ormat to locate geothermal test wells at the most ideal locations.

The Project area encompasses approximately 26 square miles (~16,640 acres) on lands that are managed by public (state and federal) agencies or are privately owned. Portions of the public lands are managed by the U.S. Department of the Interior, BLM, California Department of Parks and Recreation (DPR) as part of the Ocotillo Wells SVRA, and California State Lands Commission (SLC) (Attachment 1). The County of Imperial manages 320 acres of land inside the boundary of the SVRA as a landfill; Ormat holds a mineral lease beneath the landfill. Private land is located within unincorporated portions of the County of Imperial. For this Project, the BLM will serve as the Federal Lead Agency and the County of Imperial will serve as the CEQA Lead Agency. As a result, in order to comply with federal and state law and DPR requirements, and in accordance with BLM (1998a, 1998b) guidelines, the Project area will be subject to a paleontological resource assessment prior to the issuance of permits for any 3D seismic survey work on BLM, state, or county land.

The Ormat/Geokinetics team has considered various designs for placement of source locations and receiver locations in the Project area to maximize seismic data quality while minimizing environmental impact. Receiver points and source points (part of an equipment array required for retrieval of seismic data) will be placed generally 200 feet apart along parallel lines spaced approximately 1,200 feet apart (Attachment 2). The Project would include approximately 3,168 receiver points distributed over approximately 119.09 linear miles of receiver lines (24 receiver transects) and 3,243 source points distributed over approximately 121.97 linear miles of source lines (23 source transects). Ground disturbance during the placement of the source point array will include ground vibration and surficial disturbance along the Vibroseis drive paths, all proposed access routes, work areas, and test well pads. Ground disturbance during placement of the receiver devices (geophones) will include insertion of the Geophone Node (Z Land Gen 2 type) holding spike into the ground. The holding spike about 4.5 inches long and the wireless node is approximately 5 inches in diameter (POWER Engineers, Inc., 2016).

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Research Methodology

Museum Record Search. Paleontological resources are not found in "soil" but are contained within the geologic deposits or bedrock that underlies the soil layer. Therefore, in order to ascertain whether a particular study area has the potential to contain significant fossil resources at the subsurface, it is necessary to review relevant scientific literature and geologic mapping to determine the geology and stratigraphy of the area. Further, in order to delineate the boundaries of an area of paleontological sensitivity, it is necessary to determine the extent of the entire geologic unit, because paleontological sensitivity is not limited to surface exposures of fossil material.

To determine whether fossil localities have been previously discovered within the Project area or a particular rock unit, a search of pertinent local and regional museum repositories for paleontological localities was conducted at the Los Angeles County Museum of Natural History (LACM), the Colorado Desert District Stout Research Center (DSRC), and the San Diego Natural History Museum (SDNHM). The museum records search was supplemented by a review of the University of California Museum of Paleontology's (UCMP's) online database, which contains paleontological records for Imperial County and nearby eastern San Diego County and southern Riverside County.

Paleontological Significance and Resource Classification

Definition of Paleontological Resources. Paleontological resources are the evidence of once-living organisms as preserved in the rock record. They include both the fossilized remains of ancient plants and animals and the traces thereof (trackways, imprints, burrows, etc.). In general, fossils are considered to be older than recorded human history and are typically preserved in sedimentary rocks. Although rare, fossils also can be preserved in volcanic rocks and low-grade metamorphic rocks formed under certain conditions (SVP, 2010). Paleontological resources can provide important taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, or biochronological data. These data are important because they are used to examine evolutionary relationships, provide insight on the development of and interaction between biological communities, establish time scales for geologic studies, and for many other scientific purposes (Scott and Springer, 2003; SVP, 2010).

Paleontological Sensitivity and Resource Classification. Portions of the Project area traverse federally managed, state, and local lands; as a result, the both the BLM and SVP paleontological resource significance and sensitivity classification schemes will be used to assess the paleontological sensitivity of each geologic unit in the Project area. The criteria for each sensitivity classification, and the corresponding mitigation recommendations, are provided in Table 1.

BLM Potential Fossil Yield Classification. For projects located on BLM lands, typically, the local Field Office will assign Potential Fossil Yield Classification (PFYC) values (Class 1–5; Class 5 having the highest management concern) based on the recommendation of the Project Paleontologist (BLM, 2008). These categories include very high, high, moderate or unknown, low, and very low potential for fossilized remains. According to the BLM (2008), geologic units are considered "sensitive" if they are known to contain scientifically significant paleontological

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resources anywhere in their extent. The BLM defines a significant paleontological resource as follows:

> Any paleontological resource that is considered to be of scientific interest, including most vertebrate fossil remains and traces, and certain rare or unusual invertebrate and plant fossils. A significant paleontological resource is considered to be scientifically important because it is a rare or previously unknown species, it is of high quality and well-preserved, it preserves a previously unknown anatomical or other characteristic, provides new information about the history of life on earth, or has identified educational or recreational value. Paleontological resources that may be considered to not have paleontological significance include those that lack provenience or context, lack physical integrity because of decay or natural erosion, or that are overly redundant or are otherwise not useful for research [2008, p. 1-18].

Society of Vertebrate Paleontology Standard Procedures. Absent specific agency guidelines, most professional paleontologists in California adhere to guidelines set forth by SVP in "Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources" (SVP, 2010). These guidelines establish detailed protocols for the assessment of the paleontological resource potential (i.e., "sensitivity") of a project area and outline measures to follow in order to mitigate adverse impacts to known or unknown fossil resources during project development. In order to prevent project delays, SVP highly recommends that the owner or developer retain a qualified professional paleontologist in the advance planning phases of a project to conduct an assessment and to implement paleontological mitigation during construction, as necessary. Using baseline information gathered during a paleontological resource assessment, the paleontological resource potential of the geologic unit(s) (or members thereof) underlying a Project area can be assigned to one of four categories defined by SVP (2010). These categories include high, undetermined, low, and no potential.

Table 1
Paleontological Sensitivity Classification

BLM Potential Fossil Yield Classification	SVP Resource Potential	Sensitivity Criteria and Mitigation Recommendations
Class 1: Very Low	No Potential	Rock units of intrusive igneous origin, most extrusive igneous rocks, and medium- to high-grade metamorphic rocks are classified as having no potential for containing significant paleontological resources. No mitigation required.
Class 2 : Low	Low Potential	Sedimentary rock units that have yielded few, if any, vertebrate fossils or significant invertebrate fossils in the past, based upon review of available literature and museum collections records. Geologic units of low potential also include those that yield fossils only on rare occasion and under unusual circumstances; eolian deposits, rock units deposited less than 10,000 years before present; and deposits that exhibit a high degree of diagenetic alteration. Mitigation is not typically required.

Table 1
Paleontological Sensitivity Classification

Class 3a: Moderate	(SVP has no *moderate* category; therefore, a moderate PFYC would typically correspond to a *high* or *low* SVP potential)	A fossiliferous rock unit with moderate potential is a sedimentary deposit where the significance, abundance, and predictability of recovery of fossils vary. In some cases, available literature on a particular geologic unit will be scarce and a determination of whether or not it is fossiliferous or potentially fossiliferous will be difficult to make. Under these circumstances, the sensitivity is unknown and further study is needed to determine the unit's paleontological resource potential. Examples include, marine units with uncommon vertebrate fossils, such as sharks teeth or fish scales, or terrestrial units with inconsistent significant fossils or widespread and well-known plant remains
Class 3b: Unknown	Undetermined Potential	Due to the unknown potential, and moderate or infrequent occurrence of fossils, surface-disturbing activities will require sufficient assessment to determine whether significant paleontological resources occur in the area of a proposed action. Management recommendations may include a preconstruction field survey, monitoring, or avoidance.
Class 4a: High, exposed Class 4b: High, soil or vegetative cover	High Potential	Geologic units with high potential for paleontological resources are those that have been proven to yield vertebrate or significant invertebrate, plant, or trace fossils in the past or are likely to contain new vertebrate materials, traces, or trackways; however, these units may vary in occurrence or predictability, may be obscured by vegetation cover or inaccessible from a road or trail, and may have been degraded by historical fossil-hunting. A unit with high sensitivity is susceptible to surface-disturbing activities and includes fossiliferous sedimentary deposits that are well exposed with little vegetative cover as well as those shallowly covered by soil, alluvium, or vegetation. Typically, a field survey as well as onsite monitoring will be required. Any significant specimens discovered will need to be prepared, identified, and curated into a museum. A final report documenting the significance of the finds will also be required.
Class 5a: Very High, exposed Class 5b: Very High, soil or vegetative cover	High Potential	Geologic units with very high potential for paleontological resources are those that consistently and predictably yield vertebrate or significant invertebrate, plant, or trace fossils. A unit with very high sensitivity is highly susceptible to surface disturbing activities and includes fossiliferous sedimentary deposits that are well exposed with little vegetative cover, as well as those shallowly covered by soil, alluvium, or vegetation. Typically, a field survey as well as onsite monitoring will be required. Any significant specimens discovered will need to be prepared and curated. A final report documenting the significance of the finds will also be required.

Sources: BLM 2007, 2008; SVP, 2010.

RESOURCE CONTEXT

Regional Geology. The Project area is located east of the Borrego Badlands and west of the Salton Sea within the Colorado Desert geologic province of California (Norris and Webb, 1976). The Colorado Desert extends from the Mojave Desert to the north, the Colorado River on the east, the Peninsular Ranges on the west, and south into Mexico. Dominant features within the western Colorado Desert include the Salton Trough, the Colorado River, Borrego Badlands, Superstition Hills, and the Orocopia, Chocolate, Palo Verde, Chuckwalla, and Santa Rosa mountains (Norris and Webb, 1976).

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Specifically, the Project is located within the Salton Trough; a large structural depression that extends from the San Gorgonio Pass in the north to the Gulf of Mexico in the south. The Salton Trough is a graben structure, bounded by roughly parallel north-west-trending faults, including the San Andreas Fault zone to the northeast and the San Jacinto Fault zone to the southeast. During the Pliocene, the Salton Trough formed due to spreading and subsidence associated with the rift system that opened the Gulf of California, which continues to undergo ~ 48 millimeters per year of spreading (Alles, 2011). The Salton Trough, which encompasses the Salton Sea and includes the Coachella Valley to the north and the Imperial Valley to the south, would currently be underwater as part of the Gulf of California if not for millions of years of sedimentation derived from the Colorado River and alluvial fan accumulation resulting from regional faulting. During the Pliocene to Early Pleistocene, sedimentation along the Colorado River resulted in the build-up of a substantial delta, which eventually separated the marine waters of the Gulf of California from the brackish and fresh waters of the Salton Trough (Ingwall, 2008). Since the Late Pleistocene, the Salton Trough was periodically occupied by the freshwater Lake Cahuilla. The lake formed, drained, and reformed between approximately 37,000 to 300 years before present (BP) as a result of fluctuations in the course of the Colorado River and the subsequent diversion of the river's mouth from the Gulf of California to the Salton Trough (Deméré, 2002; Norris, 1979). Lake Cahuilla reached a maximum depth of 300 feet, 105 miles long, and 35 miles across at its last high stand at approximately 45 feet above sea level in the Coachella Valley.

Geology and Paleontology of the Project Area. The Project area is mapped at a scale of 1:24,000 by Dibblee and Minch (2008a, 2008b), 1:125,000 by Winker (1987), and 1:100,000 by Kirby et al. (2007). According to these published maps, the Project area is underlain by sedimentary rock units of Pliocene to Holocene age. The geology and paleontology of these units are described in the following sections.

Palm Spring Group. The Pliocene-Pleistocene Palm Spring Formation was named by Woodring (1932) for its type section near a spring along Vallecito Creek in Anzo-Borrego Desert State Park, within eastern San Diego County, and redescribed by Dibblee (1954), Woodard (1963), Winker (1987), and Cassiliano (2002), among others. On the basis of distinct lithologic characteristics observed at Vallecito Creek, Fish Creek, and Carrizo Creek in the Salton Trough of Southern California, the Palm Spring Formation was elevated to the Palm Springs Group (Cassiliano, 2002). The Pliocene-Pleistocene Palm Spring Group was deposited at least 3.58 million years ago (Ma) to 0.78 Ma, based on biostratigraphic correlation (Cassiliano, 1999). Rock units of the Palm Spring Group record sedimentation of the ancient Colorado River delta and, together with other terrestrial deposits in the Colorado Desert, record nearly continuous sedimentation from the Miocene to the Pleistocene (Dibblee, 1954). The Palm Spring Group is well exposed throughout the Salton Trough where it is up to 12,000 feet thick (approximately 4,000 feet thick near the Project area) and is gradational with the underlying Imperial Formation and overlying Borrego Formation (Cassiliano, 2002; Dibblee, 1954; Dibblee and Minch, 2008a, 2008b).

On the basis of lithologic characteristics and depositional environment, the Palm Spring Group has been formally divided into five interbbeded and gradational units: the Arroyo Diablo Formation, Olla Formation, Tapiado Claystone, Hueso Formation, and Canebrake Conglomerate (Cassiliano, 1999, 2002; Dibblee, 1954, Winker, 1987; Woodard, 1963). The Olla and Arroyo Diablo formations primarily consist of Colorado River delta and braided river facies composed

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of orange, friable, massive to thickly bedded, fine-grained sandstone and siltstone with interbedded red-brown claystone. The lithology of the Olla and Arroyo Diablo Formations consists of fining upward sandstone sequences with basal conglomerate lag. Clasts within the conglomerate and coarse sandstone consist of lithic pebbles, silicified wood, fossil plant material, and reworked Paleozoic limestone pebbles derived from the Colorado Plateau embedded with bryozoan, brachiopod, and coral invertebrate fossils. The Arroyo Diablo Formation is the most widespread unit of the Palm Spring Group and is exposed within the Project area (Kirby et al., 2007; Winker, 1987). The Tapiado Claystone is of lacustrine origin and is predominately composed of green-gray claystone with subordinate limestone and tuff deposits. The Hueso member consists of alluvial plain and fluvial facies composed of tan, buff, and gray arkose, micaceous sandstone and siltstone, with subordinate claystone, limestone, and conglomerate, derived from local streams (Cassiliano, 1999, 2002; Winker, 1987). The Canebrake Conglomerate of Dibblee (1954) consists of coarse alluvial fan deposits that intertongue with the Imperial Formation and the units of the Palm Springs Group (Cassiliano, 2002). The Canebrake Conglomerate is composed of grayish-tan, crudely bedded, pebble to boulder conglomerate with an arkosic matrix and subrounded to subangular clasts derived primarily from granitic, gneissic, and other metamorphic sources (Winker, 1987).

The rock units within the Palm Spring Group have yielded abundant terrestrial vertebrate specimens from localities within the Colorado Desert (Woodard, 1963). (Many of the previously recorded localities reference the former designation of the Palm Spring as a formation with subordinate members; the discussion presented below will use the revised designation for the Palm Spring Group, with subordinate formations).The majority of the vertebrate fossils within the Palm Springs Group have been recorded from the Hueso Formation, with smaller quantities identified within the Arroyo Diablo Formation; within the Tapiado Claystone, especially near the contact with the Hueso Formation; and from dark olive, biotite-rich, parallel-laminate siltstones (i.e., banded silts) in the Olla Formation (Cassiliano, 2002). Diversity and abundance of specimens within the Hueso Formation is likely the result of taphonomic processes, whereby sediments within the unit were typically derived from local sources and transported short distances under relatively quiet conditions (Cassiliano, 1999). Vertebrate fossils have also previously been attributed to the deposits identified as the Canebrake Conglomerate; however, based on stratigraphic revisions by Cassiliano (2002), Winker (1987) and others, those localities are assigned to other units.

Three local faunas (LF) have been recognized from the Palm Spring Group (and uppermost Imperial Formation) in the Fish Creek-Vallecito Creek (FCVC) area of Anzo-Borrego Desert State Park, approximately 30 to 40 miles southwest of the Project area (Downs and White, 1968). The LFs were identified as the Layer Cake LF (4.38 Ma – 3.58 Ma; early Blancan North American Land Mammal Age [NALMA]), Arroyo Seco LF (3.58 Ma – 2.58 Ma; late Blancan NALMA), and Vallecito Creek LF (2.58 Ma – 0.78 Ma; late Blancan to Irvingtonian NALMA). However, based on revised biostratigraphic analysis, Cassiliano (1999) suggests the LFs should be abandoned. According to Cassiliano (1999), approximately 100 different species and hundreds of specimens have been identified from the Palm Spring Group in the FCVC area, primarily from the Heuso Formation. Recovered specimens include mammoth, mastodon, horse, tapir, camel, deer, coyote, fox, mountain lion, Jaguar, saber-toothed cat, bobcat, ring-tailed cat, Wheatley's ground sloth, Florida spectacled bear, wolverine, short-faced bear, American black bear, North

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American badger, long-tailed weasel, raccoon, eastern spotted skunk, shrew, rabbit, squirrel, mole, vesper bat, hare, frog, desert tortoise, whiptail lizard, desert iguana, leopard lizard, red-eared slider turtle, mud turtles, teratorn, white pelican, seabird, sandhill crane, ray-finned fish, sucker fish, and herring. Previously recorded localities in the immediate vicinity of the Project area are limited; however McLeod (2016) notes several specimens (LACM 7087), including pocket gopher, horse, and pronghorn antelope, that were recovered immediately northwest of the Project area, near the southern flank of the Santa Rosa Mountains

Borrego Formation. The Pliocene to Pleistocene Borrego Formation is well exposed in the central Project area (Dibblee and Minch, 2008a, 2008b; Kirby et al., 2007). The Borrego Formation was named by Tarbet and Holman (1944) for the type section in the Borrego Badlands in eastern San Diego County, where it is up to 6,000 feet thick, thinning to approximately 2,500 feet near the Project area (Deméré and Walsh, 1993; Dibblee, 1954). According to recent structural investigations and geologic mapping in the San Felipe Hills by Kirby et al. (2007), some rock exposures in the Project area that were previously mapped as belonging to the Borrego Formation and Palm Spring Group, have been informally redefined as a transitional unit between the underlying Arroyo Diablo Formation and the overlying Borrego Formation. For this study, for the sake of conciseness and accordance with previously recorded localities, the transitional unit will be considered as part of the Arroyo Diablo Formation. Further, due to the gradational lower contact and the interfingering character of the Borrego Formation, Cassiliano (2002) suggests the Borrego Formation could be included within the underlying Palm Spring Group; however, for this study, the Borrego Formation will be treated separately.

Based on fieldwork studies by Dibblee (1954), the Borrego Formation is conformable with the overlying Brawley Formation and forms a gradational contact with the underlying units of the Palm Spring Group. In addition to the type section in the Borrego Badlands in the Anzo-Borrego Desert State Park, the Borrego Formation is intermittently exposed in the Salton Trough between Ocotillo Wells and Borrego Springs, and along portions of the northeast and southwest margins of the Salton Sea. The Borrego Formation consists of commonly rippled lacustrine sediments composed of light-gray, well-bedded mudstone and claystone, with thin interbeds of local and Colorado River-derived siltstone and sandstone as well as intermittent deposits of sodium sulfate evaporates up to 5 feet thick (Dibblee, 1954; Winker, 1987). The massive siltstone and sandstones are pale orange in color and are locally abundant.

The Borrego Formation has previously yielded numerous localities, which have yielded specimens of terrestrial vertebrate, invertebrate, and microfossils (Winker, 1987). Invertebrate and microfossil specimens recorded at the type section include mollusks, small crustaceans, mussel shrimp, and rare foraminifera (Dorsey, 2006). Vertebrate localities within the fine-grained lacustrine deposits exposed near the Borrego Badlands have yielded abundant well-preserved specimens of terrestrial vertebrates, including specimens of horse, mastodon, mammoth, camel, antelope, cat, short-faced bear, rodent, bird, and fish (Deméré and Walsh, 1993; McLeod, 2016).

Brawley Formation. The Early Pleistocene Brawley Formation is locally exposed near the eastern Project boundary, east of SR 86 and southeast of Tule Wash (Dibblee and Minch, 2008b; Kirby et al., 2007). The Brawley Formation was first described by Dibblee (1954) for exposures in the Superstition Hills, southwest of the Salton Sea. The Brawley Formation, which is also referred to as the lacustrine facies or “finer-grained lateral equivalent” of the Ocotillo

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Conglomerate, is conformably underlain by the lithologically similar Borrego Formation in the Project area (Dibblee, 1954; Kirby et al., 2007, 45; Winker, 1987). The Brawley Formation is up to approximately 2,000 feet thick and is intermittently exposed in the region surrounding the Salton Sea, including the Superstition Hills (Dibblee, 1954). The unit is composed of light gray, massive lacustrine claystone with rare ripple structures and crossbeds, and thin interbeds of parallel-bedded, buff fine-sandstone, and local pebble lenses primarily derived from sedimentation along the Colorado River (Dibblee and Minch, 2008b; Winker, 1987).

According to Winker (1987), numerous fossil localities have been previously identified from within the fine-grained sediments of the Brawley Formation and the unit has yielded a freshwater to brackish lacustrine invertebrate fauna similar to that of the underlying Borrego Formation, including specimens of gastropod, algae, and foraminifera (Dibblee, 1954). Vertebrate localities have also been previously identified within the Brawley Formation. During fieldwork within the Brawley Formation in the Superstition Hills (Imperial County), matrix-screening yielded vertebrate fossil specimens of corvina and chub fish as well as the remains of small mammal fossils preliminarily identified as vole, pocket mouse, and deer mouse (Roeder and Remeika, 2014). In addition, the LACM records the occurrence of at least two localities (LACM 5834 and 5850) near the Salton Sea in the Superstition and Mecca hills that yielded specimens of large land mammals, camel and horse (McLeod, 2016).

Further, as noted above, the Brawley Formation is also referred to as the lacustrine facies of the Ocotillo Conglomerate. Numerous paleontological resources belonging to the Borrego LF have been previously identified within the Ocotillo Conglomerate (Dibblee and Minch, 2008c; Jefferson and Remeika, 1994; Remeika and Jefferson, 1993). Remeika and Jefferson (1993) identified localities in the western Borrego Badlands of San Diego County that yielded vertebrate fragments and articulated specimens of the Borrego LF, including taxa of horse, camel, pronghorn, elk, deer, zebra, oxen, ground sloth, badger, bear, dire, wolf, coyote, mountain lion, sabertooth cat, rabbit, gopher, squirrel, rat, sucker fish, hawk, eagle, duck, vulture, owl, flamingo, tortoise, and pond turtle. In addition, Dibblee and Minch (2008c) report several unidentified vertebrate fossil fragments from the Ocotillo Conglomerate. The location of discovery was not identified, but it was likely recorded within the Indio Hills along the San Andreas Fault zone, northeast of the Project area.

Quaternary Surficial Deposits: Lake Cahuilla Deposits, Quaternary Older Alluvium, and Quaternary Alluvium. According to published geologic maps, the Project area is immediately underlain by undifferentiated younger alluvium, older alluvium, lacustrine (Lake Cahuilla), and terrace deposits of Quaternary age (Dibblee and Minch, 2008a, 2008b). The younger Quaternary alluvium consists of gravel, silt, sand, and clay derived from alluvial fans and streams. The Quaternary older alluvium is composed of weakly indurated, dissected, elevated gravel, silt, and sand, above the ancient shoreline of former Lake Cahuilla. The Lake Cahuilla deposits are composed of undissected to dissected, weakly consolidated silts and clays, with abundant, non-mineralized mollusk fragments, with localized terrace deposits.

Based on previous stratigraphic, archaeological, paleontological, hydrogeological, and tectonic studies, where not explicitly mapped at the surface, Holocene Lake Cahuilla deposits are known to underlie surficial alluvial deposits similar to the younger alluvium deposits in the Project area, at shallow depth (Alles, 2011; Deméré, 2002; Norris, 1979; Scott, 2014; Waters, 1983; Whistler

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et al., 1995). In turn, older Pleistocene-age ancient Lake Cahuilla deposits underlie the surficial to shallowly buried Holocene-age lacustrine silt at moderate depth. The depth of the contact between the Holocene-age and Pleistocene-age Lake Cahuilla deposits in the Project area is unknown; however, the Pleistocene-age ancient Lake Cahuilla sediments are likely present at a relatively shallow depth below the Holocene lacustrine deposits (Waters, 1983). The Pleistocene-age Lake Cahuilla deposits are generally composed of weakly consolidated, lacustrine sands, silts and clays, with tufa and travertine rock coatings, coarse alluvial deposits, and beach sands (Norris, 1979; Waters, 1983). The Pleistocene- to Holocene-age Lake Cahuilla sediments range from several feet deep at the margin of the Coachella Valley to as much as 300 feet thick in the center of the Salton Trough (Arnal, 1961; Norris and Webb, 1976).

Late Quaternary-age lacustrine deposits derived from ancient Lake Cahuilla have proven to yield scientifically significant mollusk shells within the Salton Trough (Scott, 2014; Whistler et al., 1995). Fossil specimens of diatoms, spores, pollen, land plants, sponges, ostracods, freshwater gastropods, fresher bivalves, fish, and small terrestrial vertebrate have been recovered from the Pleistocene-age Lake Cahuilla Beds (Scott, 2014). During excavation for the San Diego Gas and Electric Company Sunrise Powerlink Transmission Line in western Imperial County, at least four different taxa of freshwater fish (chub, razorback sucker, threespine stickleback, and an indeterminate bony fish) were recovered from within sediments previously mapped as the Brawley Formation and subsequently determined to be fine-grained sediments of the Pleistocene Lake Cahuilla (Roeder, 2013; Roeder and Calvano, 2014). Further, Holocene-age, non-mineralized (non-fossil) mollusk shells are also found in the Lake Cahuilla silt deposits, their recovery and subsequent dating have helped researchers with studies in archaeology, geology, and seismology (Norris and Webb, 1976). In addition, Pleistocene-age alluvial deposits similar to those that are mapped in the Project area have proven to yield significant vertebrate fossils throughout the inland valley and desert regions of Southern California, including the Salton Trough. Recovered specimens include large land mammals, rodents, birds, reptiles, amphibians, invertebrates, and insects (Springer et al., 2009; UCMP, 2016). Holocene age alluvial deposits are typically too young to contain fossilized material (SVP, 2010), but they may overlie older fossiliferous deposits (e.g., Lake Cahuilla deposits, Quaternary older age alluvium) at an unknown depth.

Museum Record Search Results

To determine whether fossil localities have been previously discovered within the Project area, a museum records search was performed at the LACM, Colorado Desert DSRC, and SDNHM. A supplemental review was conducted using the UCMP online database. The results of the LACM and UCMP records searches yielded no records for previously identified vertebrate localities within the Project area; however, at least 50 have been recorded nearby (McLeod, 2016; UCMP, 2016). Record search requests to the DSRC and SDNHM have not yet been returned.

A review of fossil records maintained by the LACM returned records for 43 vertebrate localities in the vicinity of the Project area from within the Palm Spring Group (formation not identified), Borrego Formation, Brawley Formation, Lake Cahuilla Deposits, and Quaternary older alluvium (McLeod, 2016). Rock units of the Palm Spring Group yielded a rich suite of vertebrate fossils from the Borrego Badlands and Santa Rosa Mountains in Imperial County and eastern San Diego County, including specimens of horse, antelope, cat, sloth, deer, camel, rodent, bird, and fish.

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Numerous vertebrate specimens have been recorded within the Borrego Formation in the Borrego Badlands, including taxa of horse, mastodon, mammoth, camel, antelope, cat, short-faced bear, rodent, bird, and fish. Near the Superstition Hills, at least two vertebrate localities have been previously recorded in the Brawley Formation, which yielded vertebrate fossil specimens of horse and camel. Lastly, Quaternary Lake Cahuilla deposits have yielded fossils throughout the Salton Trough; McLeod (2016) reports that a particularly significant fauna of terrestrial and freshwater vertebrates, diatoms, land plants, clams, snails and crustaceans was recovered during excavations for the PGA West Tom Weiskopf Signature Golf Course, near the Lake Cahuilla County Park, southeast of La Quinta. These localities yielded numerous vertebrate specimens of small mammal, bird, reptile, and fish. Depth for each vertebrate and invertebrate locality is unreported.

A supplemental review of the online database maintained by the UCMP (2016) indicated that at least seven additional localities have been recorded in the vicinity of the Project area from within the Palm Spring Group (formation not identified), Borrego Formation, and Quaternary Lake Cahuilla and older alluvial deposits. The localities yielded fossil specimens of horse, deer, camel, and other unspecified vertebrates. The results of the museum records search are presented in Table 2.

Table 2
Vertebrate Localities Reported in the Vicinity of the Project Area

Locality No.	Geologic Unit	Age	Taxa
LACM 7087	Palm Spring Group (recorded as the Palm Spring Formation)	Pliocene to Pleistocene	*Geomys anzensis* (pocket gopher), *Equus* (horse), and *Tetrameryx* (pronghorn antelope)
LACM 1499-1500, 1911, 1913-1917, 3794, 6763, 6915, and 67113 (12)	Palm Spring Group (recorded as the Palm Spring Formation)	Pliocene to Pleistocene	*Xyrauchen texanus* (duck), Anserinae (goose), *Gymnogyps* (condor), Proboscidea (undetermined elephant), Canidae (dog), *Felis* (cat), *Lepus* (rabbit), *Neotoma* (wood rat), *Geomys garbanii* (pocket gopher), *Nothrotheriops* (ground sloth), *Equus*, Cervidae (deer), Antilocapridae, and *Camelops* (camel).
UCMP V5210	Palm Spring Group (recorded as the Palm Spring Formation)	Pliocene to Pleistocene	Unspecified vertebrates
UCMP V6847	Palm Spring Group (recorded as the Palm Spring Formation)	Pliocene to Pleistocene	*Equus*
UCMP V65686	Palm Spring Group (recorded as the Palm Spring Formation)	Pliocene to Pleistocene	Unspecified vertebrates
UCMP V78104	Palm Spring Group (recorded as the Palm Spring Formation)	Pliocene to Pleistocene	*Odocoileus casensis* (deer)
LACM 4120-4128,4142-4153, 4207-4210, 4212-4217, and 4222	Borrego Formation	Pliocene to Pleistocene	Testudinidae (tortoise), Aves (bird), Mammutidae (mastodon), *Mammuthus* (mammoth), Felidae (cat), *Arctodus* (short-faced bear), Rodentia (rodent), *Equus*, *Plesippus* (horse), Antilocapridae (pronghorn antelope), and Camelidae (camel).
LACM 1188	Borrego Formation	Pliocene to Pleistocene	*Plesippus* and *Equus*.

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Table 2
Vertebrate Localities Reported in the Vicinity of the Project Area

Locality No.	Geologic Unit	Age	Taxa
UCMP V5209	Borrego Formation	Pliocene to Pleistocene	Unspecified vertebrates
LACM 5850	Brawley Formation	Pleistocene	Lamini (camel)
LACM 5834	Brawley Formation	Pleistocene	*Equus*
LACM 6252, 6253, 6255 (3)	Lake Cahuilla Deposits	Quaternary	*Xyrauchen texanus* (razorback sucker), *Gila elegans* (bonytail), *Cyprinodon macularius* (desert pupfish), *Uma inornata* (Coachella Valley fringe-toed lizard), *Urosaurus graciosus* (long-tailed brush lizard), *Hypsiglena torquata* (night snake), *Sonora semiannulata* (western ground snake), *Sylvilagus* (cottontail rabbit), *Neotoma lepida*, *Dipodomys* (kangaroo rat), *Perognathus longimembris* (pocket mouse)
LACM 6256	Lake Cahuilla Deposits	Quaternary	*Ovis canadensis* (bighorn sheep)
UCMP V5303	Lake Cahuilla/Quaternary older Alluvial Deposits	Quaternary	Camelidae
UCMP V5931	Lake Cahuilla/Quaternary older Alluvial Deposits	Quaternary	Unspecified vertebrates

Sources: McLeod, 2016; UCMP, 2016.

Recommendation of Paleontological Resource Potential for Geologic Units in the Project Area

In accordance with BLM guidelines (2008), this report utilizes the PFYC system (BLM, 2007) to assess paleontological sensitivity and the level of effort required to manage potential impacts to significant fossil resources. Using this ranking system, the sensitivity of geologic units in the Project area was recommended on the basis of the relative abundance and risk of adverse impacts to significant fossils. In addition, the paleontological sensitivity of the Project area was determined according to the SVP (2010) classification scheme, which, absent specific agency guidelines, is typically used for the assessment of paleontological resources in California.

On the basis of the findings of the literature review and museum records search results, the geologic units underlying the Project area have a recommended paleontological sensitivity ranging from low to very high. The Palm Spring Group (Arroyo Diablo Formation) and Borrego Formation, which are well exposed in the Project area, have a very high recommended paleontological resource potential (PFYC Class 5a) because the units have yielded significant vertebrate fossils in the vicinity of the Project area that, according to Cassiliano (2002, 1), provide important information on the "evolution and diversification of paleocommunities characteristic of the Blancan and Irvingtonian NALMA" and "have the potential to...define the Blancan-Irvingtonian boundary" (Cassiliano, 1999). The Brawley Formation and Lake Cahuilla deposits are mapped within the eastern Project area and have a high recommended paleontological resource potential (PFYC Class 4) because they have proven to yield significant fossils in the western Colorado Desert. The Quaternary older alluvial deposits are known to yield intermittent vertebrate fossils in the western Colorado Desert, and as a result, a moderate paleontological resource potential (PFYC Class 3a) is recommended. Quaternary alluvial

deposits have a low paleontological resource potential recommendation (PFYC Class 2) because they are generally too young to preserve fossilized remains; however, these alluvial deposits may shallowly overlie older sensitive units at an unknown depth. The geologic units underlying the Project area and their recommended sensitivity ratings are shown in Table 3 and depicted in Attachment 3.

Table 3
Geologic Units in the Project Area and Their SVP Paleontological Sensitivity and PFYC

Geologic Unit	Age	Typical Fossils	Potential Fossil Yield Classification (PFYC)	SVP Paleontological Sensitivity
9.5	Pliocene-Pleistocene	Vertebrates; Mammals, fish	Very High (Class 5)	High
Borrego Formation (Tbo)	Pliocene-Pleistocene	Vertebrates; Mammals, fish	Very High (Class 5)	High
Brawley Formation (QBr)	Pleistocene	Vertebrates; Mammals	High (Class 4)	High
Quaternary older alluvium (Qoa)	Pleistocene	Vertebrates; Mammals	Moderate (Class 3)	High
Lake Cahuilla deposits (Qc)	Quaternary	Invertebrates, Vertebrates	High (Class 4)	High
Quaternary alluvium (Qa, Qt)	Holocene	None	Low (Class 2)	Low

Source: BLM (2007, 2008); Dibblee and Minch (2008a, 2008b); Kirby et al. (2007); SVP (2010)

Survey Methodology

Since this Project entails the installation of a temporary array of seismic equipment for geophysical field analysis, very shallow and surficial ground disturbances are anticipated; as a result, a paleontological reconnaissance survey is necessary in order to determine the presence or absence of significant surface paleontological resources and potential subsurface fossils. The purpose of the field survey will be to inspect the ground surface visually for exposed fossils or traces thereof. The paleontological survey crew will conduct a pedestrian walkover of the area of proposed ground disturbance within the Vibroseis drive paths, including all proposed source points, access routes, work areas, and test well pads. The receiver points will not be subject to a paleontological resource survey at this time; however, based on agency consultation and the findings of a paleontological resource assessment which will be conducted following the source point survey, the receiver point installation may be subject to monitoring during Project-related activities in order to mitigate any potential impacts or adverse effects to paleontological resources.

The pedestrian survey will be conducted simultaneously with specialists undertaking the Class III archaeological survey, as well as the biological and botanical surveys (POWER Engineers, Inc., 2016) and in accordance with the BLM's paleontology guidelines (1998a, 1998b, 2008) and the DPR's requirements. The paleontological survey will be conducted by four dedicated paleontologists who will follow behind the cultural survey crew and other non-archaeological survey staff. The paleontological survey crew will consist of four qualified paleontologists split into four separate teams; two teams will survey within the SVRA (Crew #1 and Crew #2) and

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two teams will survey within non-SVRA lands (Crew #3 and Crew #4). Each paleontologist will visually inspect the area of direct effect along the survey route (i.e., the source points and route centerline). As needed, the paleontologists will be able to move freely within the survey route in order to pay particular attention to rock outcrops of paleontologically sensitive strata as well as any areas where geologic sediments are well exposed.

During the survey, field personnel will utilize a handheld Trimble® GeoXH™ (less than 30 centimeter accuracy) with Global Positioning Systems capability, topographic maps, aerial photographs, and geologic maps in order to locate source points, geologic formation contacts, and other areas of potential interest (e.g., outcrops, unique geologic features, etc.). The surface of bedrock outcrops and geologic exposures will be visually examined for the evidence of paleontological resources. Notes will be taken on the geology and lithology of geologic units encountered and photographs will be taken to document the survey. Field data will be collected in field notebooks and entered into a Daily Activity Report, which will be submitted to the BLM at the conclusion of the survey.

All fossil occurrences observed during the course of fieldwork, significant or not, will be adequately documented and recorded in field notes at the time of discovery. The data collected for each fossil occurrence will include, at minimum, the following information: Universal Transverse Mercator coordinates, a detailed description of the encasing sediments, recordation of stratigraphic context and fossil orientation, elevation above mean sea level, and a description of taxa. In addition, each locality will be recorded on a BLM Locality Form (8270-3) and photographically documented with a digital camera. Any identified and recorded significant paleontological locality will be considered an obstacle by the seismic survey team and modifications will be made to the source route alignment (i.e., rerouting) in order to avoid the resource and prevent any adverse effects. The modification should include at least a 50-foot buffer around the resource. If necessary, further action should be taken, at the discretion of the pertinent land management agency (e.g., BLM, DPR), to protect the resource from further impacts, including looting, erosion, or other human or natural damage. Because this survey is being conducted in tandem with the Class III archaeological survey, which is a “no-collection” survey, identified and recorded fossils will not be collected and no matrix sampling will occur during fieldwork.

Following completion of the survey, a final report (Paleontological Resource Survey Report) detailing all findings will be submitted to the BLM, the County of Imperial, and the DPR for the area surveyed within their boundaries. The report will include a recommended PFYC for geologic units in the Project area; an inventory of all fossils discovered during the course of fieldwork; and an analysis of each fossil locality including its scientific significance, approximate age, and geologic context. The report will also include, as a confidential appendix, 1:24,000-scale maps showing the exact location or areal extent of each significant fossil locality as well as Project-specific recommendations, a Geographic Information System map depicting areas where further mitigation is recommended, and references cited.

Schedule and Staffing

Prior to conducting fieldwork, Æ will request a Fieldwork Authorization (FWA) from the El Centro Field Office and a safety plan will be submitted to the BLM. The survey will be

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conducted following receipt of the signed FWA. The Paleontological Resource Survey Report will be submitted to the BLM and DPR (who are charged with surface management of the SVRA through a Memorandum of Understanding [MOU]) no later than 30 days following the completion of the survey.

The survey will be conducted under the direction of Æ's Paleontology Program Manager and BLM-permitted Principal Investigator, Jessica DeBusk. She will supervise the field survey and serve as primary author of the final report. DeBusk has more than 12 years of professional experience and holds statewide BLM paleontological use permits in Nevada, California, Utah, Arizona, and Colorado. The field survey will be conducted by the following qualified Paleontologists: BLM-permitted Field Agents Blake Bufford and Heather Clifford (Field Director), and Erik Pino and Michelle Conrad who will serve as Field Assistants under the supervision of the Field Agents (see Attachment 4 for the resumes of the PI and Field Director). For this Project, a qualified paleontologist is defined as a person who meets or exceeds the BLM's definition of a Principal Investigator, Field Agent, or Field Assistant, as follows:

> A PI (Principal Investigator) must have a minimum of a graduate degree or a bachelor degree with 24 months of professionally supervised experience including the kinds of duties covered in the permitted work. A PI must have 16 months of professional paleontology management experience including project planning and 4 months of experience with comparable paleontological resources in similar environmental settings. A Field Agent must have a bachelor's degree and 12 months professionally supervised experience or 30 months supervised experience leading up to responsibilities similar to those of a Field Agent. A Field Assistant must be under direct, on-site supervision of either the PI or a Field Agent as part of a supervised crew. Field assistants must have at least 4 to 8 hours of training or experience received from a qualified paleontologist in identifying paleontological resources prior to performing fieldwork or when first utilized in this capacity (BLM, 2008; C. Hunter, personal communication, 2015).

This letter report serves as the Survey Plan for the Ormat Nevada, Inc. Truckhaven 3D Seismic Survey Project. Thank you for allowing us to be of assistance to you on this Project. Please contact Jessica DeBusk at 626-578-0119 or jdebusk@appliedearthworks.com if you have any questions.

Sincerely,

Heather Clifford

Heather Clifford
Associate Paleontologist
Applied EarthWorks, Inc.

For Jessica DeBusk
Paleontology Program Manager
Applied EarthWorks, Inc.
Paleontological Resources Use Permit No. CA-15-13P

REFERENCES

Alles, D. L., 2011, Geology of the Salton Trough. Western Washington University, Unpublished manuscript, 31 p., http://fire.biol.wwu.edu/trent/alles/GeologySaltonTrough.pdf (accessed March 2016).

Arnal, Robert E., 1961, Limnology, Sedimentation, and Microorganisms of the Salton Sea, California. Geological Society of America Bulletin, v. 72, no. 3. p. 427–478.

Bureau of Land Management (BLM), 1998a, General Procedural Guidance for Paleontological Resource Management Manual H-8270. Department of the Interior, Washington, D.C.

_____, 1998b , Paleontological Resources Management Manual H-8270-1. Department of the Interior, Washington, D.C.

_____, 2007, Potential Fossil Yield Classification (PFYC) System for Paleontological Resources on Public Lands. Instruction Memorandum No. 2008-009. Department of the Interior, Washington, D.C.

_____, 2008, Assessment and Mitigation of Potential Impacts to Paleontological Resources. Instruction Memorandum No. 2009-011: Department of the Interior, Washington, D.C.

_____, 2012, The Omnibus Public Land Management Act, Subtitle D—Paleontological Resources Preservation, 16 USC 470aaa, SEC. 630. http://www.blm.gov/pgdata/etc/medialib/blm/wo/Planning_and_Renewable_Resources/coop_agencies/paleontology_library/paleon_legis.Par.45651.File.dat/PL-111-011-prpa.pdf, (accessed March 2016).

BLM and Office of the Solicitor, 2001, The Federal Land Policy and Management Act of 1976, As Amended: Compiled by U.S. Department of the Interior Bureau of Land Management and Office of the Solicitor, Washington, D.C.

Cassiliano, M. L., 1999, Biostratigraphy of Blancan and Irvingtonian Mammals in the Fish Creek-Vallecito Creek Section, Southern California, and a Review of the Blancan-Irvingtonian Boundary. Journal of Vertebrate Paleontology, v. 19, no. 1, p. 169-186.

Cassiliano, M.L., 2002, Revision of the stratigraphic nomenclature of the Plio-Pleistocene Palm Spring Group (new rank), Anza-Borrego Desert, southern California. Proceedings of the San Diego Society of Natural History 38, p. 1-30.

Deméré, T. A., 2002, Silent Beaches – Ancient Lake Cahuilla and its geologic setting. Biodiversity Research Center of the Californias, Paleontology, June 2002. San Diego Natural History Museum. http://www.sdnhm.org/archive/ research/paleontology/ lakecahuilla.html (accessed March 2016).

Deméré, T.A., and Walsh, S.L., 1993 Paleontological Resources, County of San Diego California. Department Of Paleontology San Diego Natural History Museum, revised April 7, 2003.

133 N. San Gabriel Blvd., Suite 201 | Pasadena, CA 91107-3414 | T: (626) 578-0116 | F: (626) 204-5620

Dibblee, T. W., Jr., 1954, Geology of the Imperial Valley region, California *in* R. H. Jahns, ed., Geology of southern California. California Division of Mines, Bulletin 170, p. 21-28.

Dibblee, T. W., Jr., and J.A. Minch, 2008a, Geologic map of the Durmid 15-minute quadrangle, Riverside and Imperial Counties, California. Dibblee Geological Foundation, Dibblee Foundation Map DF-376, scale 1:62,500.

_____, 2008b, Geologic map of the Kane Spring 15-minute quadrangle, Imperial County, California. Dibblee Geological Foundation, Dibblee Foundation Map DF-408, scale 1:62,500.

_____, 2008c, Geologic map of the Cottonwood Spring & Canyon Spring 15 minute quadrangles, Riverside County, California. Dibblee Geological Foundation, Dibblee Foundation Map DF-375, scale 1:62,500.

Dorsey, R.J., 2006. Stratigraphy, tectonics, and basin evolution in the Anza-Borrego Desert region, Fossil treasures of the Anza-Borrego Desert – San Diego, California. Sunbelt Publications, pp.89-104, http://www.borregospringschamber.com/abdsp/documents/dorseychapernov05.pdf (accessed April 2016).

Downs, T., and J. A. White, 1968, A vertebrate faunal succession in superposed sediments from late Pliocene to middle Pleistocene in California. XXIII International Geological Congress, Section 10, p. 41-47.

Ingwall, R., 2008, Park Paleontology. Anza-Borrego Desert State Park Paleontology, http://www.anzaborregopaleo.org/park_paleontology.html (accessed October 2016).

Jefferson, G.T., and Remeika, 1994, The Mid-Pleistocene stratigraphic co-occurrence of *Mammuthus columbi* and *M. imperator* in the Ocotillo Formation, Borrego Badlands, Anza-Borrego Desert State Park, California. Current Research in the Pleistocene v. 11, p. 89-91.

Kirby, S.M., Janecke, S.U., Dorsey, R.J., Housen, B.A., Langenheim, V., McDougall, K., and Steely, A.N., 2007, Pleistocene Brawley and Ocotillo formations: Evidence for initial strike-slip deformation along the San Felipe and San Jacinto fault zones, southern California. Journal of Geology 115, p. 43-62.

McLeod, S. A., 2016, Unpublished museum records: The Natural History Museum of Los Angeles County.

National Park Service (NPS), 2006, Federal Historic Preservation Laws: Official Compilation of U.S. Cultural Heritage Statutes, U.S. Department of the Interior, National Park Service, Washington, D.C., http://www.cr.nps.gov/local-law/FHPL/ (accessed March 2016).

Norris, R. M., 1979, Lake Cahuilla High Shorelines *in* A.G. Sylvester, ed., Rifting, Transpression, and Neotectonics in the Mecca Hills, Salton Trough. Society for Sedimentary Geology, Pacific Section, Fall Field Trip Guide Book, September 25-26, 1999.

Norris, R.M., and Webb, R.W., 1976, Geology of California: New York, John Wiley Sons, 378 p.

133 N. San Gabriel Blvd., Suite 201 | Pasadena, CA 91107-3414 | T: (626) 578-0116 | F: (626) 204-5620

POWER Engineers, Inc., 2016, Class III Archaeological Survey Work Plan for the Ormat Nevada, Inc. Truckhaven Three-Dimensional Seismic Project. Prepared by POWER Engineers, Inc. and submitted to the Bureau of Land Management, El Centro Field Office and CA Department of Parks and Recreation in April 2016.

Remeika, P., and Jefferson, G.T., 1993, The Borrego local fauna – revised basin-margin stratigraphy and paleontology of the western Borrego Badlands, Anza-Borrego Desert State Park, California *in* R. E. Reynolds and J. Reynolds eds., Ashes, Faults, and Basins. San Bernadino County Museum Association Special Publication 93-1, p. 90-93.

Roeder, M.A, 2013, New records of freshwater fish from Irvingtonian deposits around the Salton Trough, southern California and northwestern Sonora, Mexico. Cordilleran GSA Section Meeting, Fresno California, Abstracts with Programs, v. 45, no. 6, p. 9.

Roeder, M.A., and G. Calvano, 2014, Records of freshwater bony fish from the latest Pleistocene to Holocene Lake Cahuilla beds of western Imperial County, California *in* R.E. Reynolds, ed., Not a Drop to Drink, 2014 Desert Symposium. California State University Desert Studies Consortium, Desert Symposium Field Guide and Proceedings, p. 94-99.

Roeder, M.A., and P. Remeika, 2014, A preliminary report on new records of fossils from the Brawley Formation (Middle to Late Pleistocene), northwestern Superstition Hills, Imperial County, California *in* R.E. Reynolds, ed., Not a Drop to Drink, 2014 Desert Symposium. California State University Desert Studies Consortium, Desert Symposium Field Guide and Proceedings, p. 123.

Scott, E., 2014, Unpublished museum collections records. San Bernardino County Museum.

Scott, E., and Springer, K., 2003, CEQA and Fossil Preservation in California: The Environmental Monitor Fall 2003, Association of Environmental Professionals, Sacramento, California.

Society of Vertebrate Paleontology, 2010, Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. Society of Vertebrate Paleontology Impact Mitigation Guidelines Revision Committee, http://vertpaleo.org/PDFS/8f/8fe02e8f-11a9-43b7-9953-cdcfaf4d69e3.pdf.

Springer, K., Scott, E., Sagebiel, J.C., and Murray, L.K., 2009, The Diamond Valley Lake Local Fauna - Late Pleistocene Vertebrates from Inland Southern California, *in* Albright, L.B., III, ed., Papers on Geology, Vertebrate Paleontology, and Biostratigraphy in Honor of Michael O. Woodburne, Museum of Northern Arizona Bulletin 65, Flagstaff, Arizona.

Tarbet, L.A., and W.H. Holman, 1944, Stratigraphy and micropaleontology of the west side of Imperial Valley, California. American Association of Petroleum Geologists, Bulletin 28, p. 1781-1782.

University of California Museum of Paleontology, 2016, Paleontological database, http://www.ucmp.berkeley.edu/ (accessed March 2016).

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USDA Forest Service, 2005, Training Guide for Management of Paleontological Resources: http://www.wilderness.net/toolboxes/ (accessed March 2016).

Waters, M. R., 1983, Late Holocene lacustrine chronology and archaeology of ancient Lake Cahuilla, California. Quaternary Research, v. 19, Issue 3, p. 373–387.

Whistler, D. P., Lander, E.B., and Roeder, M.A., 1995, A diverse record of microfossils and fossil plants, invertebrates, and small vertebrates from the late Holocene Lake Cahuilla beds, Riverside County, California *in* P. Remeika and A. Sturz, eds., Paleontology and Geology of the Western Salton Trough Detachment, Anza-Borrego Desert State Park, California. San Diego Geological Society, p. 109–118.

Winker, C.D., 1987, Neogene stratigraphy of the Fish Creek-Vallecito section, southern California – implications for early history of the northern Gulf of California and Colorado delta. PhD dissertation, The University of Arizona, http://hdl.handle.net/10150/191123 (accessed March 2016).

Woodard, G. D., 1963, The Cenozoic succession of the west Colorado Desert, San Diego and Imperial Counties, southern California. Ph.D. dissertation, University of California, Berkeley, 173 p.

Woodring, W. P., 1932, Distribution and age of the marine Tertiary deposits of the Colorado Desert. U.S. Carnegie Institute of Washington, Publication 418, p. 1-25.

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APPENDIX E – BUREAU OF LAND MANAGEMENT FOSSIL LOCALITY FORM (CONFIDENTIAL)

APPENDIX G – CalEEMod GREENHOUSE GAS EMISSIONS MODEL RUN PRINTOUTS

Truckhaven Geothermal Exploration Wells - 1 Well Calculations

Imperial County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	160.00	1000sqft	3.67	160,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	3.4	**Precipitation Freq (Days)**	12
Climate Zone	15			**Operational Year**	2021
Utility Company	Imperial Irrigation District				
CO2 Intensity (lb/MWhr)	1270.9	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Truckhaven Geothermal Exploration Wells - 1 Well Calculations - Imperial County, Annual

Project Characteristics -

Land Use - 1 Well Pad = 400 ft x 400 ft = 3.67 acres

Construction Phase - Construction Schedule Provided by Applicant

Off-road Equipment - Well Cleanup - 1 Rubber Tired Loader, 2 Tractor/Loader/Backhoe

Off-road Equipment - Well Drilling - 1 Drill Rig 24-hours, 1 Mud Tank (Pump) 24-hours, 1 diesel generator (for lights) 12 hours, 1 Forklift 8 hours, 1 air compressor 8 hours

Off-road Equipment - Well Pad - 1 Rubber Tired Dozer, 1 Grader, and 2 Tractor/Loader/Backhoe

Off-road Equipment - Well Testing - 1 Crane 8 hours, 1 pump 24 hours, 1 Tractor/Loader/Backhoe 8 hours

Trips and VMT - 6 vendor truck trips per day added to Well Pad Construction and Well Cleanup to account for Water Trucks (already accounted for in Well Drilling)

On-road Fugitive Dust - 90% of construction trips on pavement

Grading -

Construction Off-road Equipment Mitigation - Water Exposed Area 2x per day selected to account for ICAPCD Regulation VIII minimum requirements

Off-road Equipment - Geo Survey - 4 Off-hwy trucks 8 hr/dy

Off-road Equipment - Well Pad - 1 Grader, 1 Dozer, 2 Tractors

Vehicle Trips - 2 trips per week

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	5.00	10.00
tblConstructionPhase	NumDays	230.00	45.00
tblConstructionPhase	NumDays	8.00	5.00
tblConstructionPhase	NumDaysWeek	5.00	7.00
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00

Truckhaven Geothermal Exploration Wells - 1 Well Calculations - Imperial County, Annual

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	4.00
tblOffRoadEquipment	PhaseName		Well Pad Construction
tblOffRoadEquipment	PhaseName		Well Drilling
tblOffRoadEquipment	PhaseName		Well Drilling
tblOffRoadEquipment	PhaseName		Well Drilling
tblOffRoadEquipment	PhaseName		Well Testing
tblOffRoadEquipment	PhaseName		Well Testing
tblOffRoadEquipment	PhaseName		Well Testing
tblOffRoadEquipment	PhaseName		Well Cleanup-Abandoment
tblOffRoadEquipment	PhaseName		Geophysical Survey
tblOffRoadEquipment	UsageHours	8.00	12.00
tblOnRoadDust	HaulingPercentPave	50.00	90.00
tblOnRoadDust	HaulingPercentPave	50.00	90.00
tblOnRoadDust	HaulingPercentPave	50.00	90.00
tblOnRoadDust	HaulingPercentPave	50.00	90.00
tblOnRoadDust	HaulingPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	VendorPercentPave	50.00	90.00

tblOnRoadDust	VendorPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblOnRoadDust	WorkerPercentPave	50.00	90.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	VendorTripNumber	0.00	6.00
tblTripsAndVMT	WorkerTripNumber	15.00	8.00
tblTripsAndVMT	WorkerTripNumber	10.00	20.00
tblVehicleTrips	CC_TTP	0.00	100.00
tblVehicleTrips	PR_TP	0.00	100.00
tblVehicleTrips	ST_TR	0.00	0.02

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	0.1167	1.0852	0.8849	2.2700e-003	2.7096	0.0471	2.7566	0.2932	0.0453	0.3385	0.0000	199.2134	199.2134	0.0395	0.0000	200.2013
Maximum	**0.1167**	**1.0852**	**0.8849**	**2.2700e-003**	**2.7096**	**0.0471**	**2.7566**	**0.2932**	**0.0453**	**0.3385**	**0.0000**	**199.2134**	**199.2134**	**0.0395**	**0.0000**	**200.2013**

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	0.1167	1.0852	0.8849	2.2700e-003	2.6825	0.0471	2.7296	0.2793	0.0453	0.3246	0.0000	199.2132	199.2132	0.0395	0.0000	200.2011
Maximum	**0.1167**	**1.0852**	**0.8849**	**2.2700e-003**	**2.6825**	**0.0471**	**2.7296**	**0.2793**	**0.0453**	**0.3246**	**0.0000**	**199.2132**	**199.2132**	**0.0395**	**0.0000**	**200.2011**

	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**	**1.00**	**0.00**	**0.98**	**4.74**	**0.00**	**4.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Truckhaven Geothermal Exploration Wells - 1 Well Calculations - Imperial County, Annual

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	3-1-2020	5-31-2020	0.9934	0.9934
		Highest	0.9934	0.9934

2.2 Overall Operational

Unmitigated Operational

	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					
Area	0.0138	1.0000e-005	1.4800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	2.8600e-003	2.8600e-003	1.0000e-005	0.0000	3.0500e-003
Energy	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
Mobile	2.3000e-004	1.7400e-003	2.3000e-003	1.0000e-005	0.1550	0.0000	0.1550	0.0155	0.0000	0.0155	0.0000	0.5560	0.5560	5.0000e-005	0.0000	0.5572
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0141**	**1.7500e-003**	**3.7800e-003**	**1.0000e-005**	**0.1550**	**1.0000e-005**	**0.1550**	**0.0155**	**1.0000e-005**	**0.0155**	**0.0000**	**0.5589**	**0.5589**	**6.0000e-005**	**0.0000**	**0.5603**

2.2 Overall Operational

Mitigated Operational

	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					
Area	0.0138	1.0000e-005	1.4800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	2.8600e-003	2.8600e-003	1.0000e-005	0.0000	3.0500e-003
Energy	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
Mobile	2.3000e-004	1.7400e-003	2.3000e-003	1.0000e-005	0.1550	0.0000	0.1550	0.0155	0.0000	0.0155	0.0000	0.5560	0.5560	5.0000e-005	0.0000	0.5572
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0141**	**1.7500e-003**	**3.7800e-003**	**1.0000e-005**	**0.1550**	**1.0000e-005**	**0.1550**	**0.0155**	**1.0000e-005**	**0.0155**	**0.0000**	**0.5589**	**0.5589**	**6.0000e-005**	**0.0000**	**0.5603**

	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**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Truckhaven Geothermal Exploration Wells - 1 Well Calculations - Imperial County, Annual

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Geophysical Survey	Trenching	2/11/2020	2/29/2020	5	14	
2	Well Pad Construction	Site Preparation	3/1/2020	3/14/2020	5	10	
3	Well Drilling	Building Construction	3/15/2020	4/28/2020	7	45	
4	Well Testing	Trenching	4/29/2020	4/30/2020	5	2	
5	Well Cleanup-Abandoment	Grading	5/1/2020	5/7/2020	5	5	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 3.67

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Well Pad Construction	Graders	1	8.00	187	0.41
Well Pad Construction	Rubber Tired Dozers	1	8.00	247	0.40
Well Pad Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Well Drilling	Air Compressors	1	8.00	78	0.48
Well Drilling	Bore/Drill Rigs	1	24.00	221	0.50
Well Drilling	Forklifts	1	8.00	89	0.20
Well Drilling	Generator Sets	1	12.00	84	0.74
Well Drilling	Pumps	1	24.00	84	0.74
Well Testing	Cranes	1	8.00	231	0.29
Well Testing	Pumps	1	24.00	84	0.74
Well Testing	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Well Cleanup-Abandoment	Rubber Tired Loaders	1	8.00	203	0.36
Well Cleanup-Abandoment	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Geophysical Survey	Off-Highway Trucks	4	8.00	402	0.38

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
Well Pad Construction	4	10.00	6.00	0.00	7.30	8.90	20.00	LD_Mix	HDT_Mix	HHDT
Well Drilling	10	67.00	26.00	0.00	7.30	8.90	20.00	LD_Mix	HDT_Mix	HHDT
Well Testing	3	8.00	2.00	0.00	7.30	8.90	20.00	LD_Mix	HDT_Mix	HHDT
Well Cleanup-Abandoment	6	8.00	6.00	0.00	7.30	8.90	20.00	LD_Mix	HDT_Mix	HHDT
Geophysical Survey	4	20.00	6.00	0.00	7.30	8.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Geophysical Survey - 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	0.0186	0.1770	0.1067	3.7000e-004		6.4500e-003	6.4500e-003		5.9300e-003	5.9300e-003	0.0000	32.4785	32.4785	0.0105	0.0000	32.7411
Total	**0.0186**	**0.1770**	**0.1067**	**3.7000e-004**		**6.4500e-003**	**6.4500e-003**		**5.9300e-003**	**5.9300e-003**	**0.0000**	**32.4785**	**32.4785**	**0.0105**	**0.0000**	**32.7411**

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	1.9000e-004	4.8900e-003	1.3800e-003	1.0000e-005	0.0535	3.0000e-005	0.0536	5.4000e-003	3.0000e-005	5.4300e-003	0.0000	1.2763	1.2763	7.0000e-005	0.0000	1.2781
Worker	8.1000e-004	6.2000e-004	5.7900e-003	1.0000e-005	0.1462	1.0000e-005	0.1462	0.0147	0.0000	0.0147	0.0000	0.6511	0.6511	5.0000e-005	0.0000	0.6524
Total	**1.0000e-003**	**5.5100e-003**	**7.1700e-003**	**2.0000e-005**	**0.1997**	**4.0000e-005**	**0.1997**	**0.0201**	**3.0000e-005**	**0.0201**	**0.0000**	**1.9274**	**1.9274**	**1.2000e-004**	**0.0000**	**1.9304**

3.2 Geophysical Survey - 2020

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	0.0186	0.1770	0.1067	3.7000e-004		6.4500e-003	6.4500e-003		5.9300e-003	5.9300e-003	0.0000	32.4785	32.4785	0.0105	0.0000	32.7411
Total	**0.0186**	**0.1770**	**0.1067**	**3.7000e-004**		**6.4500e-003**	**6.4500e-003**		**5.9300e-003**	**5.9300e-003**	**0.0000**	**32.4785**	**32.4785**	**0.0105**	**0.0000**	**32.7411**

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	1.9000e-004	4.8900e-003	1.3800e-003	1.0000e-005	0.0535	3.0000e-005	0.0536	5.4000e-003	3.0000e-005	5.4300e-003	0.0000	1.2763	1.2763	7.0000e-005	0.0000	1.2781
Worker	8.1000e-004	6.2000e-004	5.7900e-003	1.0000e-005	0.1462	1.0000e-005	0.1462	0.0147	0.0000	0.0147	0.0000	0.6511	0.6511	5.0000e-005	0.0000	0.6524
Total	**1.0000e-003**	**5.5100e-003**	**7.1700e-003**	**2.0000e-005**	**0.1997**	**4.0000e-005**	**0.1997**	**0.0201**	**3.0000e-005**	**0.0201**	**0.0000**	**1.9274**	**1.9274**	**1.2000e-004**	**0.0000**	**1.9304**

3.3 Well Pad Construction - 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					0.0328	0.0000	0.0328	0.0168	0.0000	0.0168	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.8700e-003	0.1093	0.0525	1.1000e-004		5.1200e-003	5.1200e-003		4.7100e-003	4.7100e-003	0.0000	9.3966	9.3966	3.0400e-003	0.0000	9.4726
Total	**9.8700e-003**	**0.1093**	**0.0525**	**1.1000e-004**	**0.0328**	**5.1200e-003**	**0.0379**	**0.0168**	**4.7100e-003**	**0.0216**	**0.0000**	**9.3966**	**9.3966**	**3.0400e-003**	**0.0000**	**9.4726**

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	1.3000e-004	3.4900e-003	9.9000e-004	1.0000e-005	0.0382	2.0000e-005	0.0383	3.8600e-003	2.0000e-005	3.8800e-003	0.0000	0.9116	0.9116	5.0000e-005	0.0000	0.9129
Worker	2.9000e-004	2.2000e-004	2.0700e-003	0.0000	0.0522	0.0000	0.0522	5.2500e-003	0.0000	5.2500e-003	0.0000	0.2325	0.2325	2.0000e-005	0.0000	0.2330
Total	**4.2000e-004**	**3.7100e-003**	**3.0600e-003**	**1.0000e-005**	**0.0904**	**2.0000e-005**	**0.0905**	**9.1100e-003**	**2.0000e-005**	**9.1300e-003**	**0.0000**	**1.1442**	**1.1442**	**7.0000e-005**	**0.0000**	**1.1459**

3.3 Well Pad Construction - 2020

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					0.0147	0.0000	0.0147	7.5800e-003	0.0000	7.5800e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.8700e-003	0.1093	0.0525	1.1000e-004		5.1200e-003	5.1200e-003		4.7100e-003	4.7100e-003	0.0000	9.3966	9.3966	3.0400e-003	0.0000	9.4726
Total	**9.8700e-003**	**0.1093**	**0.0525**	**1.1000e-004**	**0.0147**	**5.1200e-003**	**0.0199**	**7.5800e-003**	**4.7100e-003**	**0.0123**	**0.0000**	**9.3966**	**9.3966**	**3.0400e-003**	**0.0000**	**9.4726**

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	1.3000e-004	3.4900e-003	9.9000e-004	1.0000e-005	0.0382	2.0000e-005	0.0383	3.8600e-003	2.0000e-005	3.8800e-003	0.0000	0.9116	0.9116	5.0000e-005	0.0000	0.9129
Worker	2.9000e-004	2.2000e-004	2.0700e-003	0.0000	0.0522	0.0000	0.0522	5.2500e-003	0.0000	5.2500e-003	0.0000	0.2325	0.2325	2.0000e-005	0.0000	0.2330
Total	**4.2000e-004**	**3.7100e-003**	**3.0600e-003**	**1.0000e-005**	**0.0904**	**2.0000e-005**	**0.0905**	**9.1100e-003**	**2.0000e-005**	**9.1300e-003**	**0.0000**	**1.1442**	**1.1442**	**7.0000e-005**	**0.0000**	**1.1459**

3.4 Well Drilling - 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	0.0713	0.6731	0.6010	1.4200e-003		0.0330	0.0330		0.0322	0.0322	0.0000	123.6206	123.6206	0.0230	0.0000	124.1942
Total	**0.0713**	**0.6731**	**0.6010**	**1.4200e-003**		**0.0330**	**0.0330**		**0.0322**	**0.0322**	**0.0000**	**123.6206**	**123.6206**	**0.0230**	**0.0000**	**124.1942**

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	2.6100e-003	0.0681	0.0193	1.9000e-004	0.7455	4.1000e-004	0.7459	0.0753	3.9000e-004	0.0756	0.0000	17.7769	17.7769	9.8000e-004	0.0000	17.8014
Worker	8.7500e-003	6.7000e-003	0.0623	8.0000e-005	1.5739	6.0000e-005	1.5740	0.1583	5.0000e-005	0.1584	0.0000	7.0105	7.0105	5.7000e-004	0.0000	7.0247
Total	**0.0114**	**0.0748**	**0.0816**	**2.7000e-004**	**2.3194**	**4.7000e-004**	**2.3199**	**0.2336**	**4.4000e-004**	**0.2340**	**0.0000**	**24.7873**	**24.7873**	**1.5500e-003**	**0.0000**	**24.8262**

3.4 Well Drilling - 2020

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	0.0713	0.6731	0.6010	1.4200e-003		0.0330	0.0330		0.0322	0.0322	0.0000	123.6204	123.6204	0.0230	0.0000	124.1941
Total	**0.0713**	**0.6731**	**0.6010**	**1.4200e-003**		**0.0330**	**0.0330**		**0.0322**	**0.0322**	**0.0000**	**123.6204**	**123.6204**	**0.0230**	**0.0000**	**124.1941**

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	2.6100e-003	0.0681	0.0193	1.9000e-004	0.7455	4.1000e-004	0.7459	0.0753	3.9000e-004	0.0756	0.0000	17.7769	17.7769	9.8000e-004	0.0000	17.8014
Worker	8.7500e-003	6.7000e-003	0.0623	8.0000e-005	1.5739	6.0000e-005	1.5740	0.1583	5.0000e-005	0.1584	0.0000	7.0105	7.0105	5.7000e-004	0.0000	7.0247
Total	**0.0114**	**0.0748**	**0.0816**	**2.7000e-004**	**2.3194**	**4.7000e-004**	**2.3199**	**0.2336**	**4.4000e-004**	**0.2340**	**0.0000**	**24.7873**	**24.7873**	**1.5500e-003**	**0.0000**	**24.8262**

3.5 Well Testing - 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	1.9300e-003	0.0181	0.0157	3.0000e-005		9.8000e-004	9.8000e-004		9.5000e-004	9.5000e-004	0.0000	2.4754	2.4754	3.5000e-004	0.0000	2.4842
Total	**1.9300e-003**	**0.0181**	**0.0157**	**3.0000e-005**		**9.8000e-004**	**9.8000e-004**		**9.5000e-004**	**9.5000e-004**	**0.0000**	**2.4754**	**2.4754**	**3.5000e-004**	**0.0000**	**2.4842**

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	2.3000e-004	7.0000e-005	0.0000	2.5500e-003	0.0000	2.5500e-003	2.6000e-004	0.0000	2.6000e-004	0.0000	0.0608	0.0608	0.0000	0.0000	0.0609
Worker	5.0000e-005	4.0000e-005	3.3000e-004	0.0000	8.3500e-003	0.0000	8.3500e-003	8.4000e-004	0.0000	8.4000e-004	0.0000	0.0372	0.0372	0.0000	0.0000	0.0373
Total	**6.0000e-005**	**2.7000e-004**	**4.0000e-004**	**0.0000**	**0.0109**	**0.0000**	**0.0109**	**1.1000e-003**	**0.0000**	**1.1000e-003**	**0.0000**	**0.0980**	**0.0980**	**0.0000**	**0.0000**	**0.0981**

3.5 Well Testing - 2020

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	1.9300e-003	0.0181	0.0157	3.0000e-005		9.8000e-004	9.8000e-004		9.5000e-004	9.5000e-004	0.0000	2.4754	2.4754	3.5000e-004	0.0000	2.4842
Total	**1.9300e-003**	**0.0181**	**0.0157**	**3.0000e-005**		**9.8000e-004**	**9.8000e-004**		**9.5000e-004**	**9.5000e-004**	**0.0000**	**2.4754**	**2.4754**	**3.5000e-004**	**0.0000**	**2.4842**

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	2.3000e-004	7.0000e-005	0.0000	2.5500e-003	0.0000	2.5500e-003	2.6000e-004	0.0000	2.6000e-004	0.0000	0.0608	0.0608	0.0000	0.0000	0.0609
Worker	5.0000e-005	4.0000e-005	3.3000e-004	0.0000	8.3500e-003	0.0000	8.3500e-003	8.4000e-004	0.0000	8.4000e-004	0.0000	0.0372	0.0372	0.0000	0.0000	0.0373
Total	**6.0000e-005**	**2.7000e-004**	**4.0000e-004**	**0.0000**	**0.0109**	**0.0000**	**0.0109**	**1.1000e-003**	**0.0000**	**1.1000e-003**	**0.0000**	**0.0980**	**0.0980**	**0.0000**	**0.0000**	**0.0981**

3.6 Well Cleanup-Abandoment - 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					0.0164	0.0000	0.0164	8.4200e-003	0.0000	8.4200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.9800e-003	0.0216	0.0155	3.0000e-005		1.0300e-003	1.0300e-003		9.5000e-004	9.5000e-004	0.0000	2.7367	2.7367	8.9000e-004	0.0000	2.7589
Total	**1.9800e-003**	**0.0216**	**0.0155**	**3.0000e-005**	**0.0164**	**1.0300e-003**	**0.0174**	**8.4200e-003**	**9.5000e-004**	**9.3700e-003**	**0.0000**	**2.7367**	**2.7367**	**8.9000e-004**	**0.0000**	**2.7589**

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	7.0000e-005	1.7500e-003	4.9000e-004	0.0000	0.0191	1.0000e-005	0.0191	1.9300e-003	1.0000e-005	1.9400e-003	0.0000	0.4558	0.4558	3.0000e-005	0.0000	0.4565
Worker	1.2000e-004	9.0000e-005	8.3000e-004	0.0000	0.0209	0.0000	0.0209	2.1000e-003	0.0000	2.1000e-003	0.0000	0.0930	0.0930	1.0000e-005	0.0000	0.0932
Total	**1.9000e-004**	**1.8400e-003**	**1.3200e-003**	**0.0000**	**0.0400**	**1.0000e-005**	**0.0400**	**4.0300e-003**	**1.0000e-005**	**4.0400e-003**	**0.0000**	**0.5488**	**0.5488**	**4.0000e-005**	**0.0000**	**0.5497**

3.6 Well Cleanup-Abandoment - 2020

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					7.3700e-003	0.0000	7.3700e-003	3.7900e-003	0.0000	3.7900e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.9800e-003	0.0216	0.0155	3.0000e-005		1.0300e-003	1.0300e-003		9.5000e-004	9.5000e-004	0.0000	2.7367	2.7367	8.9000e-004	0.0000	2.7589
Total	**1.9800e-003**	**0.0216**	**0.0155**	**3.0000e-005**	**7.3700e-003**	**1.0300e-003**	**8.4000e-003**	**3.7900e-003**	**9.5000e-004**	**4.7400e-003**	**0.0000**	**2.7367**	**2.7367**	**8.9000e-004**	**0.0000**	**2.7589**

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	7.0000e-005	1.7500e-003	4.9000e-004	0.0000	0.0191	1.0000e-005	0.0191	1.9300e-003	1.0000e-005	1.9400e-003	0.0000	0.4558	0.4558	3.0000e-005	0.0000	0.4565
Worker	1.2000e-004	9.0000e-005	8.3000e-004	0.0000	0.0209	0.0000	0.0209	2.1000e-003	0.0000	2.1000e-003	0.0000	0.0930	0.0930	1.0000e-005	0.0000	0.0932
Total	**1.9000e-004**	**1.8400e-003**	**1.3200e-003**	**0.0000**	**0.0400**	**1.0000e-005**	**0.0400**	**4.0300e-003**	**1.0000e-005**	**4.0400e-003**	**0.0000**	**0.5488**	**0.5488**	**4.0000e-005**	**0.0000**	**0.5497**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	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					
Mitigated	2.3000e-004	1.7400e-003	2.3000e-003	1.0000e-005	0.1550	0.0000	0.1550	0.0155	0.0000	0.0155	0.0000	0.5560	0.5560	5.0000e-005	0.0000	0.5572
Unmitigated	2.3000e-004	1.7400e-003	2.3000e-003	1.0000e-005	0.1550	0.0000	0.1550	0.0155	0.0000	0.0155	0.0000	0.5560	0.5560	5.0000e-005	0.0000	0.5572

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	3.20	0.00	832	832
Total	0.00	3.20	0.00	832	832

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	6.70	5.00	8.90	0.00	100.00	0.00	100	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.509486	0.032430	0.160670	0.124446	0.017653	0.005129	0.019157	0.119824	0.003361	0.001189	0.005223	0.000739	0.000694

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	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					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	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
NaturalGas Unmitigated	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

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	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
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Non-Asphalt Surfaces	0	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
Total		**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**

Mitigated

	NaturalGas Use	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
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Non-Asphalt Surfaces	0	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
Total		**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**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	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					
Mitigated	0.0138	1.0000e-005	1.4800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	2.8600e-003	2.8600e-003	1.0000e-005	0.0000	3.0500e-003
Unmitigated	0.0138	1.0000e-005	1.4800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	2.8600e-003	2.8600e-003	1.0000e-005	0.0000	3.0500e-003

6.2 Area by SubCategory

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
SubCategory	tons/yr										MT/yr					
Architectural Coating	3.3400e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0103					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.4000e-004	1.0000e-005	1.4800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	2.8600e-003	2.8600e-003	1.0000e-005	0.0000	3.0500e-003
Total	**0.0138**	**1.0000e-005**	**1.4800e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**2.8600e-003**	**2.8600e-003**	**1.0000e-005**	**0.0000**	**3.0500e-003**

6.2 Area by SubCategory

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
SubCategory	tons/yr										MT/yr					
Architectural Coating	3.3400e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0103					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.4000e-004	1.0000e-005	1.4800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	2.8600e-003	2.8600e-003	1.0000e-005	0.0000	3.0500e-003
Total	**0.0138**	**1.0000e-005**	**1.4800e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**2.8600e-003**	**2.8600e-003**	**1.0000e-005**	**0.0000**	**3.0500e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

APPENDIX H – NOISE CALCULATION MODEL RUN PRINTOUTS

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Pad & Access Rd

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to Well 32-5	Residential	55	45	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		1800	0
Dozer	No	40		81.7	1800	0
Tractor	No	40	84		1800	0

Equipment	Calculated (dBA) *Lmax	Leq	Results Day Lmax	Day Leq	Evening Lmax	Evening Leq
Grader	53.2	46.2	N/A	N/A	N/A	N/A
Dozer	49.8	46.8	N/A	N/A	N/A	N/A
Tractor	49.5	46.5	N/A	N/A	N/A	N/A
Total	**53**	**53**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to Well 47-5	Residential	55	45	45

Description	Impact Device	Usage(%)	Equipment **Spec** Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		2320	0
Dozer	No	40		81.7	2320	0
Tractor	No	40.0	84		2320	0

Equipment	Calculated (dBA) *Lmax	Leq	Results Day Lmax	Day Leq	Evening Lmax	Evening Leq
Grader	52	48	N/A	N/A	N/A	N/A
Dozer	48	44	N/A	N/A	N/A	N/A
Tractor	51	47	N/A	N/A	N/A	N/A
Total	**52**	**51**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Pad & Access Rd

---- Receptor #3 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to Well 18-32	Residential	55.0	45.0	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		2110	0
Dozer	No	40.0		81.7	2110	0
Tractor	No	40.0	84		2110	0

Equipment	Calculated (dBA) *Lmax	Leq	Results Day Lmax	Day Leq	Noise Limits (dBA) Evening Lmax	Evening Leq
Grader	52.5	48.5	N/A	N/A	N/A	N/A
Dozer	49.2	45.2	N/A	N/A	N/A	N/A
Tractor	51.5	47.5	N/A	N/A	N/A	N/A
Total	**53**	**52**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to Well 47-32	Residential	55	45	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		1060	0
Dozer	No	40		81.7	1060	0
Tractor	No	40	84		1060	0

Equipment	Calculated (dBA) *Lmax	Leq	Results Day Lmax	Day Leq	Noise Limits (dBA) Evening Lmax	Evening Leq
Grader	58.5	54.5	N/A	N/A	N/A	N/A
Dozer	55.1	51.2	N/A	N/A	N/A	N/A
Tractor	57.5	53.5	N/A	N/A	N/A	N/A
Total	**59**	**58**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Pad & Access Rd

---- Receptor #5 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to Well 14-4	Residential	55	45	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		1480	0
Dozer	No	40		81.7	1480	0
Tractor	No	40	84		1480	0

Equipment	Calculated (dBA) *Lmax	Leq	Results Day Lmax	Day Leq	Evening Lmax	Evening Leq
Grader	55.6	51.6	N/A	N/A	N/A	N/A
Dozer	52.2	48.3	N/A	N/A	N/A	N/A
Tractor	54.6	50.6	N/A	N/A	N/A	N/A
Total	**56**	**55**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #6 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to Well 17-4	Residential	55	45	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		3060	0
Dozer	No	40		81.7	3060	0
Tractor	No	40	84		3060	0

Equipment	Calculated (dBA) *Lmax	Leq	Results Day Lmax	Day Leq	Evening Lmax	Evening Leq
Grader	49.3	45.3	N/A	N/A	N/A	N/A
Dozer	45.9	42.0	N/A	N/A	N/A	N/A
Tractor	48.3	44.3	N/A	N/A	N/A	N/A
Total	**49**	**49**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Drilling

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to Well 32-5	Residential	55	45	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	1800	0
Pumps	No	50		80.9	1800	0
Generator	No	50		80.6	1800	0
Gradall	No	40		83.4	1800	0
Compressor (air)	No	40		77.7	1800	0

Results

Equipment		Calculated (dBA) *Lmax	Leq	Day Lmax	Noise Limits (dBA) Day Leq	Evening Lmax	Evening Leq
Auger Drill Rig		53.2	46.2	N/A	N/A	N/A	N/A
Pumps		49.8	46.8	N/A	N/A	N/A	N/A
Generator		49.5	46.5	N/A	N/A	N/A	N/A
Gradall		52.3	48.3	N/A	N/A	N/A	N/A
Compressor (air)		46.5	42.6	N/A	N/A	N/A	N/A
	Total	**53**	**53**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Drilling

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to Well 47-5	Residential	55	45	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20.0		84.4	2320	0
Pumps	No	50		80.9	2320	0
Generator	No	50		80.6	2320	0
Gradall	No	40		83.4	2320	0
Compressor (air)	No	40		77.7	2320	0

		Results Calculated (dBA)		Noise Limits (dBA) Day		Evening	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig		51.0	44.0	N/A	N/A	N/A	N/A
Pumps		47.6	44.6	N/A	N/A	N/A	N/A
Generator		47.3	44.3	N/A	N/A	N/A	N/A
Gradall		50.1	46.1	N/A	N/A	N/A	N/A
Compressor (air)		44.3	40.4	N/A	N/A	N/A	N/A
	Total	**51**	**51**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Drilling

		Baselines (dBA)			---- Receptor #3 ----
Description	Land Use	Daytime	Evening	Night	
Nearest Home to Well 18-32	Residential	55.0	45.0	45	

Description	Impact Device	Usage(%)	Equipment Spec Lmax **(dBA)**	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	2110	0
Pumps	No	50		80.9	2110	0
Generator	No	50		80.6	2110	0
Gradall	No	40		83.4	2110	0
Compressor (air)	No	40		77.7	2110	0

		Results					
		Calculated (dBA)		Noise Limits (dBA)			
				Day		Evening	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig		51.9	44.9	N/A	N/A	N/A	N/A
Pumps		48.4	45.4	N/A	N/A	N/A	N/A
Generator		48.1	45.1	N/A	N/A	N/A	N/A
Gradall		50.9	46.9	N/A	N/A	N/A	N/A
Compressor (air)		45.2	41.2	N/A	N/A	N/A	N/A
	Total	**52**	**52**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Drilling

				---- Receptor #4 ----
		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Home to Well 47-32	Residential	55	45.0	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	1060	0
Pumps	No	50.0		80.9	1060	0
Generator	No	50		80.6	1060	0
Gradall	No	40		83.4	1060	0
Compressor (air)	No	40		77.7	1060	0

		Results					
		Calculated (dBA)		Noise Limits (dBA)			
				Day		Evening	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig		57.8	50.8	N/A	N/A	N/A	N/A
Pumps		54.4	51.4	N/A	N/A	N/A	N/A
Generator		54.1	51.1	N/A	N/A	N/A	N/A
Gradall		56.9	52.9	N/A	N/A	N/A	N/A
Compressor (air)		51.1	47.2	N/A	N/A	N/A	N/A
	Total	**58**	**58**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Drilling

		Baselines (dBA)			---- Receptor #5 ----
Description	Land Use	Daytime	Evening	Night	
Nearest Home to Well 14-4	Residential	55	45	45	

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	1480	0
Pumps	No	50		80.9	1480	0
Generator	No	50		80.6	1480	0
Gradall	No	40		83.4	1480	0
Compressor (air)	No	40		77.7	1480	0

		Calculated (dBA)		Results Noise Limits (dBA)			
				Day		Evening	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig		54.9	47.9	N/A	N/A	N/A	N/A
Pumps		51.5	48.5	N/A	N/A	N/A	N/A
Generator		51.2	48.2	N/A	N/A	N/A	N/A
Gradall		54.0	50.0	N/A	N/A	N/A	N/A
Compressor (air)		48.2	44.3	N/A	N/A	N/A	N/A
	Total	**55**	**55**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Drilling

		Baselines (dBA)			---- Receptor #6 ----
Description	Land Use	Daytime	Evening	Night	
Nearest Home to Well 17-4	Residential	55	45	45	

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	3060	0
Pumps	No	50		80.9	3060	0
Generator	No	50		80.6	3060	0
Gradall	No	40		83.4	3060	0
Compressor (air)	No	40		77.7	3060	0

		Calculated (dBA)		Results Noise Limits (dBA)			
				Day		Evening	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig		48.6	41.6	N/A	N/A	N/A	N/A
Pumps		45.2	42.2	N/A	N/A	N/A	N/A
Generator		44.9	41.9	N/A	N/A	N/A	N/A
Gradall		47.7	43.7	N/A	N/A	N/A	N/A
Compressor (air)		41.9	38.0	N/A	N/A	N/A	N/A
	Total	**49**	**49**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Drilling Mitigated

				---- Receptor #1 ----
		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Home to Well 32-5	Residential	55	45	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	1800	15
Pumps	No	50		80.9	1800	15
Generator	No	50		80.6	1800	15
Gradall	No	40		83.4	1800	15
Compressor (air)	No	40		77.7	1800	15

		Results					
		Calculated (dBA)		Noise Limits (dBA)			
				Day		Evening	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig		38.2	31.2	N/A	N/A	N/A	N/A
Pumps		34.8	31.8	N/A	N/A	N/A	N/A
Generator		34.5	31.5	N/A	N/A	N/A	N/A
Gradall		37.3	33.3	N/A	N/A	N/A	N/A
Compressor (air)		31.5	27.6	N/A	N/A	N/A	N/A
	Total	**38**	**38**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Drilling Mitigated

				---- Receptor #2 ----
		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Home to Well 47-5	Residential	55	45	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20.0		84.4	2320	15
Pumps	No	50		80.9	2320	15
Generator	No	50		80.6	2320	15
Gradall	No	40		83.4	2320	15
Compressor (air)	No	40		77.7	2320	15

		Calculated (dBA)		Results	Noise Limits (dBA)		
				Day		Evening	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig		36.0	29.0	N/A	N/A	N/A	N/A
Pumps		32.6	29.6	N/A	N/A	N/A	N/A
Generator		32.3	29.3	N/A	N/A	N/A	N/A
Gradall		35.1	31.1	N/A	N/A	N/A	N/A
Compressor (air)		29.3	25.4	N/A	N/A	N/A	N/A
	Total	**36**	**36**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Drilling Mitigated

				---- Receptor #3 ----
		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Home to Well 18-32	Residential	55.0	45.0	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax **(dBA)**	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	2110	15
Pumps	No	50		80.9	2110	15
Generator	No	50		80.6	2110	15
Gradall	No	40		83.4	2110	15
Compressor (air)	No	40		77.7	2110	15

		Calculated (dBA)		Results	Noise Limits (dBA)		
				Day		Evening	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig		36.9	29.9	N/A	N/A	N/A	N/A
Pumps		33.4	30.4	N/A	N/A	N/A	N/A
Generator		33.1	30.1	N/A	N/A	N/A	N/A
Gradall		35.9	31.9	N/A	N/A	N/A	N/A
Compressor (air)		30.2	26.2	N/A	N/A	N/A	N/A
	Total	**37**	**37**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Drilling Mitigated

				---- Receptor #4 ----
		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Home to Well 47-32	Residential	55	45.0	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	1060	15
Pumps	No	50.0		80.9	1060	15
Generator	No	50		80.6	1060	15
Gradall	No	40		83.4	1060	15
Compressor (air)	No	40		77.7	1060	15

		Calculated (dBA)		Results	Noise Limits (dBA)		
				Day		Evening	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig		42.8	35.8	N/A	N/A	N/A	N/A
Pumps		39.4	36.4	N/A	N/A	N/A	N/A
Generator		39.1	36.1	N/A	N/A	N/A	N/A
Gradall		41.9	37.9	N/A	N/A	N/A	N/A
Compressor (air)		36.1	32.2	N/A	N/A	N/A	N/A
	Total	**43**	**43**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Drilling Mitigated

				---- Receptor #5 ----
		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Home to Well 14-4	Residential	55	45	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	1480	15
Pumps	No	50		80.9	1480	15
Generator	No	50		80.6	1480	15
Gradall	No	40		83.4	1480	15
Compressor (air)	No	40		77.7	1480	15

		Calculated (dBA)		Results			
				Day		Evening	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig		39.9	32.9	N/A	N/A	N/A	N/A
Pumps		36.5	33.5	N/A	N/A	N/A	N/A
Generator		36.2	33.2	N/A	N/A	N/A	N/A
Gradall		39.0	35.0	N/A	N/A	N/A	N/A
Compressor (air)		33.2	29.3	N/A	N/A	N/A	N/A
	Total	**40**	**40**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Drilling Mitigated

---- Receptor #6 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to Well 17-4	Residential	55	45	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	3060	15
Pumps	No	50		80.9	3060	15
Generator	No	50		80.6	3060	15
Gradall	No	40		83.4	3060	15
Compressor (air)	No	40		77.7	3060	15

		Results Calculated (dBA)		Noise Limits (dBA) Day		Evening	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig		33.6	26.6	N/A	N/A	N/A	N/A
Pumps		30.2	27.2	N/A	N/A	N/A	N/A
Generator		29.9	26.9	N/A	N/A	N/A	N/A
Gradall		32.7	28.7	N/A	N/A	N/A	N/A
Compressor (air)		26.9	23.0	N/A	N/A	N/A	N/A
	Total	**34**	**34**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Testing

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to Well 32-5	Residential	55	45	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	1800	0
Pumps	No	50		80.9	1800	0
Tractor	No	40	84		1800	0

Equipment	Results Calculated (dBA) *Lmax	Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq
Crane	49.4	41.5	N/A	N/A	N/A	N/A
Pumps	49.8	46.8	N/A	N/A	N/A	N/A
Tractor	52.9	48.9	N/A	N/A	N/A	N/A
Total	**53**	**51**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to Well 47-5	Residential	55.0	45.0	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	2320	0
Pumps	No	50.0		80.9	2320	0
Tractor	No	40	84		2320	0

Equipment	Results Calculated (dBA) *Lmax	Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq
Crane	51.7	47.7	N/A	N/A	N/A	N/A
Pumps	48.3	44.4	N/A	N/A	N/A	N/A
Tractor	50.7	46.7	N/A	N/A	N/A	N/A
Total	**52**	**51**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Testing

---- Receptor #3 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to Well 18-32	Residential	55	45	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16.0		80.6	2110	0
Pumps	No	50.0		80.9	2110	0
Tractor	No	40.0	84		2110	0

Equipment	Calculated (dBA) *Lmax	Leq	Results Day Lmax	Day Leq	Evening Lmax	Evening Leq
Crane	52.5	48.5	N/A	N/A	N/A	N/A
Pumps	49.2	45.2	N/A	N/A	N/A	N/A
Tractor	51.5	47.5	N/A	N/A	N/A	N/A
Total	**53**	**52**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to Well 47-32	Residential	55	45	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	1060	0
Pumps	No	50		80.9	1060	0
Tractor	No	40	84		1060	0

Equipment	Calculated (dBA) *Lmax	Leq	Results Day Lmax	Day Leq	Evening Lmax	Evening Leq
Crane	54.0	46.1	N/A	N/A	N/A	N/A
Pumps	54.4	51.4	N/A	N/A	N/A	N/A
Tractor	57.5	53.5	N/A	N/A	N/A	N/A
Total	**58**	**56**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Testing

---- Receptor #5 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to Well 14-4	Residential	55.0	45.0	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16.0		80.6	1480	0
Pumps	No	**50**		80.9	1480	0
Tractor	No	40	84		1480	0

Results

Equipment	Calculated (dBA) *Lmax	Leq	Day Lmax	Noise Limits (dBA) Day Leq	Evening Lmax	Evening Leq
Crane	55.6	51.6	N/A	N/A	N/A	N/A
Pumps	52.2	48.3	N/A	N/A	N/A	N/A
Tractor	54.6	50.6	N/A	N/A	N/A	N/A
Total	**56**	**55**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #6 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to Well 17-4	Residential	55	45	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	3060	0
Pumps	No	50		80.9	3060	0
Tractor	No	40	84		3060	0

Results

Equipment	Calculated (dBA) *Lmax	Leq	Day Lmax	Noise Limits (dBA) Day Leq	Evening Lmax	Evening Leq
Crane	49.3	45.3	N/A	N/A	N/A	N/A
Pumps	45.9	42.0	N/A	N/A	N/A	N/A
Tractor	48.3	44.3	N/A	N/A	N/A	N/A
Total	**49**	**49**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Cleanup

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to Well 32-5	Residential	55	45	45.0

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Front End Loader	No	40		79.1	1800	0
Tractor	No	40	84		1800	0
Tractor	No	40	84		1800	0

Results

Equipment	Calculated (dBA) *Lmax	Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq
Front End Loader	48.0	44.0	N/A	N/A	N/A	N/A
Tractor	52.9	48.9	N/A	N/A	N/A	N/A
Tractor	52.9	48.9	N/A	N/A	N/A	N/A
Total	**53**	**53**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to Well 47-5	Residential	55.0	45.0	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Front End Loader	No	40.0		79.1	2320	0
Tractor	No	40	84		2320	0
Tractor	No	40	84		2320	0

Results

Equipment	Calculated (dBA) *Lmax	Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq
Front End Loader	51.7	47.7	N/A	N/A	N/A	N/A
Tractor	48.3	44.4	N/A	N/A	N/A	N/A
Tractor	50.7	46.7	N/A	N/A	N/A	N/A
Total	**52**	**51**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Cleanup

---- Receptor #3 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to Well 18-32	Residential	55.0	45.0	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Front End Loader	No	40.0		79.1	2110	0
Tractor	No	40.0	84		2110	0
Tractor	No	40.0	84		2110	0

Results

	Calculated (dBA)		Noise Limits (dBA)			
			Day		Evening	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq
Front End Loader	52.5	48.5	N/A	N/A	N/A	N/A
Tractor	49.2	45.2	N/A	N/A	N/A	N/A
Tractor	51.5	47.5	N/A	N/A	N/A	N/A
Total	**53**	**52**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to Well 47-32	Residential	55	45	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Front End Loader	No	40.0		79.1	1060	0
Tractor	No	40.0	84		1060	0
Tractor	No	40.0	84		1060	0

Results

	Calculated (dBA)		Noise Limits (dBA)			
			Day		Evening	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq
Front End Loader	54.0	46.1	N/A	N/A	N/A	N/A
Tractor	54.4	51.4	N/A	N/A	N/A	N/A
Tractor	57.5	53.5	N/A	N/A	N/A	N/A
Total	**58**	**56**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/3/2019
Case Description: Truckhaven Geothermal Exploration Wells - Well Cleanup

---- Receptor #5 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Home to Well 14-4	Residential	55	45.0	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Front End Loader	No	40		79.1	1480	0
Tractor	No	40	84		1480	0
Tractor	No	40	84		1480	0

Results

	Calculated (dBA)		Noise Limits (dBA)			
			Day		Evening	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq
Front End Loader	55.6	51.6	N/A	N/A	N/A	N/A
Tractor	52.2	48.3	N/A	N/A	N/A	N/A
Tractor	54.6	50.6	N/A	N/A	N/A	N/A
Total	**56**	**55**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #6 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Home to Well 17-4	Residential	55	45	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Front End Loader	No	40		79.1	3060	0
Tractor	No	40	84		3060	0
Tractor	No	40	84		3060	0

Results

	Calculated (dBA)		Noise Limits (dBA)			
			Day		Evening	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq
Front End Loader	49.3	45.3	N/A	N/A	N/A	N/A
Tractor	45.9	42.0	N/A	N/A	N/A	N/A
Tractor	48.3	44.3	N/A	N/A	N/A	N/A
Total	**49**	**49**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.