Meeting Date: 08/20/20
Application Number: A2600
Staff: R. B. Greenwood

Staff Report 52

Non-Exclusive Geological Survey Permit

APPLICANT:

City of Los Angeles Department of Water and Power

PROPOSED ACTION:

TERM:

1 year and 1 month, beginning August 20, 2020, through September 20, 2021

BACKGROUND:

The City of Los Angeles Department of Water and Power (LADWP) has applied for a 1-year Geological Survey Permit to collect geological and geotechnical information by hollow stem auger drilling on up to 49 shallow borings (less than 15 feet deep) on State sovereign land (Exhibits A and A1). The proposed geotechnical investigation is being conducted to support the condition assessment, risk analysis, and infrastructure investment strategies for portions of the Owens Lake Dust Mitigation facilities. The data collected under this permit will be used to evaluate and provide recommendations for the Los Angeles Department of Power's long-term investment strategies that are necessary to improve the resiliency of existing dust mitigation infrastructure on Owens Lake.

The proposed sampling locations were selected in consideration of data gaps in existing soil mapping and past geotechnical boring locations, and location of existing infrastructure. Sampling locations may need to be adjusted in the field to avoid potential environmental impacts, to avoid existing buried utilities, and based upon site access conditions. Locations could be shifted up to 500 feet from the proposed sites. Access to sampling locations for equipment and staff conducting the investigations will be from the existing roads and berms constructed within the dust control project; equipment will only traverse off these existing berms and roads once it reaches the proposed sampling location and must reach the exact drilling coordinates.

Borings will be conducted with a 6- to 8-inch-diameter hollow stem auger to depths of 15 feet below ground surface using a low ground pressure tracked drill rig. Bulk soil samples will be collected from drilling spoils and soil samples will be collected using driven standard split-spoon samplers. Boring holes will be backfilled with the soil removed from the borings. Any excess material will be spread on the soil surface around the investigation site.

LADWP has consulted with a qualified archaeologist and Native American tribes to ensure that existing known sensitive resource areas are avoided. Archaeological and Native American tribal monitors will be required on-site during all activities that take place off existing berms and roads. The proposed Project includes precautionary actions to ensure impacts to sensitive resources are avoided. These actions are listed in Exhibit B and include: a lakebed worker education program; pre-construction surveys for snowy plover; preconstruction surveys for nesting birds; speed limit for vehicle traffic during snowy plover nesting season; preconstruction surveys for archaeological and paleontological resources; avoidance of known resources adjacent to the project areas using a 100-foot buffer around archaeological sites; Native American, archaeological, paleontological, training program and monitoring; and an Unanticipated Discovery Plan for human remains and artifacts reviewed and approved by staff in consultation with Native American tribal monitors (Exhibit C). The proposed permit would require LADWP to adhere to these precautionary actions, as described in Exhibit B.

The general terms of this Geological Survey Permit require the permittee to provide staff with advance notification of operations and the specifications of the equipment to be employed. Staff may obtain copies of all geological data derived from any and all surveys under this permit upon request.

STAFF ANALYSIS AND RECOMMENDATION:

AUTHORITY:

Public Resources Code sections 6005, 6212.2, 6216, and 6301; California Code of Regulations, title 2, section 2100.

PUBLIC TRUST AND STATE'S BEST INTERESTS:

The LADWP is a public agency that has applied for a permit to conduct geological surveys on State sovereign land. The Permit would allow the City to obtain geologic data as part of its efforts to assess conditions and evaluate strategies regarding older dust mitigation methodologies, projects, and facilities on the dry lakebed.

Collection of scientific data is a use recognized by the courts to be consistent with the common law Public Trust Doctrine. (See, for example, *Marks v. Whitney* (1971) 6 Cal.3d 251, 259-260.) This analysis is limited to the specific use of the borings for the collection of scientific data. Staff's recommendation does not include an analysis or opinion regarding the use of geologic data for dust control measures on the lake as any changes to current dust control measures would require additional action by the Commission. The approximately 1-year plus 1-month non-exclusive Permit contains restrictions that protect public rights and cultural and environmental resources. Staff believes that granting the Permit will not substantially interfere with the Public Trust needs at this time, at this location, and for the foreseeable term of the proposed Permit.

For all the reasons above, staff believes the approval of a 1-year plus 1-month permit for geologic data gathering is in the best interests of the State. Staff recommends approval of this Non-Exclusive Geological Survey Permit application.

OTHER PERTINENT INFORMATION:

1. This action is consistent with Strategy 1.1 of the Commission's Strategic Plan to deliver the highest levels of public health and safety in the protection, preservation and responsible economic use of the lands and resources under the Commission's jurisdiction.

2. Staff recommends that the Commission find that this activity is exempt from the requirements of the California Environmental Quality Act (CEQA) as a categorically exempt project. The project is exempt under Class 6, Information Collection; California Code of Regulations, title 14, section 15306.

   Authority: Public Resources Code section 21084 and California Code of Regulations, title 14, section 15300.

EXHIBITS:

A. Location Map
A1. Regional Location Map
B. Project Description and Precautionary Actions
C. Late Discovery Evaluation Plan

RECOMMENDED ACTION:

It is recommended that the Commission:

CEQA FINDINGS:

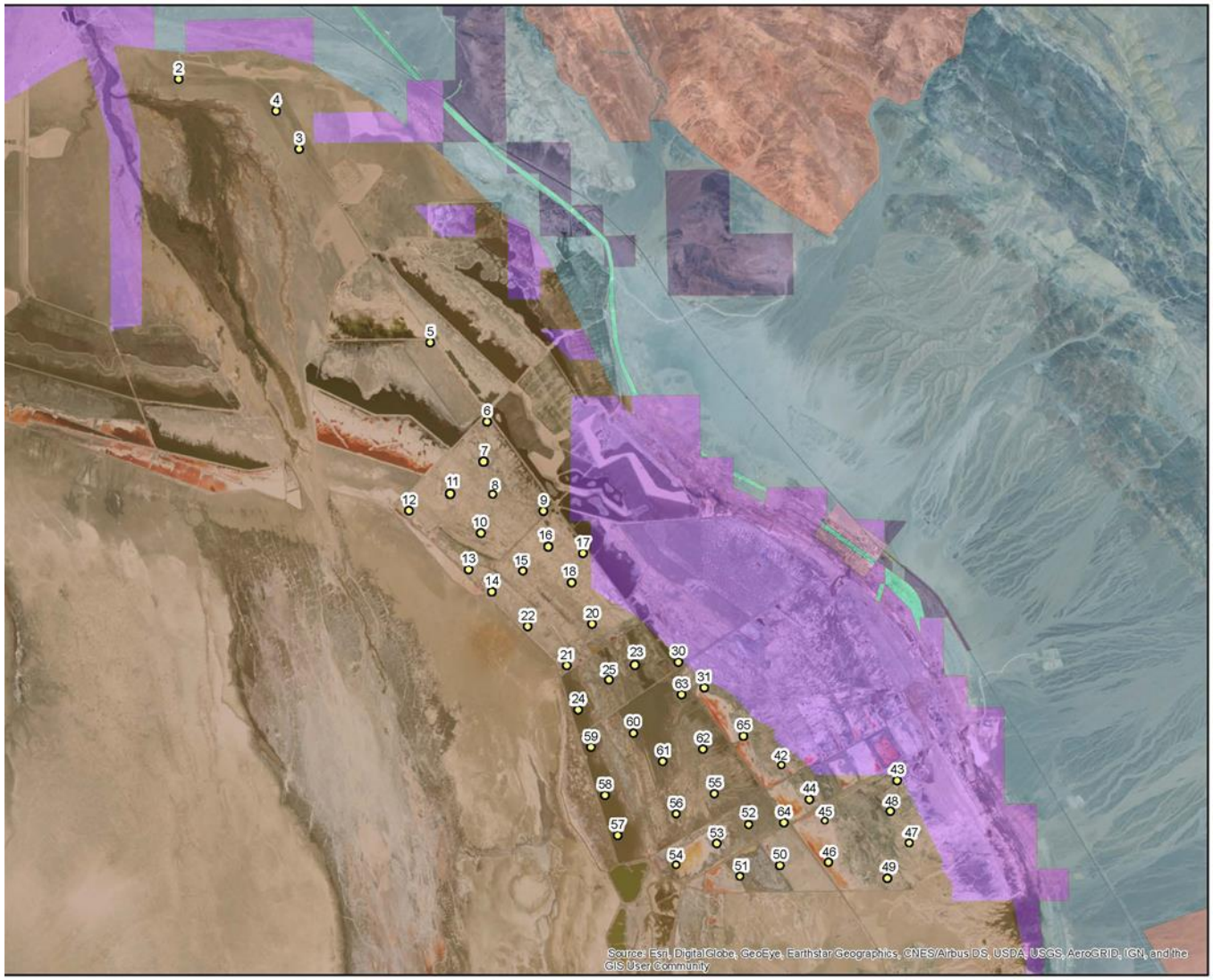
Find that the activity is exempt from the requirements of CEQA pursuant to California Code of Regulations, title 14, section 15061 as a categorically exempt project, Class 6, Information Collection; California Code of Regulations, title 14, section 15306.

PUBLIC TRUST AND STATE'S BEST INTERESTS:

Find that the proposed Permit will not substantially interfere with Public Trust needs and values at this time, at this location, and for the foreseeable term of the proposed Permit; and is in the best interests of the State.

AUTHORIZATION:

Authorize issuance of a Non-Exclusive Geological Survey Permit to the City of Los Angeles Department of Water and Power to conduct geological surveys by hollow stem auger drilling, on up to 49 shallow 6- to 8-inch-diameter borings, less than 15 feet deep, for the period August 20, 2020, through September 20, 2021, pursuant to the conditions described in this staff report, on State sovereign land of Owens Lake within Inyo County as shown on Exhibit A, attached and incorporated by reference herein.



LEGEND

Investigation Method

- Boring

Property Ownership

- BLM
- Indian Lands
- LADWP
- Local Government
- Military
- National Park Service
- Private
- Southern Pacific
- State Lands
- Township
- US Forest Service
- Wilderness Areas

Notes:
1. Exact locations of borings may change as the design is refined, to avoid impacts to known archaeological sites, to avoid existing buried utilities, and based on site access conditions in the field.

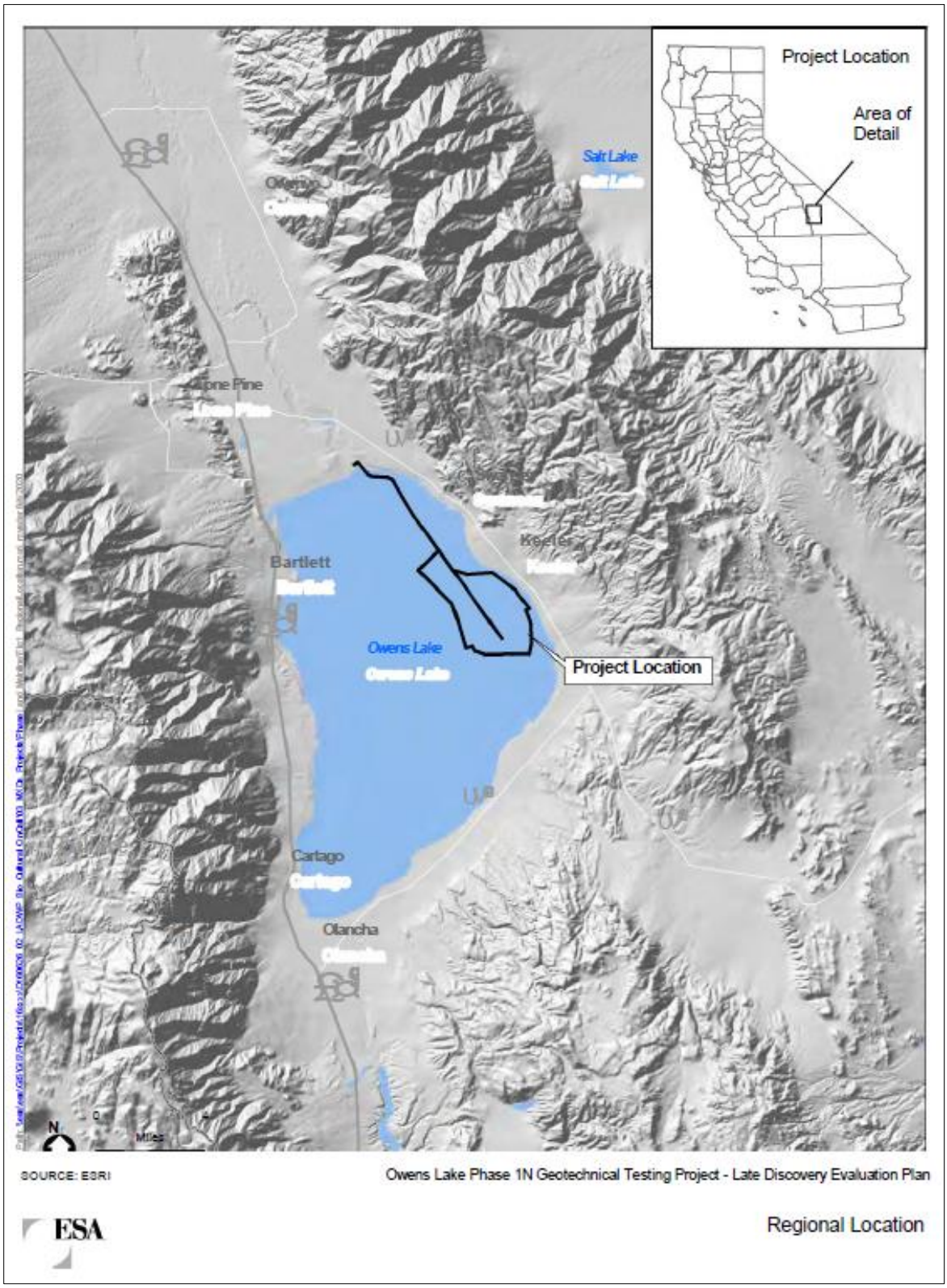
EXHIBIT A
Supplemental Geotechnical Investigation Locations
Owens Lake Dust Mitigation Project
Los Angeles Department of Water and Power

Jacobs

Exhibit A1

Regional Location Map

A2600



SOURCE: ESRI

Owens Lake Phase 1N Geotechnical Testing Project - Late Discovery Evaluation Plan

ESA

Regional Location

Exhibit B

A2600

Geotechnical Application (AP 2600)
Geotechnical Investigation at Owens Lake Phase 1 N Dust Control Areas
Project Description and Precautionary Actions

Overview and Purpose: The proposed geotechnical investigation is being conducted to support the condition assessment, risk analysis, and infrastructure investment strategies for portions of the Owens Lake Dust Mitigation facilities that were constructed during the Phase 1 North design/build project in 2001. This was the first phase of dust mitigation facility construction and some of the facilities within this area are nearing the end of their useful life which places LADWP's ability to maintain compliance with regulatory dust mitigation at risk.

Soil conditions are quite variable across Owens Lake and often cause infrastructure to fail prematurely due to the highly corrosive nature of the soils, and challenging work conditions in areas with soft soils. A detailed knowledge of geotechnical soil properties across the potential project areas is therefore required to guide the asset condition assessment, risk analysis, and design. While some geotechnical information is available from previous investigations within the project area, most of the information was collected approximately 20 years ago before dust control facilities were developed and may not represent current surface conditions following past grading efforts. Furthermore, increased density is needed in some locations to improve the quality of our soil characteristics data.

The purpose of this geotechnical investigation is to collect information that will supplement existing available geotechnical soil information in support of the planned asset condition assessment and possible future design efforts. Results from these investigations will support the development and documentation of a Geotechnical Data Report to be utilized by the condition assessment and design teams, which will ultimately inform LADWP’s long-term investment strategies that are necessary to improve the resiliency of dust mitigation infrastructure on Owens Lake and remain in compliance.

Sampling Locations and Site Access: The proposed boring locations that are located on California State Lands property on Owens Dry Lakebed are presented in Exhibit A in Attachment A. Location coordinates and preliminary indication of the investigation method are also provided in Table 1 in Attachment A.

The proposed sampling locations were selected in consideration of data gaps of existing soil mapping and past geotechnical boring locations and location of existing infrastructure.

Sampling locations may need to be adjusted in the field to avoid the potential for environmental impacts, to avoid existing buried utilities, and based upon sites access conditions in the field. As a result, locations could be shifted up to 500-ft from the proposed locations.

Access to sampling locations for equipment and staff conducting the investigations will be from the existing roads and berms. Generally, equipment will be mobilized from the

nearest road or will be track-walked from location to location within a dust control area. All ingress and egress routes will be verified with a cross-trained archaeologist/paleontologist and tribal monitor for avoidance of potential impacts to cultural resources prior to project start as discussed in the Precautionary Actions listed below.

Sampling Method: Geotechnical sampling will be conducted with borings in the method summarized below.

Borings will be conducted with 6 to 8-inch diameter hollow stem auger flights to depths of 15 feet below ground surface. A low ground pressure tracked drill rig will be used (CME 850 or equivalent). See Figure 1 for a photo of a CME 850 drill rig. Bulk soil samples will be collected from drilling spoils and soil samples will be collected using driven standard split-spoon samplers.

Figure 1. Proposed drilling equipment (CME 850) with low ground pressure tracks for borings

Boring holes will be backfilled with the soil removed from the borings following the collection of soil samples. Any excess material will be spread on the soil surface around the investigation site.

Lab Testing Methods: Soil samples will be collected and sent into a geotechnical soil testing laboratory for analysis. Prescription of laboratory testing will be made based upon observations of soil properties in the field. However, testing may include soil gradation, Atterberg Limits, compaction tests (Proctor), corrosion tests, and triaxial shear tests.

Schedule: The field work is planned to be conducted in two phases outside of the dust control season between August 1 and September 15. The first set of borings will be collected during the summer of 2020 and the rest during the summer of 2021. During the dust control season, the areas are flooded for dust control and are not accessible with excavation and drilling equipment, so it is important that the work be conducted within this time frame. Due to the distance between boring locations and slow track speed equipment to be used, it is assumed that the field work will take up to three weeks per season to complete.

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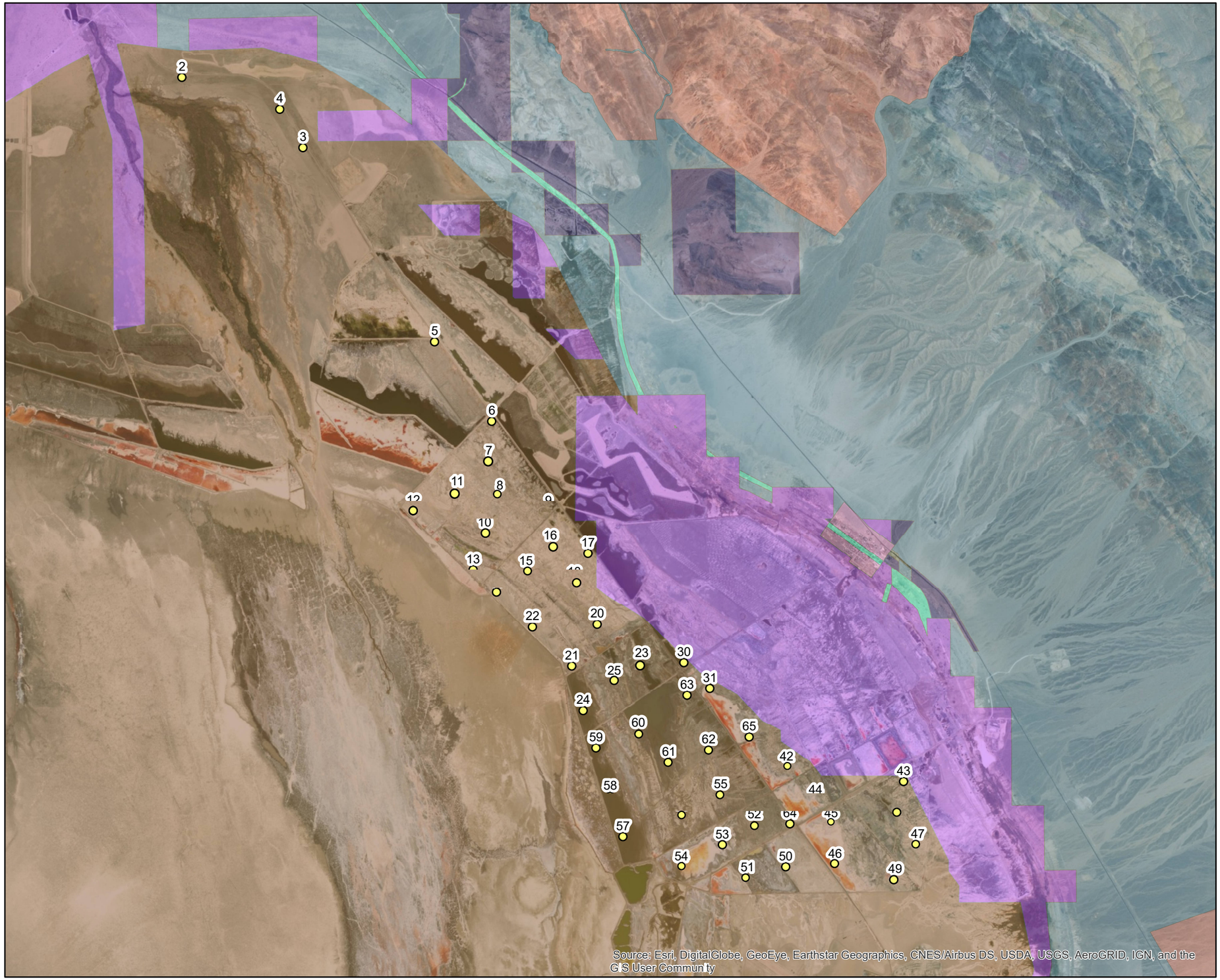
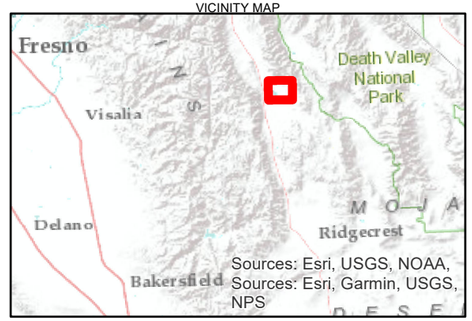
Attachment A - Potential Borehole Locations





LEGEND

Investigation Method

- Boring

Property Ownership

- BLM
- Indian Lands
- LADWP
- Local Government
- Military
- National Park Service
- Private
- Southern Pacific
- State Lands
- Township
- US Forest Service
- Wilderness Areas

Notes:
1. Exact locations of borings may change as the design is refined, to avoid impacts to known archaeological sites, to avoid existing buried utilities, and based on site access conditions in the field.

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EXHIBIT A
Supplemental Geotechnical Investigation Locations
Owens Lake Dust Mitigation Project
Los Angeles Department of Water and Power

Jacobs

Table 1
Geotechnical Investigation Borehole Point Locations

Coordinate System: NAD_1983_StatePlane_California_IV_FIPS_0404_Feet

Id	X_Easting	Y_Northing
2	6864609	2082451
3	6869637	2079532
4	6868672	2081126
5	6875106	2071468
6	6877476	2068161
7	6877363	2066494
8	6877814	2065062
9	6879828	2064437
10	6877181	2063525
11	6876043	2065227
12	6874220	2064454
13	6876703	2061998
14	6877675	2061069
15	6878899	2061928
16	6879906	2062987
17	6881477	2062675
18	6880904	2061477
20	6881859	2059732
21	6880809	2057996
22	6879168	2059628
23	6883708	2058100
24	6881278	2056147
25	6882562	2057371
30	6885462	2058143
31	6886538	2057067

Id	X_Easting	Y_Northing
42	6889724	2053803
43	6894585	2053204
44	6890931	2052414
45	6891573	2051451
46	6891738	2049758
47	6895175	2050583
48	6894342	2051876
49	6894238	2049142
50	6889689	2049662
51	6888101	2049194
52	6888387	2051416
53	6887050	2050565
54	6885349	2049645
55	6886990	2052657
56	6885366	2051807
57	6882927	2050912
58	6882398	2052588
59	6881807	2054593
60	6883569	2055209
61	6884837	2054003
62	6886486	2054515
63	6885592	2056789
64	6889863	2051442
65	6888170	2055053

Attachment B - Precautionary Actions

BIO-1 Lake Bed Worker Education Program. To minimize potential direct impacts to Snowy Plover from boring activities, LADWP shall continue the lake bed worker education program consistent with existing worker awareness training for activities on the lakebed and per California Department of Fish and Wildlife (CDFW) recommendations. The program shall be based on Snowy Plover identification, basic biology and natural history, alarm behavior of the snowy plover, and applicable mitigation procedures required of LADWP and construction personnel. The program shall be conducted by a biologist familiar with the biology of the Snowy Plover at Owens Dry Lake and familiar with special status plant and wildlife species of the Owens Lake basin. The education program shall explain the need for the speed limit in the snowy plover buffer areas and the identification and meaning of buffer markers. All construction, operation, and maintenance personnel working within the Investigation area shall complete the program prior to their working on the lake bed. A list of personnel who have completed the education program shall be maintained and made available to CSLC and CDFW upon request.

BIO-2 Preconstruction Surveys for Snowy Plover. To minimize potential direct impacts to Snowy Plover within the Project area due to construction activities, LADWP shall conduct a preconstruction survey for Snowy Plover in all potential snowy plover habitat prior to any construction activity that is performed during the Snowy Plover breeding season (March 15 to August 15). Preconstruction surveys shall be performed no more than 7 days prior to the start of ground-disturbing activities. A 200-foot buffer shall be placed around all active snowy plover nests that are discovered within the construction area. This buffer shall protect the plover nest from both destruction and construction noise. Green-colored stakes of less than 60 inches in height shall be used to mark buffer edges, with stakes spaced at approximate cardinal directions. The location of the nest (global positioning system coordinates) and current status of the nest shall be reported within 24 hours of discovery to GBUAPCD and CDFW. Maps of snowy plover nest locations shall be posted at the construction office and made available to all site personnel and submitted to CDFW. The activity of the nest shall be monitored by a biological monitor using existing monitoring protocols that have been approved by CDFW (PRBC Conservation Science, 2003). Active snowy plover nests shall be monitored at least weekly. The nest buffer shall remain in place until such time as the biological monitor determines that the nest is no longer active and that fledglings are no longer in danger from proposed construction activities in the area. Buffers shall be more densely marked where they intersect Project-maintained roads. Vehicles shall be allowed to pass through nest buffers on maintained roads at speeds less than 15 miles per hour, but shall not be allowed to stop or park within active nest buffers. Permitted activity within the nest buffer shall be limited to foot crews working with hand tools and shall be limited to 15-minute intervals, at least 1 hour apart, within a nest buffer at any one time.

BIO-3 Snowy Plover Nest Speed Limit. To minimize potential direct and cumulative impacts to Snowy Plover and other sensitive biological resources from vehicles construction activities, LADWP shall implement a speed limit of 30 miles per hour within all active construction areas on Owens Dry Lake during construction of dust control measures. Speed limits shall be 15 miles per hour within active snowy plover nest buffers. Designated speed limits for other construction areas outside of active nest buffers shall be maintained at 30 miles per hour where it is determined to be safe according to vehicle capabilities, weather conditions, and road conditions. Site personnel and CSLC staff shall be informed daily of

locations where active nest buffers overlap with roads in the construction area. Signs shall be posted that clearly state required speed limits. Speed limit signs shall be posted at all entry points to the lake. The number of speed limit signs shall be kept at a minimum near active snowy plover nest areas to reduce potential perches for raptors and other snowy plover predators and shall be outfitted with Nixalite or the functional equivalent if greater than 72 inches (increased from the original 60 inches) in height at entry points to the lake and 60 inches in height by active snowy plover nest areas.

BIO-4 Preconstruction Surveys for Nesting Birds. If vegetation removal activities are scheduled to occur during the bird breeding season (January 15 to July 31), pre-construction surveys for bird nests shall be conducted no more than 7 days prior to the start of ground-disturbing activities. Surveys shall be conducted in areas of suitable nesting habitat that will be impacted by construction. Active nests will be marked at a safe distance with visible flagging and the construction crew supervisor will be made aware of these locations. Construction may commence in all areas without active bird nests. All bird nests will remain undisturbed while they are active. After a nest ceases to be active (fledges or fails), and the qualified biologist has made this determination, construction may proceed in the area.

CR-1 Preconstruction Cultural Survey
Prior to any project-related ground disturbance for each site, a qualified cross-trained archaeologist/paleontologist and a qualified Lone Pine Paiute-Shoshone cultural resources Native American monitor shall be retained to carry out a pedestrian cultural resources survey in the vicinity of the proposed work site as well as ingress and egress routes. The survey shall identify and evaluate the significance of any resources that may be directly or indirectly impacted by the proposed work. Proposed locations of boreholes may be modified based on survey findings. The survey effort and findings shall be documented in a cultural resources report and any potentially sensitive sites shall be avoided. The report will be on file at LADWP and provided to CSLC staff.

CR-2 Avoidance of known resources adjacent to the project areas using a 100-foot buffer around archaeological sites
A qualified archaeologist shall provide maps depicting archaeological sites with a 100-foot buffer as environmentally sensitive areas. The location of the buffer will be noted in the field through survey and a marking system. To avoid identifying the locations of significant cultural resources to the public, no physical barriers will be erected. These maps shall be available for cultural resources monitors and construction crews to use for avoidance during all construction activities and vehicle transportation through the project areas.

CR-3 Native American, Archaeological, Paleontological, Training Program and Monitoring

- A qualified Lone Pine Paiute-Shoshone Native American cultural resources monitor shall be present during off-road equipment moving, earthwork and excavation activities.
- A qualified archaeologist shall be retained to implement a monitoring and recovery program. The “qualified archaeologist” shall meet the U. S. Secretary of the Interior’s Historic Preservation Professional Qualification Standards for Archaeology.
- A qualified paleontologist, or cross-trained archaeologist/paleontological monitor, shall be retained to implement a monitoring and recovery program. The qualified paleontologist shall meet the qualifications established by the Society of Vertebrate Paleontology.

- The qualified archaeologist, paleontologist and Native American monitor shall provide cultural resources awareness training prior to the start of construction for all construction personnel. Construction personnel shall be briefed on procedures to be followed in the event that a unique cultural resource or human remains are encountered during construction. A training log shall be kept on-site throughout the construction period.
- The monitors will consult with LADWP and LADWP will halt work briefly in a single location as necessary to examine soils and possible sensitive features. The monitors shall coordinate with the construction manager to divert work around the discovery of any potentially significant cultural resource, if any are encountered. In the event of a cultural resources discovery, avoidance measures such as staking a 100-foot buffer (or in case of human remains, steel plating) will be used to prohibit or otherwise restrict access to sensitive areas. If the resource is determined to be significant by the Native American monitor, qualified archaeologist/paleontologist, a treatment plan shall be prepared and implemented in consultation with LADWP. Construction will not recommence in the area until authorized to do so by LADWP.
- Each archaeological/paleontological monitor shall maintain daily monitoring logs during ground-disturbing activities that shall be submitted to LADWP. A complete set of the daily monitoring logs shall be kept on site throughout the ground-disturbing activities and be available for inspection. The daily monitoring log shall indicate the area monitored, the date, assigned personnel including tribal representatives, and the results of monitoring, including the recovery of archaeological resources, sketches of recovered materials, photographic record, and associated geographic site data.
- Each Tribal Monitor shall also maintain daily monitoring logs. These logs are property of the Tribes. If a specific log may assist the Investigation, LADWP may request a copy and the THPO will consider any requests for such a document to be decided on an individual case basis.
- Any collected artifacts will be curated at the repository at the Lone Pine Paiute-Shoshone Reservation.

CR-4 Unanticipated Discovery of Human Remains

Upon the discovery of human remains, there shall be no further excavation or disturbance of the site or any areas that are reasonably suspected to overlie adjacent human remains until the following conditions are met:

- The Inyo County Coroner has been informed and has determined that no investigation of the cause of death is required.
- If the remains are of Native American origin, the Native American Heritage Commission (NAHC) will be contacted. In consultation with the Most Likely Descendant, the NAHC and qualified archaeologist shall determine the treatment and disposition of the human remains and any associated grave goods, with appropriate dignity, as provided in Public Resources Code Section 5097.98.
- If the remains are not of Native American origin, the Inyo County Coroner will make a determination as to the disposition of the remains.

Ground-disturbing activities may continue once compliance with all relevant sections of the California Health and Safety Code have been addressed and authorization to proceed issued by the Inyo County Coroner and LADWP.

Exhibit C

A2600

LATE DISCOVERY EVALUATION PLAN FOR RESOURCES FOUND DURING MONITORING FOR THE OWENS LAKE PHASE 1N GEOTECHNICAL INVESTIGATION LOCATED IN INYO COUNTY, CALIFORNIA

Prepared for

Jaime Valenzuela
Manager of Owens Lake Capital Development & Implementation
Water Operations Division
Los Angeles Department of Water and Power
111 North Hope Street, Room 1468
Los Angeles, CA 90012

August 2020

ESA

LATE DISCOVERY EVALUATION PLAN FOR RESOURCES FOUND DURING MONITORING FOR THE OWENS LAKE PHASE 1N GEOTECHNICAL INVESTIGATION LOCATED IN INYO COUNTY, CALIFORNIA

Prepared for

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Manager of Owens Lake Capital
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Water Operations Division
Los Angeles Department of Water and
Power
111 North Hope Street, Room 1468
Los Angeles, CA 90012

August 2020

Prepared by:
ESA
626 Wilshire Blvd. Suite 1100
Los Angeles, CA 90017

Principal Investigator:
Monica Strauss, M.A., RPA

Investigation Location:
Dolomite, Owens Lake, and Keeler (CA) USGS
7.5-minute Topographic Quads
Township 16 and 17 South, Range 37 and 38 East,
Section 8 and Unsectioned Portions

Acreage: approx. 163 acres

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Suite 1100
Los Angeles, CA 90017
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esassoc.com

Bend	**Orlando**	**San Jose**
Camarillo	**Pasadena**	**Santa Monica**
Delray Beach	**Petaluma**	**Sarasota**
Destin	**Portland**	**Seattle**
Irvine	**Sacramento**	**Tampa**
Los Angeles	**San Diego**	
Oakland	**San Francisco**	

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OWENS LAKE PHASE 1N GEOTECHNICAL INVESTIGATION

Late Discovery Evaluation Plan

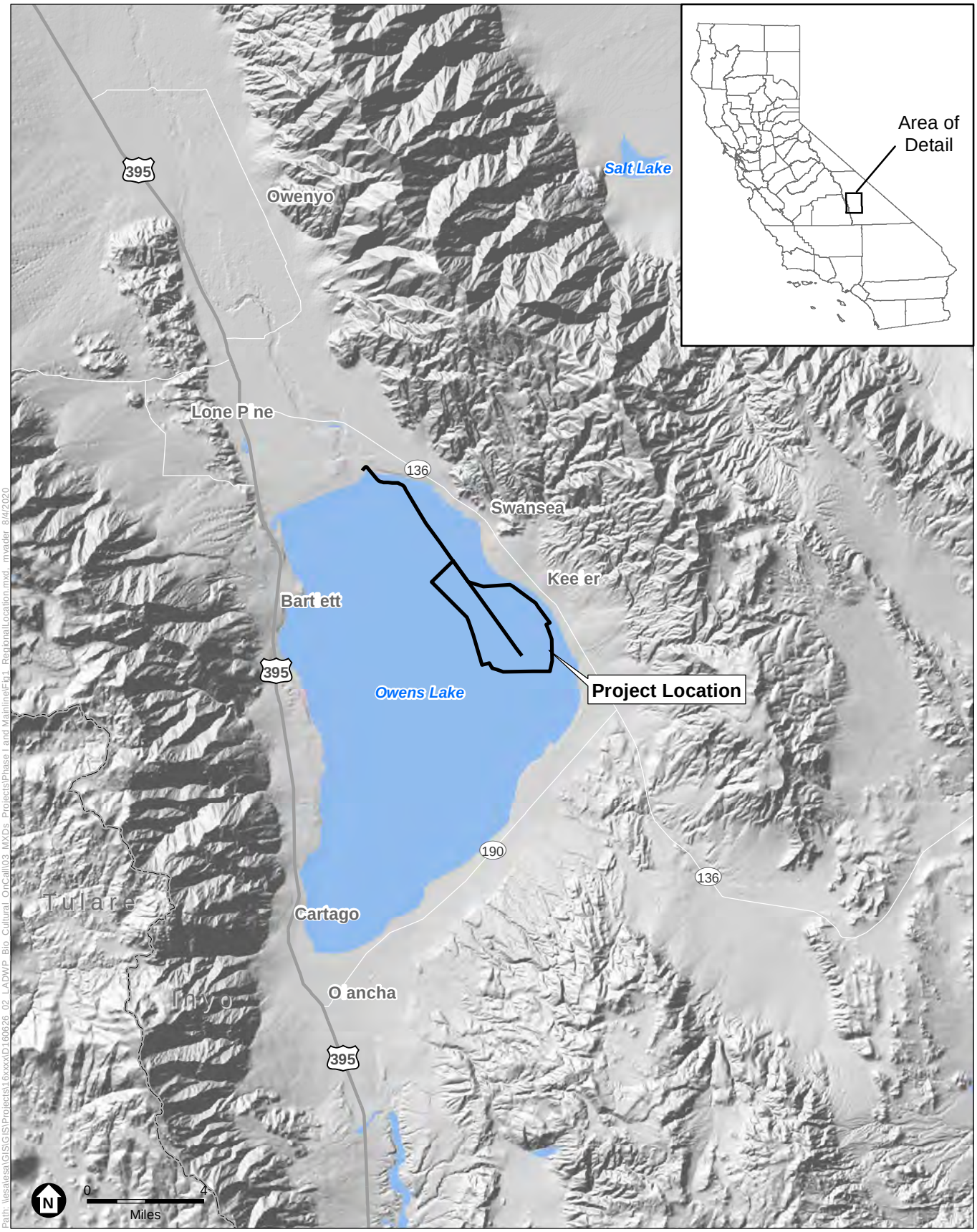
Introduction

The Los Angeles Department of Water and Power (LADWP) proposes implementation of the Owens Lake Phase 1N Geotechnical Investigation (Investigation). The proposed geotechnical investigation would be conducted to support the condition assessment, risk analysis, and infrastructure investment strategies for portions of the Owens Lake Dust Mitigation facilities that were constructed during the Phase 1 North design/build project in 2001. This was the first phase of dust mitigation facility construction and some of the facilities within this area are nearing the end of their useful life which places LADWP's ability to maintain compliance with regulatory dust mitigation at risk.

Soil conditions are variable across Owens Lake and often cause infrastructure to fail prematurely due to the highly corrosive nature of the soils, and challenging work conditions in areas with soft soils. A detailed knowledge of geotechnical soil properties across the Investigation area is therefore required to guide the asset condition assessment, risk analysis, and design. While some geotechnical information is available from previous investigations within the Investigation area, most of the information was collected approximately 20 years ago before dust control facilities were developed and may not represent current surface conditions following past grading efforts. Furthermore, increased density is needed in some locations to improve the quality of our soil characteristics data.

The purpose of the geotechnical investigation would be to collect information that will supplement existing available geotechnical soil information in support of the planned asset condition assessment and possible future design efforts. Results from these investigations will support the development and documentation of a Geotechnical Data Report to be utilized by the condition assessment and design teams, which will ultimately inform LADWP's long-term investment strategies that are necessary to improve the resiliency of dust mitigation infrastructure on Owens Lake and remain in compliance.

The Investigation proposes up to 63 boring locations within Dust Control Areas and along the Mainline Road on California State Lands Commission (CSLC) property on Owens Dry Lakebed (**Figure 1**); however, this number may be reduced and will be highly dependent on accessibility due to soil conditions Most proposed boring locations would be placed within DCAs T23SE,

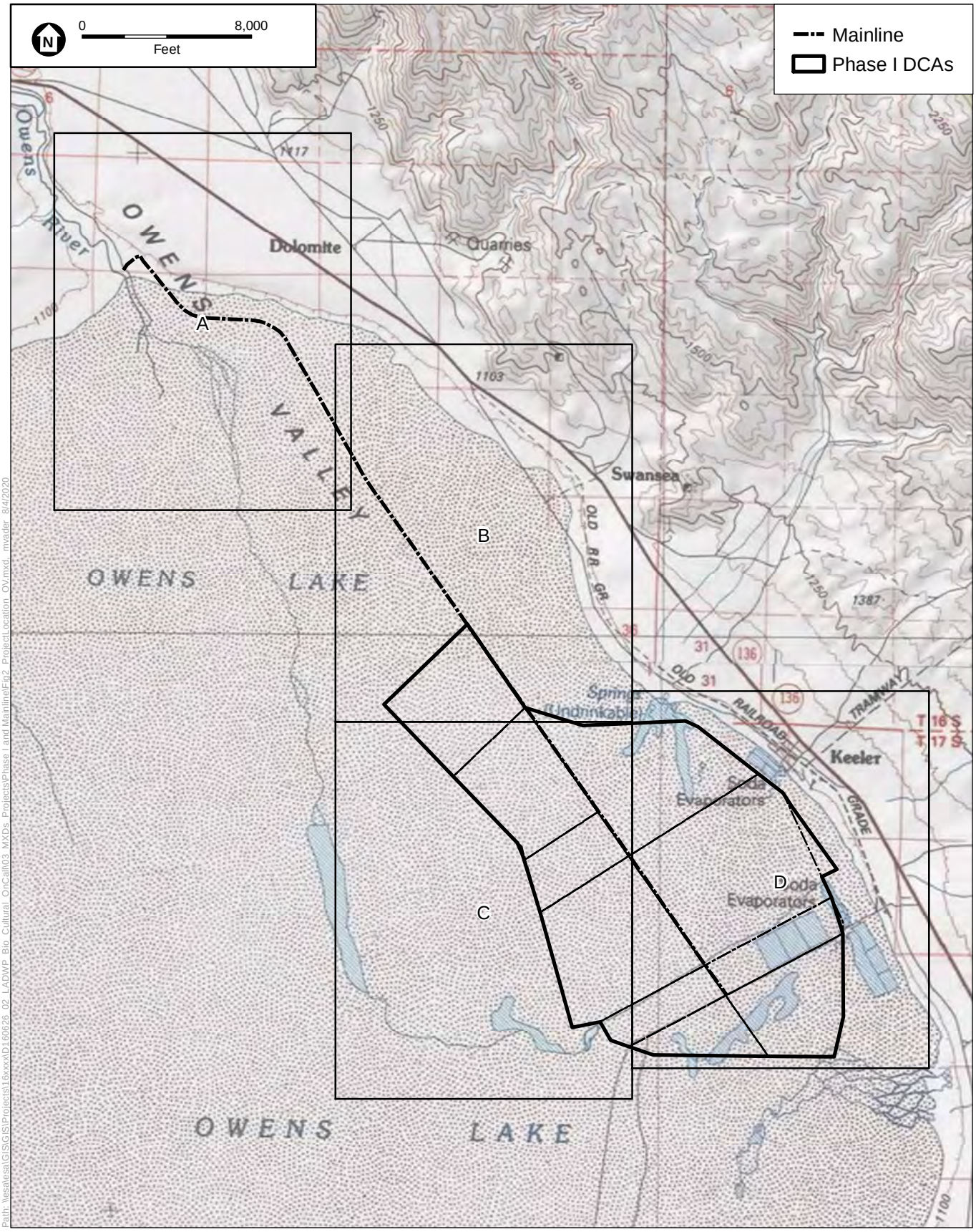


SOURCE: ESRI

Owens Lake Phase 1N Geotechnical Testing Project - Late Discovery Evaluation Plan

Figure 1
Regional Location

ESA



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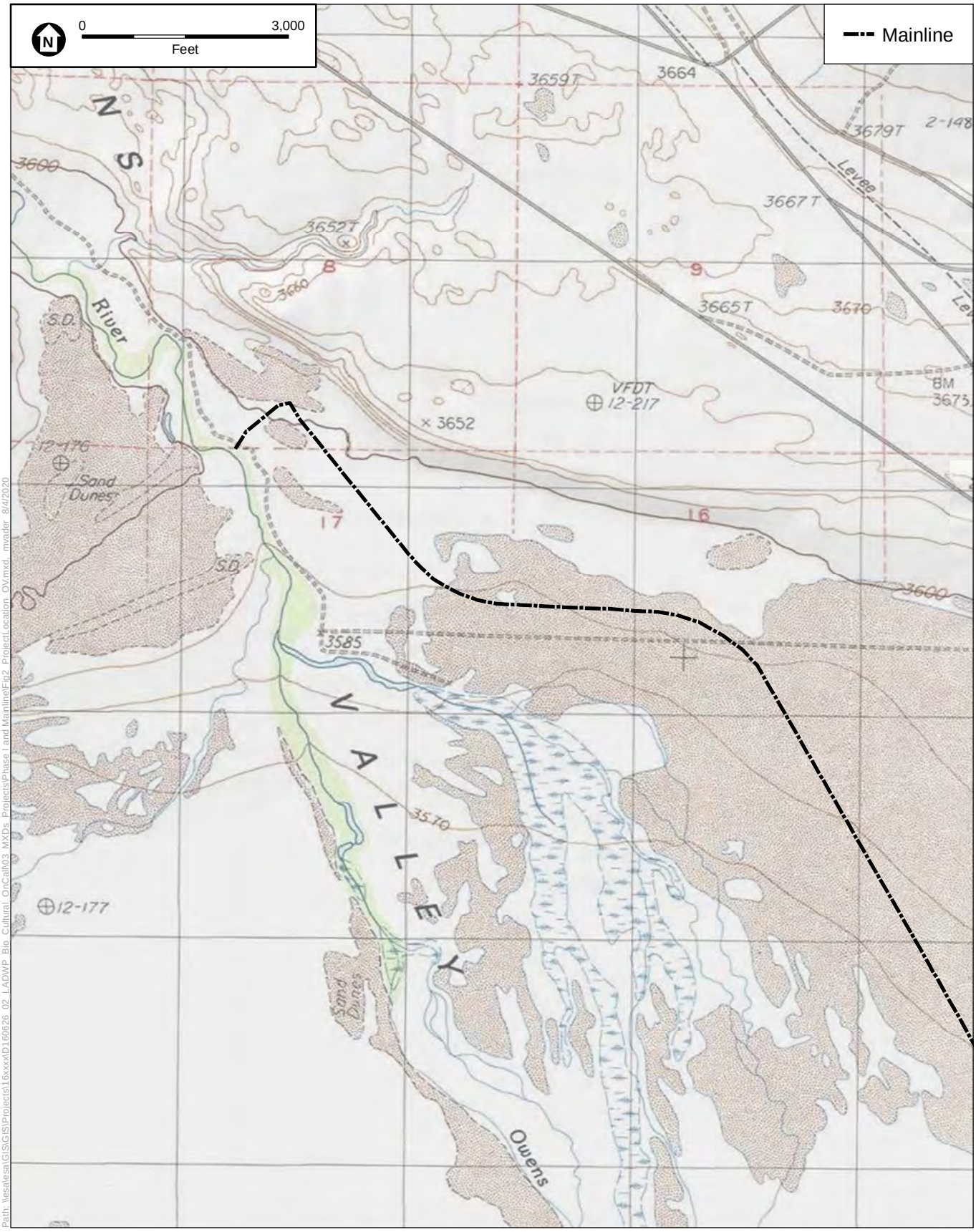
TOPO QUADS: Dolomite, Owens Lake, and Keeler, CA 7.5-minute

Owens Lake Phase 1N Geotechnical Testing Project - Late Discovery Evaluation Plan

Figure 2
Project Location Overview

ESA



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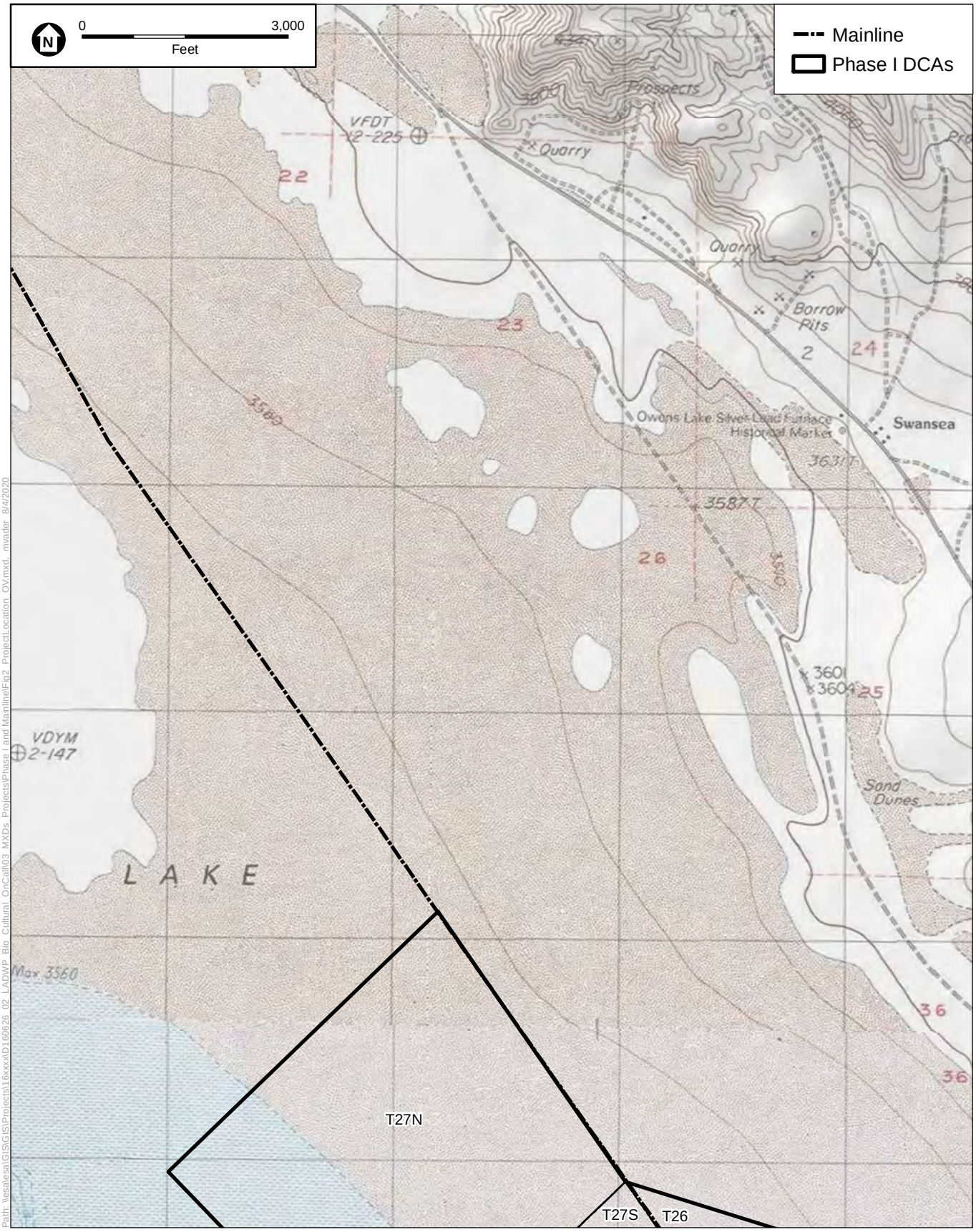
TOPO QUADS: Dolomite, Owens Lake, and Keeler, CA 7.5-minute

Owens Lake Phase 1N Geotechnical Testing Project - Late Discovery Evaluation Plan

Figure 2A
Project Location

ESA



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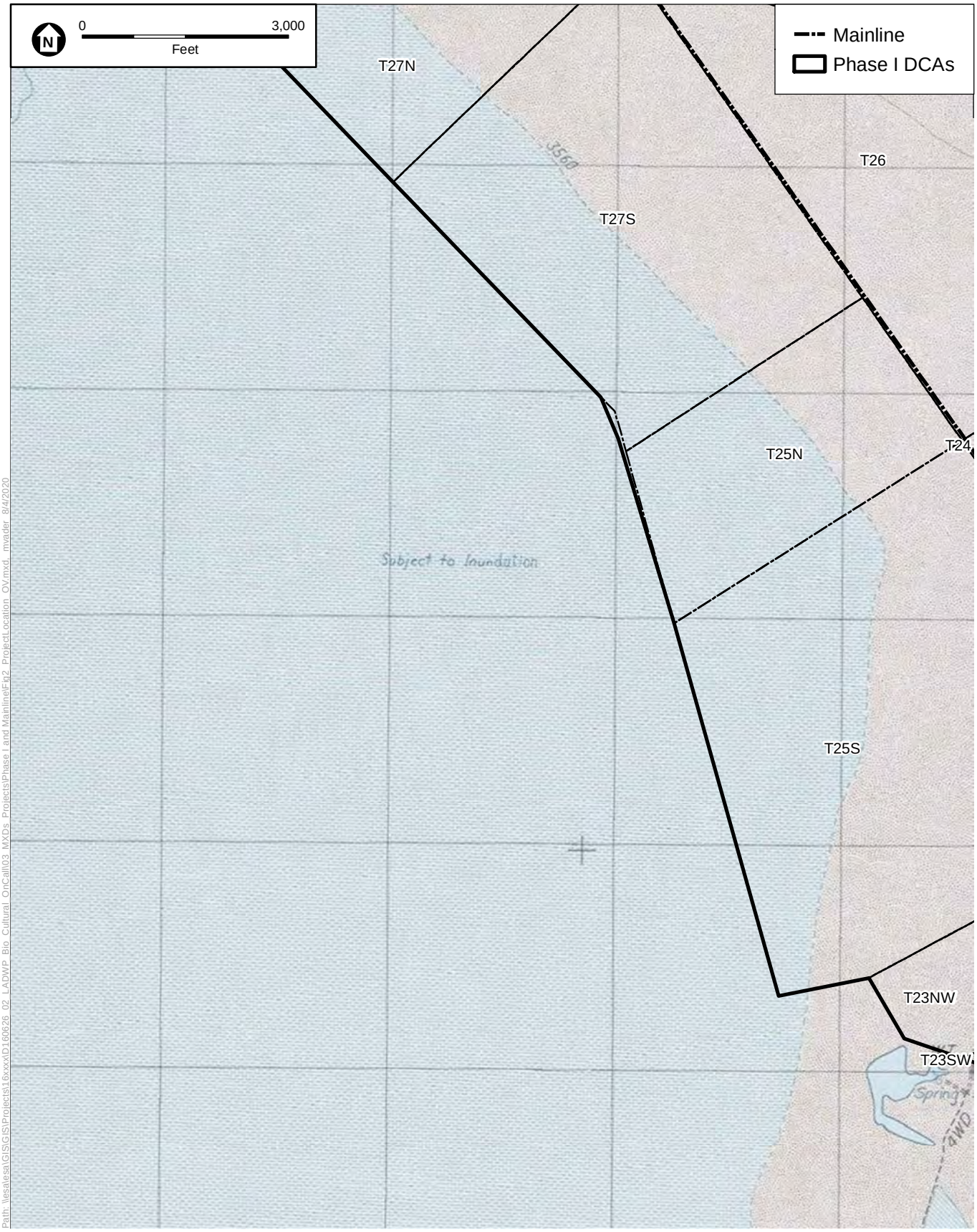
TOPO QUADS: Dolomite, Owens Lake, and Keeler, CA 7.5-minute

Owens Lake Phase 1N Geotechnical Testing Project - Late Discovery Evaluation Plan

Figure 2B
Project Location

ESA



TOPO QUADS: Dolomite, Owens Lake, and Keeler, CA 7.5-minute

Owens Lake Phase 1N Geotechnical Testing Project - Late Discovery Evaluation Plan

Figure 2C
Project Location

ESA

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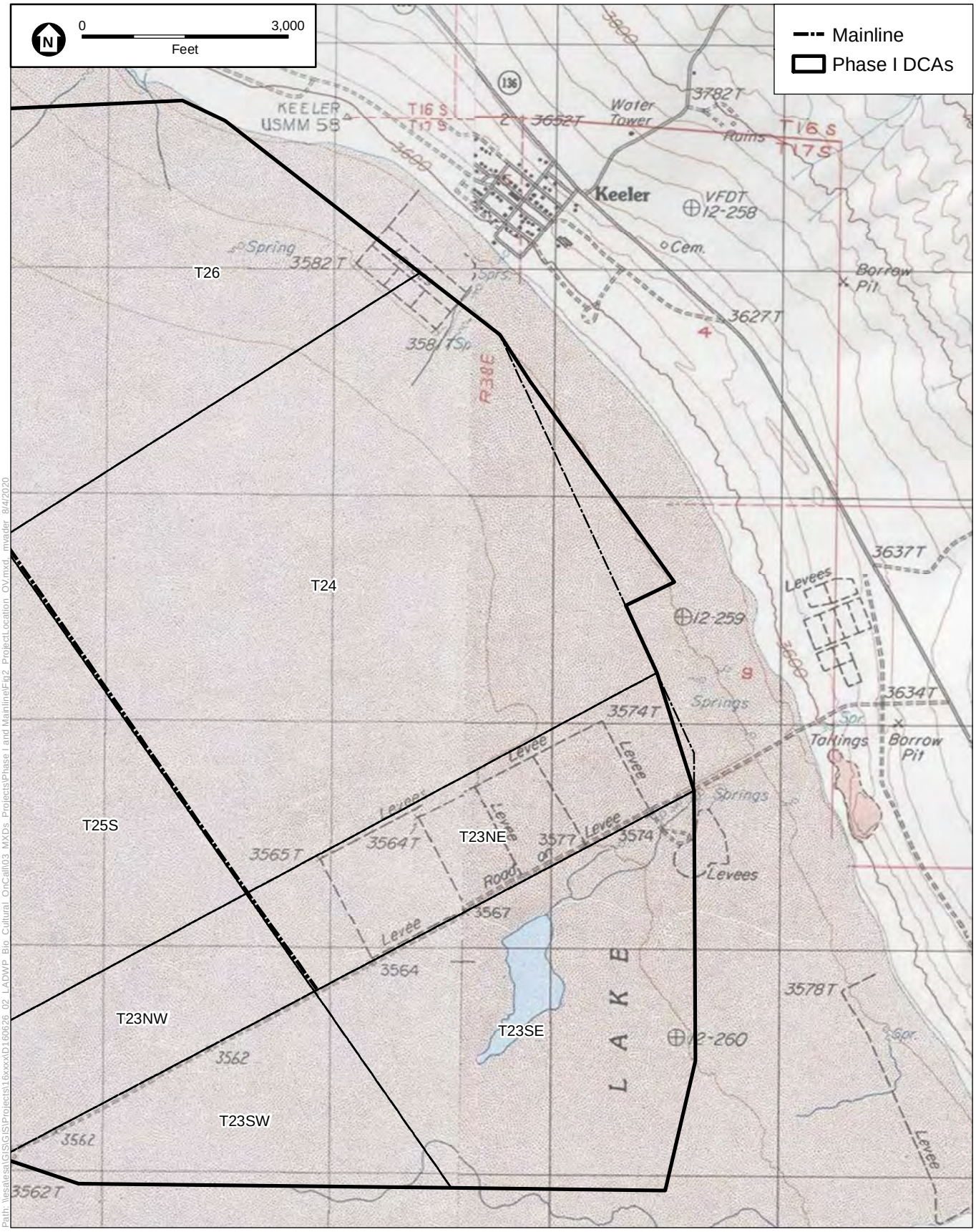

TOPO QUADS: Dolomite, Owens Lake, and Keeler, CA 7.5-minute

Owens Lake Phase 1N Geotechnical Testing Project - Late Discovery Evaluation Plan

Figure 2D
Project Location

ESA

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Sampling locations may need to be adjusted in the field to avoid the potential for environmental impacts, to avoid existing buried utilities, and based upon site access conditions in the field. As a result, locations could be shifted up to 500-ft from the proposed locations. Access to sampling locations for equipment and staff conducting the investigations will be from the existing roads and berms. Generally, equipment will be mobilized from the nearest road or will be track-walked from location to location within a dust control area. All ingress and egress routes will be verified with an archaeologist and tribal monitor prior to Investigation start. Borings will be conducted with 6 to 8-inch diameter hollow stem auger flights to depths of 15 feet below ground surface. A low ground pressure tracked drill rig will be used (CME 850 or equivalent).

Regulatory Context

The Investigation is being completed by the LADWP and is located on lands owned and managed by the CSLC. Therefore, the Investigation is subject to compliance regulations stipulated by the California Environmental Quality Act (CEQA). A Categorical Exemption will be prepared for the proposed Investigation and Precautionary Actions to ensure impacts to sensitive resources are avoided will be established in agreement with CSLC to avoid and reduce potential impacts to cultural resources that qualify as historical resources. CEQA defines historical resources as those listed or eligible for listing in the California Register of Historical Resources (California Register; Public Resources Code Section 5024.1).

Native American Coordination

As part of Native American coordination for the Investigation, LADWP contacted Tribal Historic Preservation Offices (THPOs) associated with the Lone Pine Paiute-Shoshone, the Big Pine Band of Owens Valley Paiute Shoshone Indians, the Bishop Paiute Tribe, the Timbisha Shoshone Tribe of Death Valley, and the Fort Independence Indian Community of Paiute Indians via email on July 22, 2020 to notify them of the Investigation prior to application submittal. The notification emails included the background, description, and a summary known cultural resources within the Project area. The emails also requested input on the Project from the THPOs should they have any comments or concerns.

To date, one response to LADWP's notification efforts has been received from Kathy Bancroft, THPO for the Lone Pine Paiute-Shoshone Reservation. In an email dated July 23, 2020, Ms. Bancroft indicated the Tribe has no issues with the number of boreholes or their locations and requested adequate notification ahead of Investigation implementation to determine the sensitivity of the bore locations. Ms. Bancroft also expressed the importance of monitoring for the identification of resources.

During a phone meeting with LADWP, CSLC, and the Lone Pine Paiute-Shoshone on August 3, 2020, Ms. Bancroft stated other tribal THPOs often defer to her regarding work on Owens Lake. In a follow up email shortly after the phone call, Ms. Bancroft stated she spoke with the other THPOs and they have no concerns regarding the Investigation.

Document Organization

The document is organized as follows. First, we demonstrate understanding the local and regional records by summarizing records search information and information available on the broader region. In the same chapter, we summarize the relevant archaeological research issues and the data required to address those research issues. Next, we present the specific construction monitoring protocols which clarify the roles of Cultural and Tribal Monitors and construction personnel; discuss training requirements for key personnel; present definitions for what constitutes a New Discovery, provides criteria for distinguishing between a site and an isolate, and discuss the communication protocols for notifying responsible parties about the discovery.

In the subsequent chapter we present the evaluation criteria and the methods used to evaluate new discoveries against all four criteria for eligibility for listing in the California Register. Sites requiring evaluation for eligibility to the National Register of Historic Places (National Register; which fall under Federal Jurisdiction) are treated separately in site-specific Evaluation Plans. In this section, we also discuss data collection procedures and outreach efforts designed to elicit the relevant information.

In the final chapter, we present the decision tree for evaluating resources and outline the path for what happens when resources are deemed eligible (or ineligible) to the California Register. Timelines are stipulated.

Context and Archaeological Research Issues

The archaeological context and regional research issues presented below draw heavily from a timely and geographically relevant Historic Properties Treatment Plan for a significant Owens Valley highway project (Hildebrandt et al. 2015). The document does not provide extensive environmental and cultural background as that information has been presented and is available in numerous other documents previously prepared for other regional projects. The following includes a review of existing cultural resources within the Investigation area followed by a discussion of the archaeology of the broader region.

Existing Cultural Resources

The Investigation area has been studied repeatedly over the years, including a variety of survey, evaluation, and monitoring projects (**Table 1**). These previous studies provide complete survey coverage of the Investigation area, reflecting LADWP's cultural resource compliance efforts during previous phases of dust-control construction. The DCAs and most of the mainline were surveyed by Gallegos et al. (2000), who also conducted test excavations at some sites. Subsequent project construction at these DCAs was monitored by Jones & Stokes (2002). Other surveys were conducted in support of work at other DCAs, or for well-placement or other ancillary projects.

TABLE 1 SUMMARY OF PREVIOUS STUDIES WITHIN THE INVESTIGATION AREA

Author	Report # (IN-)	Title	Study Type	Date	Investigation Component
Basin Research Associates	-	*Owens Valley Dust Control Mitigation Program - Post Field Cultural Resources Inventory Initial Results for April/May 2001.*	Survey	2001	DCA T24
Carpenter, Kim	-	*Berm Road Survey Letter Report*	Survey	2017	Mainline
Carpenter, Kim and Mike Lenzi	-	*DRAFT Cultural Resources Inventory and Monitoring Report for the Construction Temporary Emergency Measures Owens Lake (CTEMOL) Phase 1 Project, Inyo County, California*	Testing/data recovery	2017	Mainline
Dang, Darryl, Andrea Van Schmus, Clarus Backes, Russell Bevill, Elena Nilsson	-	*Owens Lake Dust Mitigation Project - Phase 7a Cultural Resources Monitoring and Limited Testing Report Field Years 2014-2016, Inyo County, California.*	Monitoring	2016	T27N, Mainline
Denardo, Carole and Phillip Reid	-	*Final Fence Post and Tillage Monitoring, Cultural Resource Monitoring & Mitigation Report, Owens Lake Dust Mitigation Project - Phase 7 (Phase 7a), Inyo County, California.*	Monitoring	2010	Mainline
Denardo, Carole Matthew SteinKamp and Rachael Greenlee	-	*Final Cultural Resources Survey Report for the Owens Lake Dust Mitigation Program 2011 Supplemental Control Requirements Determination (Phase 9 Project), Inyo County, California. (BLM Permit No. CA-11-13; FWA Request No. 13-38b)*	Survey	2013	Mainline
Denardo, Carole, Rachael Greenlee, Bruno Texier, Kruger Frank	I01016	*Cultural Resources Survey Report for the Owens Lake Dust Control Program, Phase 7a Project Owens Lake, Inyo County, California*	Survey	2011	Mainline, T26
Denardo, Carole, Rachael Greenlee, Matthew J. Steinkamp, Caprice "Kip" Harper, Jay Sander, Andrew Nicchitta	01090	*Final Report: Owens Lake Dust Mitigation Program, Phase 7a, Phase II Archaeological Testing and Evaluation, Owens Lake, Inyo County, California*	Testing/data recovery	2012	-
Denardo, Carole, Rachael Letter, Matthew J. Steinkamp, Andrew Nicchitta, David Smith, Georgi Chertkov, Darryl Dang	-	*Owens Lake Dust Mitigation Program 2011 Supplemental Control Requirements Determination Phase II Archaeological Testing and Evaluation, Owens Lake, Inyo County, CA.*	Testing/data recovery	2014	Mainline
Gallegos, Dennis R., Tracy Stropes, and Nina M. Harris	-	*Cultural Resources Survey and Evaluation for North Sand Sheet Full Buildout Program, Owens Lake, California*	Survey	2000	Mainline, T23NW, T23SW, T23NE, T23SE, T24, T25N, T25S, T26, T27N, T27S
ICF Jones & Stokes	00857	*Final Archaeological Testing and Evaluation of Sites in Phase 7 of the Owens Lake Dust Mitigation Program, Inyo County, California - Volume I*	Testing/data recovery	2008	T23NW
Jones & Stokes	-	*Cultural Resources Mitigation and Monitoring Report for North Sand Sheet Shallow Flood Irrigation Project, Owens Lake, Inyo County, California*	Monitoring	2002	Mainline, T23NW, T23SW, T23NE, T23SE, T24, T25N, T25S, T26, T27N, T27S
Jones & Stokes	-	*Final Cultural Resources Inventory of Two Parcels in the Moat and Row Testing Area, Owens Lake Dust Mitigation Program, Inyo County, California*	Survey	2007	Mainline
Jones & Stokes	00563	*Cultural Resources Inventory and Evaluation of Historic Resources on the Eastern Side of Owens Lake for the Great Basin Unified Air Pollution Control District*	Survey	1997	Mainline, T24, T25N, T25S, T26, T27N, T27S
Jones & Stokes	00592	*Inventory and Evaluation of 18 Sites on the Eastern Margin of the Owens Lake Playa Inyo County California*	Survey	2002	Mainline
Jones & Stokes	00596	*Cultural Resources Inventory Report for 1494 Acres of the Owens Valley Dust Mitigation Project, Phase IV, Owens Lake, Inyo County, California*	Survey	2004	T24
Jones & Stokes	00600	*Final Cultural Resources Inventory Report for a Phase V Project, Owens Lake Dust Mitigation Program, Owens Lake, Inyo County, California*	Survey	2005	T23NE, T24

Author	Report # (IN-)	Title	Study Type	Date	Investigation Component
Sapphos Environmental	IN-00853	*2008 Owens Valley PM10 Planning Area Demonstration of Attainment State Implementation Plan / Final Subsequent Environmental Impact Report, Technical Appendix R.E - Cultural Resources Technical Report*	-	2008	Mainline
Wells, H. F.	IN-00293	*Cultural Resources Survey for 2003 Owens Valley PM10 Planning Area Demonstration of Attainment State Implementation Plan*	Survey	2003	T24

Twelve archaeological sites are known to be located within the Investigation area. These sites include eight prehistoric sites (P-14-013656, -006763, -006768, -006788, -007143, -007144, -007149, and -011941), two historic-period sites (P-14-005925 and -009525), and two multicomponent sites (P-14-006766 and -011600). Of these 12 sites, four are recommended eligible for listing in the California Register (P-14-007143, -007144, -007149, and -011941), six are recommended ineligible (P-14-005926, -006763, -006766, -006768, -006788, and -009525), and two have not been previously evaluated (P-14-011600 and -013656).

Of the proposed 63 geotechnical testing locations within the Investigation area, the closest to a known archaeological site is location 8, which is approximately 420 feet from P-14-007149, an eligible prehistoric archaeological site. The remaining 62 locations are located a minimum of 700 feet from known archaeological resources. **Table 2** provides a summary of the 12 known archaeological resources as well as their distance from the nearest proposed geotechnical testing locations.

TABLE 2 SUMMARY OF ARCHAEOLOGICAL RESOURCES WITHIN INVESTIGATION AREA

Primary No. (P-14-)	Permanent Trinomial (CA-INY-)	Description	California Register Eligibility	Distance from Geotech Location
005926	-	Historic-period archaeological site: remnants of water conveyance pipeline	Not eligible	1,130 feet from Location 20
006763	5794	Prehistoric archaeological site: habitation site	Not eligible	860 feet from Location 1
006766	5797/H	Multicomponent archaeological site: prehistoric lithic scatter and historic-period refuse scatter	Not eligible	2,240 feet from Location 36
006768	5799	Prehistoric archaeological site: habitation site	Not eligible	2,650 feet from Location 5
006788	5803	Prehistoric archaeological site: lithic scatter	Not eligible	1,200 feet from Location 1
007143	6072	Prehistoric archaeological site: tabular tool site	Eligible	1,185 feet from 11
007144	6073	Prehistoric archaeological site: tabular tool site	Eligible	865 feet from Location 11
007149	6078	Prehistoric archaeological site: tabular tool site	Eligible	420 feet from Location 8
009525	7427H	Historic-period archaeological site: remnants of railroad	Not eligible	959 feet from Location 54
011600	8922/H	Multicomponent archaeological site: prehistoric lithic scatter and historic-period levee system	No evaluated	2,025 feet from Location 36
011941	9226	Prehistoric archaeological site: habitation site	Eligible	700 feet from Location 2
013656	5743	Prehistoric archaeological site: habitation site	Not evaluated	1,385 feet from Location 1

Regional Archaeological Context

The following regional archaeological context for Owens Lake was developed by Kim Carpenter, Far Western 2Anthropological Research Group (Far Wester), as part of the late discovery plan for Phase 9/10.

The region has been the focus of several large-scale excavation efforts, most notably the ASM effort (Byrd and Hale 2003) and more recently Pacific Legacy's Phase II studies (Shapiro et al. 2013b). The former included evaluations of 15 sites and hand excavation of 182 cubic meters of deposit; the latter entailed controlled excavations of 38 cubic meters of deposit spread over nine sites between Cartago and Olancha along Highway 395. In addition, evaluations were conducted at seven sites within the same vicinity as part of a fiber optic project conducted in the early 1990s (Delacorte and McGuire 1993), one site as part of a California Department of Transportation (Caltrans) Highway 395 improvement project in the Ash Creek area (Gilreath and Holanda 2000), and one site associated with the Crystal Geyser bottling plant (Far Western 2007; Markos et al. 1997). There have been many other surveys, large and small, some involving subsurface probing, but these six major excavation studies comprise most of our understanding of the archaeological record in the area near the site.

What we have learned from these efforts can be distilled into a series of environmental and assemblage patterns, each with broader implications for cultural-historical developments in the region (**Table 3**). Dominating this discussion is the role of Owens Lake in the land-use patterns of the prehistoric inhabitants of this area. Throughout the Holocene the surface elevation of Owens Lake has fluctuated over time, with more recent highstands reported at around 3500 BP (Neopluvial) and 350 BP (the Little Ice Age), lower lake levels associated with a drought between 2500 and 1800 BP (Mensing et al. 2007) and the major warm-dry events associated with the Medieval Climatic Anomaly (MCA) between about 1,150 and 600 years ago. The dry periods associated with the MCA were especially harsh in the local area, as it appears that Mono and Owens lakes, as well as those high in the Sierra Nevada, were dry long enough for trees to colonize many of their lake beds and survive for several decades before being inundated after the climate ameliorated and the lakes infilled again (Bacon et al. 2006; Stine 2003).

TABLE 3 CULTURAL-HISTORICAL SEQUENCE FOR THE OWENS LAKE REGION

Interval	Radiocarbon Years BP a	Calibrated (cal) Years BP b
Ethnohistoric	Post-100	Post-100
Marana/Terminal Prehistoric Period	650–100	610–100
Haiwee/Late Archaic Period	1350–650	1280–610
Newberry/Middle Archaic Period	3500–1350	3800–1280
Middle Holocene	7500–3500	8300–3800
Early Holocene	10,000–7500	11,500–8300

Notes: a BP, Before Present (Present = AD 1950); b Corrected for atmospheric variations in 14C using Reimer et al. (2013) IntCal13 database

The actual effects of lake rise and fall on prehistoric populations are probably more complicated than simply wet (good) and dry (bad) times. For example, while waterfowl and fly larvae production may have been severely limited during periods of desiccation, marsh areas may have expanded on the newly exposed playa zones which were fed by creeks and springs along old beach lines (Stine 2003). As a further complication, remnant lake stands during periods of desiccation would have been situated in the southwest area of the lake basin near the site.

With this dynamic backdrop of Owens Lake in mind, major assemblage and land-use patterns observed along the west side of the basin include the following:

- With the exception of a smattering of large obsidian hydration readings and older time-sensitive projectile points, the archaeological record appears to pick up in intensity during the Late Holocene (i.e., Newberry Period and later; post-3500 BP). This is unexpected because older pre-Late Holocene components have been identified elsewhere around Owens Lake.

- A combined obsidian hydration profile used as a rough proxy for land-use intensity (Hildebrandt et al. 2015; Shapiro et al. 2013b:248), shows that land-use intensity begins to ramp up at about 3000 BP, with a peak at 2500 followed by a dip, then peaking again after 1800 BP. The profile crashes after 1000 BP and then rises modestly at about 400 BP. Rough correlations with Late Holocene lake levels enumerated above are apparent in a number of instances, lending some support to the notion that prehistoric land-use intensity is tied in some way to lake level dynamics.

- A possible Late Newberry and early Haiwee (2500–1000 BP) residential pattern has been documented on the basis of relative midden accumulation, as well as the identification of several intact house floors and interments dating to this time (Byrd and Hale 2003; Markos et al. 1997; see also Far Western 2007).

- Based on a large-scale analysis of archaeobotanical remains from the 2003 ASM investigation (Reddy 2003:753-763), 78.9% of the Newberry assemblage are wetland/riparian taxa and 21.1% are dryland species. By Marana times, the percentage of wetland species has dropped to 47.0%, with dryland seeds comprising 53.0% of the assemblage. The Newberry pattern suggests a more directed focus on wetland resources, while the Late Prehistoric increase in lower-ranked seed resources speaks to this being a time of resource intensification. The common occurrence of Owens Valley brownware at many late-dating components may be related to small seed intensification (Eerkens 2004).

- Bedrock milling features are common elements of the regional archaeological record (Byrd and Hale 2003:786-787). Although difficult to date, most appear to be correlated with either Marana (650-100 BP) or Historic-era occupation (post-100 BP/AD 1850) and are accompanied with high frequencies of handstones and pestles. The use of bedrock milling features may be associated with small seed intensification, as discussed above. Earlier-dating Newberry components generally lack these bedrock milling features but do contain comparatively higher frequencies of millingslabs.

- Regional flaked stone assemblages across all time periods are dominated by obsidian emanating from the Coso Volcanic Field located 20 miles to the southeast. Coso obsidian has a well-documented conveyance zone to consumer populations west of the Sierra Nevada that flourished between 3000 and 1000 BP (Eerkens and Rosenthal 2004; Gilreath and Hildebrandt 1997, 2011). Markos et al. (1997:124) argue that obsidian from Coso arrived in the area as quarry blanks, with little intervening reduction between the source and the sites.

- Waterfowl, mainly grebes, are dominant in many site components and absent in others (Wake 2003:537-566; see also Far Western 2007 and Markos et al. 1997). These data have been used as a seasonality indicator (grebes tend to concentrate on the lake in winter months; they are also molting at this time, and flightless), as well as a wider proxy of lacustrine exploitation. Some attempt to correlate waterfowl remains with periods of high lake levels has been made, but the results have been inconclusive. Faunal assemblages also contain the usual assortment of small terrestrial fauna (mostly rabbits), with lesser frequencies of artiodactyls (mostly deer and sheep). Curiously, fish and fresh water invertebrates are generally absent in components documented near the site.

- Archaeological investigations along Cottonwood Creek encountered the earliest known evidence for pottery manufacture in the Owens Valley area (Eerkens et al. 1999). A limited number of sherds from Sun-gah-va (CA-INY-3806/H), a single component Haiwee Period site dating to about 1150 BP, could represent early experimentation with the technology, some 500 years before pottery was commonly used in the area. Instrumental Neutron Activation Analysis showed that the sherds were made from sedimentary clays collected from in and around Owens Lake, making it possible that the first adoption of the technology could be found near the site area.

- Perhaps because of the importance of Euro-American settlements in the area, there are also several Native American historic-era component manifestations along the lake shores that may have been tied to these settlements (e.g., INY-291 and INY-3809; Delacorte and McGuire 1993). In addition, a number of otherwise prehistoric components have yielded glass trade beads suggestive of initial contact and indirect interaction with Euro-American economy that probably predate AD 1860 (Delacorte and McGuire 1993:292-298).

To summarize excavation findings along the west side of the basin indicate sporadic use of this locality prior to about 4000 BP. Occupation appears to have ramped up at the start of the Newberry Period and may be correlated with the onset of neoglacial conditions and higher lake levels at around 3500 BP. This increase seems to have been accompanied by an increase in residential activity. Subsistence pursuits, as measured by archaeobotanical indices and the occurrence of waterfowl in faunal assemblages, were primarily focused on wetland resources. Environmental conditions during the Newberry Period, however, were variable, with possible drier conditions and lower lake levels between 2500 and 1800 BP. Land-use intensity picks up again during the latter end of the Newberry Period, continuing into the Haiwee Period before dipping at around 1000 BP, roughly contemporaneous with the MCA.

It is after this time that a shift in land use toward resource intensification can be seen. Plant exploitation is now characterized by a reliance on both wetland and dryland species, and bedrock milling is in ascendance, probably directed at a variety of hard seeds. Clusters of these bedrock milling features appear to have anchored the local settlement system, as many are associated with midden aprons and other tool concentrations. Waterfowl, particularly grebes, continued to play a prominent role in subsistence. Occupation continued into the historic era, with several sites exhibiting evidence of interaction with local Euro-American settlements.

Research Domains: Prehistoric Resources

The following research domains: prehistoric research section was developed by Kim Carpenter, Far Western, as part of the late discovery plan for Phase 9/10.

This brief overview of previous investigations within the area provides an initial context to guide site evaluation and testing, and points to a series of research domains that might be addressed during subsequent treatment. These domains, as well as associated data requirements, include the following: Cultural Responses to Environmental Change; Chronology; Middle Archaic Land Use; Obsidian Quarry Production and the Trans-Sierran Conveyance of Toolstone; Late Holocene Subsistence and Resource Intensification; Early and Middle Holocene Adaptive Patterns and Assemblage Structure; and Proto-historic and Historic-era Native American Occupation.

Cultural Responses to Environmental Change

While it might not seem controversial that changing climatic conditions leading to marked shifts in shoreline elevations and water quality of Owens Lake, including periods of almost complete desiccation, would have consequences for local prehistoric subsistence-settlement systems, it has been argued that the effects of such changes have not been actually demonstrated. Thus, for example, it has been argued that the MCA has failed to have any significant effect on prehistoric land-use systems of the southern Owens Valley (Basgall 2008; Basgall and Delacorte 2011). In a more recent re-casting of this argument, it is noted that major climatic events, such as the MCA, probably had little effect on overall land-use intensity, but in certain local contexts, populations may have re-organized to some extent and occupied different habitats (Basgall and Delacorte 2012:10-12). As the site occupies a Holocene-age shoreline/sandbar of Owens Lake, the resolution of this issue is perhaps fundamental to our understanding of prehistoric culture change in this area.

Throughout the Holocene, the surface elevation of Owens Lake has fluctuated significantly, with more recent highstands reported at around 3500 BP and 350 BP (the Little Ice Age), and lower lake levels associated with a drought between 2500 and 1800 BP (Mensing et al. 2007), as well as the MCA between about 1,150 and 600 years ago (Bacon et al. 2006; Stine 2003). Previous researchers have noted broad correlations between these lake levels and certain trends in the archaeological record, including increases in obsidian deposition (a proxy for land-use intensity) during wet periods and higher lake levels, and decreases during dry periods and low stands (Shapiro et al. 2013b:248); archaeobotanical data indicate greater use of wetland resources during the 3500 BP highstand (Reddy 2003:753–763). Correlations between changing lake levels and

site locations on the lake's margins have also been observed, but only in a cursory fashion (Denardo et al. 2012).

While suggestive, these correlations between lake levels and land use are relatively broad-brush and need to be more systematically addressed. They also do not address the question as to how shifts in the local lake-margin archaeological record might be reflected in larger, regional land-use systems. The interplay of environmental and cultural systems has a long history in Great Basin anthropological research, and the issues raised here touch on all subsequent research domains. Presented below are a series of data requirements that that might more fully address this research question.

Data Requirements

As indicated above there are several archaeological proxies that have been used to measure land-use intensity. These include obsidian hydration profiles, time-standardized frequencies of projectile points; trends in radiocarbon dates, and component frequencies. While there have been some attempts to compile these data on a local level, it would be more productive to consolidate this information on a regional basis that incorporates the entire Owens Lake basin. The regional pattern could then be better investigated as a means to isolate local adjustments in land use from the broader, regional pose. In turn, these refined land-use reconstructions could be evaluated with regard to the most recent environmental and lake level reconstructions (Bacon et al. 2006; Stine 2003).

The local response to changing environmental conditions is reflected in assemblage constituents, particularly in dietary remains, as well as in certain artifact and feature trends (e.g., millingstones, projectile points, bedrock milling features). Thus, for example a profile of wetland plant exploitation during the Newberry Period gives way to greater emphasis on dryland seeds during Late Prehistoric times (Reddy 2003). Similarly, millingstones are, to some extent, replaced by bedrock milling features late in time. Waterfowl remains, particularly grebes, exhibit both spatial and temporal variability in regional components, and may be a marker for higher lake stands. Such trends, however, have not been systematically evaluated on a local or regional level and remain simply loose correlations. The identification of well-dated single component contexts containing robust amounts of dietary remains would provide the kind of high-resolution data to address this issue. Particularly important would be identification of older, pre-Newberry components containing dietary remains, thus providing a deeper time line to assess this issue.

Chronology

Although there exists a basic understanding of the regional cultural sequence, associated time-markers, and hydration rates for most Inyo-Mono obsidian sources, further refinements are possible. Thus, for example, the prevailing cultural sequence is mostly co-terminus with date ranges of key projectile point types; e.g., Rose Spring points = Haiwee Period. But as we have previously indicated, the pre-MCA Haiwee Period (roughly pre-1000 BP) may have been very different from the post-MCA Haiwee Period (roughly post-800 BP). Similarly, the post-2500 BP Newberry Period may have been altogether different that the Newberry Period between 3500 and 2500 BP. Similarly, it is also seems that major shifts in subsistence-settlement patterns may have

been tied to local changes in lake levels. Thus, in organizing temporal components likely present at the site, it may be necessary and productive to identify differing blocks of time than those afforded by the standard chronological sequence.

With regard to specific artifact types, the basic temporal and spatial parameters of most Great Basin projectile point types have been established for some time (e.g., Bettinger and Taylor 1974; Clewlow 1967; Heizer and Hester 1978; Lanning 1963; Thomas 1971, 1981); however, there are several point variants with problematic or disputed temporal spans. Thus, for example, there has been some discussion that Rose Spring points in this region may date to at least 1800 BP (Sutton et al. 2007), as opposed to the more conventional break recognized at 1350 BP (Bettinger and Taylor 1974; Gilreath and Hildebrandt 2011). There has also been divergent opinion on the age of Humboldt Basal-notched points in this area (Basgall and McGuire 1988; Bettinger 1978; Garfinkel and Yohe 2004; Yohe 1998), the most recent arguing for two distinct periods of use from 6000 to 2500 BP and a late manifestation dating from 2500 to 1200 BP (Garfinkel and Yohe 2004). Finally, Elko series points, which are traditionally thought to be Middle Archaic indicators, can sometimes date to earlier intervals. Gilreath and Hildebrandt (1997), for example, found that thicker, more robust specimens tended to be older than the thinner versions based on obsidian hydration data, and Norton (2008) largely agreed but used a more sophisticated (and more accurate) discriminant function analysis to distinguish between the older and younger forms. More recently, Larson (2009) also found a sample of unusually old Elko points along the Owens River, but his sample included multiple specimens lacking the robust morphology of those identified above.

Although Owens Valley brownware has figured prominently in dating Marana components in the region, recent studies in the Black Rock area of the Owens Valley (Jackson et al. 2009) suggest that this ceramic class may date to between 680 and 740 cal BP based on radiocarbon dates from feature contexts at INY-5877, and Eerkens et al. (1999) may have found initial experimentation with the technology even earlier. Both of these findings are somewhat earlier than the traditional post-600 BP time frame proposed for this artifact class, highlighting the need to evaluate their chronological context when discovered.

As projectile points, pottery, and other time-sensitive artifact classes are the building blocks for the identification of intact spatio-temporal components, further refinement of the temporal ranges associated with artifact classes continues to be a major research topic.

There are also any number of iterations regarding the hydration rate for Coso obsidian (Basgall 1990; King 2004; Rogers 2010) that speak to the need for continual modification and refinement of such rates. Sandy Rogers' rate formulation (2010), which incorporates an effective hydration temperature correction, has been most recently applied to Owens Valley assemblages (Shapiro et al. 2013b). As the vast percentage of flaked stone materials within the area derives from the Coso source, and because obsidian hydration is anticipated to play a major role in chronological ordering of temporal components, the refinement of such rates constitutes a continuing research theme. Data requirements to address this question are enumerated below.

Data Requirements

Correlating the age of archaeological deposits with specific changes in lake levels or other environmental events will require greater emphasis on direct dating of deposits mainly through radiocarbon assay, as opposed to simply assigning them to broad temporal periods. Similarly, the chronological refinement of certain artifact classes is best accomplished by the excavation of high-resolution archaeological contexts (e.g., intact hearths, structures, living surfaces, other stratigraphically intact deposits) that contain these artifacts in direct association with radiocarbon-dated organic materials. Such contexts also allow for the development of so-called "hydration-radiocarbon pairs" where hydration rim values obtained from obsidian artifacts in these contexts can be directly associated with radiocarbon dates, and thus assist in the refinement of regional hydration rates.

Middle Archaic/Newberry Period Land Use

Excavations in the region point to a major increase in land-use intensity with a focus on riparian/lacustrine resources during the Newberry Period. Most deposits identified to this period contain a generalized assortment of constituents; however, signatures of more robust habitation, including substantial midden development, house floors, and human interments, have been identified at INY-6021 and INY-1991 (Byrd and Hale 2003:184-200; Markos et al. 1997). Middle Archaic habitation complexes have also been previously identified along the margins of Owens Lake at Lubkin Creek (INY-30; Basgall and McGuire 1988), and elsewhere in Owens Valley near Bishop (INY-1384/H; Basgall and Delacorte 2012).

There is, however, no clear consensus for Owens Valley as to what Newberry-age central place settlements should look like and how they fit into a broader subsistence-settlement system. Based on evidence from throughout the Great Basin, it has been argued that the Middle Archaic Period may represent the "trans-Holocene highpoint" of residential stability (Hildebrandt and McGuire 2002; McGuire and Hildebrandt 2005; see also Simms et al. 2014). This includes the rise of true settlement hierarchies and the first substantiated occupation of large, semi-sedentary basecamps. Along with house structures and other evidence of community organization, such sites often have substantial middens and artifact accumulations. Such large, Middle Archaic residential complexes have been documented along the Humboldt Lake bed (Livingston 1986), Carson Sink (Kelly 2001; Madsen 2002; Raven and Elston 1988; Raymond and Parks 1990), Humboldt River near Battle Mountain (McGuire and King 2011), near Bishop (Basgall and Delacorte 2012), and closer to Owens Lake at INY-30 (Basgall and McGuire 1988).

As part of this settlement framework, this time period has been associated with the rise of logistical large-game hunting (Delacorte 1999:385; Hildebrandt and McGuire 2002; McGuire and Hildebrandt 2005; see also Broughton and Bayham 2003). From an energetic standpoint, settlements along the west margins of Owens Lake would have been particularly well-suited for logistical hunters to reach the crest zones of the Sierra to hunt bighorn sheep (McGuire et al. 2012:124-141). Accompanying, and perhaps even supporting, this trend was an expansion of female foraging production, as well as a tendency to locate base camps in settings that optimized women's foraging activities (Zeneah 2004). It may be that the ramp-up seen in Newberry land-

use intensity that has been observed in the area, including the increased use of millingslabs and focus on riparian/lacustrine plant resources, is related to these developments.

A counter-perspective holds that Newberry populations were much more residentially mobile, moving up and down the Owens Valley on a seasonal basis, traversing enormous distances (Basgall and Delacorte 2012; see also Basgall and McGuire 1988; Bettinger 1999; Delacorte and McGuire 1993). Initial evidence for this pattern was toolstone profiles, revealing a regularized system of acquisition, use, discard, and resupply of materials as populations moved north to south and back again in the Owens Valley. More recently, evidence for this perspective has come from excavations at INY-1384/H near Bishop where the dating, size, and content of a series of Newberry-age domestic structures, as well as the composition of associated artifacts and food remains, haves been used to support the notion of restricted seasonal occupation by relatively small social groups (Basgall and Delacorte 2012).

Much of this debate hinges on the notion of what comparative residential stability might mean, as well as such terms as "semi-sedentary," "base camps," and "villages"—all of which are beyond the scope of this presentation. The debate, however, does point to a set of data requirements that will need to be generated to address these issues; these are provided below.

Data Requirements

As previously mentioned, the identification of intact subsurface structures and features is a primary goal of any field methodology. As we have seen in previous keystone studies for Owens Valley, house structures, in particular, allow for an assessment of community structure and residential patterns. House construction attributes, floor and sub-feature configuration and content, caches, as well as interior and exterior artifact frequency and content, can all provide clues as to the demographic organization of house structures. The recovery of faunal remains from such contexts may allow an assessment of local procurement versus long-range logistic hunting practices, and in the case of waterfowl, provide important seasonal indicators. Archaeobotanical data, coupled with the relative frequencies of milling equipment, will allow some comparative assessment of female foraging production and, more generally, resource intensification, along with providing additional indicators of seasonal occupation.

Obsidian Quarry Production and the Trans-Sierran Conveyance of Toolstone

Potentially complicating local reconstruction of land-use intensity is the quarry production of obsidian at the Coso Volcanic Field and the conveyance of this toolstone to consuming populations in southern and central California. As the site area lies north of the Coso Range but east of large consumer populations to the west, it is situated in the conveyance zone of this particular toolstone. This activity appears to have reached its zenith during the Middle Archaic Period (Gilreath and Hildebrandt 1997, 2011), and has been observed in a number of other contexts regionally and elsewhere in the Great Basin (Basgall and McGuire 1988; Elston and Raven 1992; Ericson 1982; Hildebrandt and McGuire 2002; King and McGuire 2011; McGuire 2002, 2007; Smith 2010).

From a technological perspective, Newberry Period obsidian toolstone production involved the manufacture of prepared bifaces which are viewed as the basic package of exchange in the conveyance system. This gave way later in time to a more expedient flake-based technology (Basgall and McGuire 1988; Bettinger 1999; Delacorte 1999; Gilreath and Hildebrandt 1997, 2011). Biface reduction occurred both in quarry contexts in the Coso Volcanic Field and in off-quarry lithic workshops in the conveyance zone of Coso obsidian. Indeed, biface-thinning debris is often a hallmark of Newberry occupation in this region.

One issue raised by this Middle Archaic proclivity toward biface reduction is, to what extent is obsidian deposition the result of a larger obsidian exchange system, or simply the result of more standard toolstone acquisition and use for immediate needs? The resolution of this issue is especially relevant if the rate of obsidian deposition in site components is viewed as somehow a proxy of land-use intensity. One method would be to compare hydration profiles for actual quarry production (Gilreath and Hildebrandt 1997, 2011; Hildebrandt and McGuire 2002) with those profiles generated from sites located nearby. Initial observations of these trends suggest some divergence, with obsidian deposition ramping up after 3000 BP with peaks at 2000 and 1000 BP, while the quarry production peak is confined to around 2000 cal BP. The inference would therefore be that peaks in obsidian deposition around Owens Lake maybe, in part, related to local land use, as opposed to large-scale obsidian exchange.

Data Requirements

Separating the archaeological signatures of regional trans-Sierran exchange from local toolstone use requires both extensive and systematically collected samples of obsidian coupled with source and hydration analyses.

Other signatures of trans-Sierran exchange may be detectable in the attributes of Newberry-age bifaces. For example, there is some evidence that they tend to be larger and more standardized than those dating to earlier and later periods because of their more specialized function (Delacorte et al. 1995; Gilreath and Hildebrandt 1997). It also has been suggested that bifaces dating to this time may have a higher tendency to be found in cache contexts as they were subject to the uncertain outcome of long distance transport (McGuire et al. 2012).

Late Holocene Subsistence and Resource Intensification

Research domains falling under the general rubric of resource intensification have a long history in eastern California (Basgall and Delacorte 2012; Basgall and McGuire 1988; Bettinger 1975, 1991, 1994; Byrd and Hale 2003; Delacorte 1999). Intensification is a process whereby previously under-exploited resources that have low energy returns and high procurement and processing costs become economically important aspects of the diet (Basgall 1987). Such changes can be induced by a variety of environmental, demographic, or social pressures. In terms of the Owens Lake region, this focus falls primarily on the role of riverine (Owens River), lacustrine (Owens Lake) and riparian resources (Braley and Olancha creeks), especially during the Late Holocene Period. This issue, however, extends well beyond the region as the role of wetlands in Late Holocene lifeways remains an ongoing and debated research theme across much of the Great Basin (Hildebrandt 1997; Kelly 1985, 2001; Madsen 2002; McGuire and King 2011; Raymond

and Parks 1990). As provided in the review below, there are any number of local and regional dietary, assemblage, and feature signatures of intensification that have been promulgated.

Perhaps the most important previous study with respect to regional Late Holocene lifeways and intensification was conducted at INY-30, located on Lubkin Creek near the northwest shoreline of Owens Lake (Basgall and McGuire 1988). Documentation of a series of house structures of both Newberry and Marana age, both rich in dietary remains and artifacts, provides a unique measure of subsistence-settlement change during this time.

Residential stability, as reflected in the house structures at INY-30, appears to be greater in Newberry times in relation to those domiciles of Marana vintage (Basgall and McGuire 1988:347). Newberry archaeobotanical diversity is also higher, with a greater emphasis on dryland taxa such as grasses. Pine nuts were also documented at this time but at less frequency than observed in Marana structures. Newberry faunal assemblages are dominated by artiodactyls, lagomorphs, and grebes, with significant amounts of the former killed in upland contexts. By Marana times, archaeobotanical samples show less diversity and a greater emphasis on wetland plants. This is accompanied by greater frequencies of milling equipment, much of it expedient, and the increased use of bedrock milling facilities. Grebes are still exploited but there is now a greater range of waterfowl, including various ducks, and large game becomes less important, especially in upland contexts (McGuire et al. 2007; Fisher 2015; Hildebrandt and McGuire 2016). The density of fresh-water mussel also increases in Marana contexts. The overall trend suggests a greater focus on wetland resources.

Based on riverine, as opposed to lacustrine, archaeological contexts in the southern Owens Valley north of Owens Lake, Delacorte (1999) sees a generalized period of resource intensification, commencing during the Haiwee and continuing into Marana times, that incorporates the increasing use of wetland resources. Evidence includes the following: increased use of smaller, chub- and minnow-sized fish and, during the latest prehistoric occupations, fresh-water mussels; greater emphasis on grebes and ducks; increased procurement of lagomorphs and other lower-ranked small game; and increased plant-based food production in general and stream-side plant exploitation in particular, as reflected in both archaeobotanical assemblages and increases in milling equipment.

Results from regional studies show both agreement and divergence with the patterns enumerated above. Thus, for example, the Late Prehistoric use of bedrock milling facilities is confirmed, but archaeobotanical profiles exhibit a strong Newberry focus on wetland resources giving way to a broader mix of both wetland and dryland taxa later in time (Reddy 2003:753-763), including the use of small seeded plants which have been linked to the use of pottery (Eerkens 2004), the latter of which may have first been developed in the local area (Eerkens et al. 1999). Acorns and pine nuts were found in multiple samples. Waterfowl, again mainly grebes, are dominant in many site components, as are mostly small mammal remains, but there is not a recognized temporal trend (Wake 2003:537-566). Interestingly, fish remains and freshwater mussel are generally absent from excavations around Owens Lake, unlike the sites located north of Owens Lake described above (Delacorte 1999).

In sum, there is a somewhat mixed bag of patterns and trends associated with Late Holocene intensification. On the one hand, the late appearance of bedrock milling features is secure. Artiodactyl hunting appears more important during Newberry times, giving way to broader assortment of both small and large game later in time. Grebes are also an important element of Late Holocene hunting efforts, although their temporal profile in regional assemblages remains unclear. Pine nuts and acorns appear to become more popular through time, but the overall mix of wetland versus dryland plant taxa in regional assemblages is seemingly contradictory despite amassing large amounts of archaeobotanical data over the years. To address this situation, a series of organizational and data gathering strategies are proposed below.

Data Requirements

Issues surrounding subsistence and resource intensification require data from high-resolution contexts (i.e., well-dated stratigraphic and/or subsurface features contexts [e.g., hearths, structures, living surfaces] that contain a rich assortment of dietary remains). The discovery of such buried contexts is more amenable through initial mechanical excavations (backhoe trenching) followed by controlled hand excavations.

With regard to specific constituents that might be recovered from such contexts, dryland versus wetland archaeobotanical data should provide an indication of habitat focus, diet breadth, and seasonality. Waterfowl and, more specifically grebes, should indicate the degree of lacustrine focus and seasonality. Artiodactyl versus small mammal remains may provide an indication of the relative importance of long range logistical hunting activities. Recovery and sampling techniques should be employed to detect the presence/absence of fish remains (e.g., 1/16-inch screen mesh in select midden samples). As most radiocarbon samples are derived from organic residues (charcoal) recovered from flotation samples, charred plant remains from all high-yield flotation samples should be radiocarbon dated. In this way, archaeobotanical data can be tied to a specific calendric date, as opposed to low-resolution component assignments.

Certain artifact and feature categories and attributes also provide clues to subsistence focus, including the overall representation of certain types of milling equipment, pottery, processing hearths, and bedrock milling features, as broad measures of plant-based food production. Hunting-related toolkits (projectile points, bifaces) may provide commentary on the contribution of animal resources to the overall diet.

There has been little effort to organize and compile dietary information on a regional basis in the southern Owens Valley. This situation calls for a meta-data approach, where well-dated contexts (preferably with radiocarbon assays) with robust samples of faunal and archaeobotanical remains are assembled and analyzed as a larger whole. Coupled with the refinements previously proposed in assessing cultural responses to changing climatic conditions and lake levels, see if such data are present, future investigations may result in a higher-resolution database capable of teasing out some shifts in subsistence that occurred in shorter time frames (decade- or century-scale).

Early and Middle Holocene Adaptive Patterns and Assemblage Structure

Our current understanding of pre-Newberry assemblages is quite limited, although future studies have the potential to remedy this situation given that a number of older components have been identified elsewhere along the Owens Lake shoreline (Basgall and McGuire 1988; Delacorte 1999; Gilreath and Holanda 2000). Given this existing data gap, identification of pre-Late Holocene components is important.

But how might such components be recognized, given the low density and low visibility of such resources around the lake? Similarly, what expectations should there be regarding land-use strategies dating to this time? With regard to the former, there is a variety of evidence to suggest a relative greater use of non-obsidian toolstone (e.g., cryptocrystalline silicates [CCS] and basalt) during the Early and Middle Holocene (Basgall and McGuire 1988:343; Delacorte 1999). From a practical standpoint, this might provide a relatively straightforward assemblage marker for site evaluation.

On the larger question of Early and Middle Holocene land use, many of the issues raised for later-dating components (e.g., dryland versus wetland adaptive patterns; responses to changing climatic conditions and lake levels; the role of large versus small game resources) are applicable to earlier periods. More broadly, Early and Middle Holocene lifeways have been described as residentially mobile and territorially extensive based, in part, on the aforementioned diversity of toolstone types and obsidian sources. Assemblages contained in components dating to this period are characterized by a distinctive array of flaked stone implements, including stemmed points, elaborate formed flake tools, and cores. Milling tools are generally absent or found in only limited quantities in the oldest of these components. Components dating to this time, however, tend to contain relatively homogeneous toolkits that reflect a pattern of comparatively brief occupations by mobile groups who transported their entire toolkit between a series of sporadically occupied sites (Delacorte 1999:359-364). This contrasts with the later-dating Newberry pattern where the rise of task-specific sites, and sites of variable size, indicate a shift to logistically organized systems.

As might be expected, dietary remains found in sites dating to this time are generally sparse, although terrestrial faunal remains from regional assemblages show a focus on small-game resources (Delacorte 1999:385), as do larger, regional meta-data compilations (Rosenthal and Fitzgerald 2012). Fish also appear to have been a subsistence focus at this time in the southern Owens River, but assemblages are dominated by large-sized suckers, while later-dating components include smaller-sized suckers and the addition of minnows. The early pattern is suggestive of fish taken during spring spawning runs when return rates on this activity were much higher (Butler and Delacorte 2004).

Fish remains and freshwater mussel have not been identified in any of the excavations near Cartago; however, fish remains have been reported from INY-4554 near Ash Creek on the western lake margin from a buried component dated to between 9390 and 7600 cal BP (Gilreath and Holanda 2000). Fish remains have also been documented from buried beach deposits (non-archaeological) dated to 8265 cal BP on the lake's southeastern shore (Meyer et al. 2010). These

results raise the possibility that lake water quality may have sustained a fishery up through the Early Holocene, but at some point thereafter, water quality deteriorated to such an extent to either diminish or destroy this fishery.

Data Requirements

As with data requirements for most research questions, an understanding of Early and Middle Holocene lifeways would benefit from the documentation of intact single-component contexts (heaths, living surfaces, buried soils), preferably those redolent with dietary remains. Frequencies of milling tools and other processing equipment in components dating to these time periods may provide additional insight into subsistence. Attributes and use-wear associated with other artifact classes (e.g., formed flake tools, dome-shaped cores) may also provide commentary on Early and Middle Holocene lifeways (Delacorte 1999; Jurich 2005).

Proto-historic and Historic-era Native American Occupation

The archaeological manifestations of several Native American settlements dating to the proto-historic and historic era have been identified near Cartago at INY-3809 and INY-291 (Delacorte and McGuire 1993). In addition, traces of such historic-era Native occupations (e.g., glass beads) have been documented at a number of other sites located in the area. These findings are significant because they show that the Paiute/Shoshone were very much a part of the late-nineteenth-century settlement of Owens Lake (Davis-King 2003) both in terms of their economic contributions to local settlements and as related to conflict with settlers and the military. Davis-King (2003:178) for example, identify "expeditions of various explorers, cartographers, and the military and their response to the native population; events associated with the Owens Valley War, and the forced march to San Sebastian Reservation (Fort Tejon); and events related to the extraction of mineral and natural resources in the native catchment area, subsuming water, gold, and grasslands."

The INY-3809 occupation at Locus 1 consists of a very large elliptical depression (17 x 9 meters) and exterior midden apron. It is inferred to be an informal living area probably dating to between AD 1800 and 1860. With the exception of glass beads and a metal button, the assemblage consists entirely of traditional flaked and ground stone materials, as well as Owens Valley brownware (Delacorte and McGuire 1993:202-217). At INY-291, there are the possible remains of aboriginal house structures containing glass beads, coupled with an extensive historic-era debris scatter dated to between AD 1880–1900 and 1910–1917. The plethora of historic-era materials (cans, bottles, nails, clothing elements, kitchen items) and very limited native assemblage (glass beads) suggests that by the late-nineteenth century the Paiute/Shoshone had been integrated into the Euro-American mercantile economy of this area (Delacorte and McGuire 1993:227-237).

Delacorte and McGuire (1993:292-298) identify a sequence of nineteenth century Native American/Euro-American interaction with three phases: Indirect Interaction and Incipient Contact (AD 1800–1860); Direct Contact and Cultural Disruption (AD 1860–1875); and Post-Contact Economic Assimilation and Marginalization (post-AD 1875; see also Wall 2014). This is based, in part, on detailed historical accounts of this period, including exploration, initial settlement, and military operations, followed by the rise of farming, ranching, and mining, and the resulting

participation of the Paiute/Shoshone in the wage labor economy of this region. Each of these periods is characterized by a distinctive archaeological profile, the early expression consisting of an intact aboriginal pose with only a few Euro-American substitutions, the later-dating components dominated by Euro-American items and a more limited Native assemblage. The sequence provides a series of feature/assemblage expectations, as well as chronological parameters, that allow us to learn more about nineteenth-century Paiute/Shoshone lifeways in the face of the Euro-American onslaught.

Data Requirements

The documentation of intact single-component contexts that contain evidence of nineteenth-century Paiute/Shoshone occupation is critical. Identification of these components should be accomplished with the help of additional ethnohistoric archival research and discussions with knowledgeable contemporary descendants. Glass beads and buttons are the most important markers of this occupation at the early end, but it is also important to assess the Native content of these components (structure materials and configurations, toolkits, ornaments, pottery, dietary remains) to assess the impact of Euro-American culture on Native lifeways of this time. Evidence of military conflict in the form of military paraphernalia and human remains with indications of violence or trauma might indicate places where skirmishes and/or massacres may have taken place on and around the lake shore. In later-dating components, a comprehensive assessment of historic-era materials is necessary to determine what particular mercantile goods (food, containers, clothing, firearms, kitchen items, house forms and structural materials, etc.) were widely available to the Paiute/Shoshone, as well as what elements of traditional material cultural and lifeways were maintained.

Research Themes: Historic-era Resources

The following research themes: historic-era resources section was developed by Kim Carpenter, Far Western as part of the late discovery plan for Phase 9/10.

Seven types of historic-era resources which may be encountered on the lake bed can be organized into a series of research themes; these include *work camps*, *ranches*, *boat landings*, *refuse deposits*, *water conveyance systems*, *railways*, and *roads*. Current research issues associated with these research themes are discussed below, providing a basis for evaluating the data potential, and thereby the potential significance, of the identified resources. Particularly helpful are recent research designs developed by Caltrans: *A Historical Context and Archaeological Research Design for Agricultural Properties in California* (Caltrans 2007), *A Historical Context and Archaeological Research Design for Mining Properties in California* (Caltrans 2008), *A Historical Context and Archaeological Research Design for Townsite Properties in California* (Caltrans 2009), and *A Historical Context and Archaeological Research Design for Work Camp Properties in California* (Caltrans 2013). These research designs provide an excellent guide for evaluating historic-era resources in California.

Generally, the most data-rich features on residential sites are concentrations of domestic artifacts that date to a short time period and can be identified with a particular household or population. Such concentrations of secondarily deposited assemblages are often found in hollow features

(such as abandoned wells and privies, and trash pits) which are buried under the ground surface. These deposits are typically made up of household ceramics, glass containers, food bone, and personal accoutrements. Standardized principles designed to assess the archaeological research potential of such historic-era artifact deposits have been widely and effectively used in California since their formalization some 15 years ago (Costello et al. 1998; McIllroy and Praetzellis 1997). Captured by the mnemonic AIMS-R, the principles in this approach address the Association, Integrity, Materials, Stratigraphy, and Rarity of the resource. The approach has also been extended to evaluating the research potential of other types of individual features, as well as to determining the eligibility of sites as a whole (Caltrans 2007:212-3; Caltrans 2009:196-197). As these principles apply to all of the resource types we may encounter, they are briefly defined here:

Association: The ability to link an assemblage of artifacts and other cultural remains with an individual household, an ethnic or socioeconomic group, or a specific activity or property use.

Integrity: The physical condition of the site or artifact deposit should be in generally the same state as when it was abandoned; exceptions may include a tightly dated site with unequivocal association.

Materials: The potential for interpretation generally increases with the quantity and variety of materials present. A lack of diversity, however, may also be particularly informative.

Stratigraphy: The presence of discrete and intact depositional units—either vertical or horizontal—increases the interpretive possibilities of the site or feature for both temporal differences and distinguishing activity areas.

Rarity: This attribute encompasses those archaeological remains which are uncommon and, because of this, may be important even if they fail to meet other criteria.

Construction Monitoring Protocols

Specific protocols for cultural resources monitoring and the immediate protection of new discoveries are outlined in the Precautionary Actions to ensure impacts to sensitive resources are avoided prepared in coordination with CSLC for the Investigation. The following paragraphs summarize the construction monitoring protocols for the Investigation and reinforce the required procedures to be followed if and when a new cultural resource is found during Investigation implementation. The protocols include guidelines for construction monitoring activities, define the roles of cultural and Tribal monitors and construction personnel, and provide specific instructions regarding the coordination, notification, and reporting of the findings. Methods for the identification and handling of human remains are also outlined below.

Locations and Activities to be Monitored

The qualified archaeologist shall monitor all Investigation-related ground-disturbing activities in each of the site's DCAs, including DCAs T23SE, T23SW, T23NE, T23NW, T24, T24 Addition, T25S, T25N, T26, T27S, and T27N, as well as the Mainline Road. Monitors will move among construction locations as directed by LADWP in consultation with the cultural resources manager and the construction contractor. The archaeologist will consult with LADWP and LADWP will halt work briefly in a single location as necessary to examine soils and possible archaeological features. The archaeologist shall coordinate with the Construction Manager to divert work around the discovery of any potentially significant archaeological resource, if any are encountered.

Roles, Qualifications, and Training of Archaeological Monitors, Tribal Monitors, Paleontological Monitors, and Construction Personnel

The field responsibilities and reporting requirements for the Archaeological Monitors and Tribal Monitors are similar and they will work closely together. The two roles differ from one another with regard to their reporting pathways, as the Archaeological Monitors report to the Lead Archaeological Monitor, while Tribal Monitors reporting to the Lead Tribal Monitor. The Lead Archaeological Monitor and Lead Tribal Monitor are responsible for their respective monitoring staff, and will work closely together on a day-to-day basis, and meet daily with the LADWP's construction manager so they are aware of the construction schedule and strategy, and where monitors need to be deployed. They also report to their immediate supervisors on a regular basis—the Archaeological PI in the case of the Lead Archaeological Monitor and the THPO in the case of the Lead Tribal Monitor.

Archaeological Monitors

Archaeological Monitors will be under the supervision of a Lead Cultural Resources Monitor who will coordinate with LADWP's construction manager and construction personnel. Archaeological Monitors are responsible for observing construction activities, and:

- Maintaining a daily written log of monitoring activities, including area(s) worked, and related communications;
- Being fully knowledgeable about this Evaluation Plan and where previous sites have been found, recorded, and evaluated;
- Making decisions, in coordination with the Tribal Monitors, on when to temporarily pause construction to determine if archaeological materials are present and assessing their importance;
- Notifying the appropriate Project, agency, and tribal personnel when previously unknown archaeological findings are made;
- Documenting newly discovered archaeological findings;

- Recommending appropriate actions to protect those findings until they can be formally evaluated; and

- Implementing approved actions necessary to protect those findings.

Tribal Monitors

Tribal Monitors will be under the supervision of a Lead Tribal Monitor who will coordinate with the THPO(s). Tribal Monitor should have experience and familiarity with Great Basin archaeological materials and general excavation methods, and help with significance evaluations and treatment options that are consistent with this Plan. A Tribal Monitor is responsible for observing construction activities, and:

- Maintaining a daily written log of monitoring activities, including area(s) worked, and related communications;

- Being fully knowledgeable about this Evaluation Plan and where previous sites have been found, recorded, and evaluated;

- Making decisions, in conjunction with the Archaeological Monitor, to temporarily pause construction when previously unknown culturally significant findings are made, and to report these findings to the Lead Tribal Monitor and THPO(s); and

- Working with the Archaeological Monitors to ensure that the evaluation and treatment of any discovered materials follow the terms of this plan.

Key Construction Personnel

All key construction personnel (e.g., environmental inspectors, supervisors, contractor foremen, and sub-contractor foremen) will meet with the Lead Cultural and Tribal Monitors for training and orientation prior to the start of Investigation-related ground disturbance. The training will be developed by the participating archaeologists, in consultation with LADWP's construction manager and the tribes. All new construction personnel added after construction begins will receive the same training and orientation before working on-site. A list of participants will be kept by LADWP's construction manager.

The training will focus on: (1) avoidance of environmentally sensitive areas delineated on construction plans and marked in the field with well-defined flagging; (2) methods used by construction supervisors to disseminate this information to their workers; and (3) required responses by construction personnel should late discoveries be made.

The qualified archaeologist will work with THPO(s) to prepare and distribute informative Fact Sheets regarding archaeological and Native American sensitivities that provide samples of possible finds and procedures to be followed in the event of a discovery. The Fact Sheet will also have relevant contact information for the archaeologist, including a telephone number where they can be reached by the construction contractor, as necessary. The qualified archaeologist shall

ensure that all construction personnel are informed of the requirements to notify the Inyo County coroner within 24 hours of the discovery of human remains on state lands (as required by Public Resources Code 5097).

Training and Orientation

Prior to starting Investigation-related construction activity, the construction supervisors directly involved with the Investigation will be provided with training and orientation relevant to cultural resources including:

- the types of cultural resources that may be discovered during construction;
- the steps outlined in this discovery plan regarding the protection of discoveries until they can be properly evaluated by a qualified professional archaeologist;
- the need to treat any human remains and other items protected under state and/or federal law with dignity and respect;
- the steps outlined in the discovery plan concerning the notification of the appropriate monitors and agency personnel; and
- the necessity of reporting discoveries in a timely manner and complying with other stipulations provided in this Evaluation Plan.

What Constitutes a Discovery

The following criteria have been developed to guide monitors in determining whether a new find is an isolated find or a potentially important discovery. Note that the criteria are intentionally flexible given that archaeological and geomorphic context must also be considered when making such decisions.

Archaeological Sites and Isolates

Factors influencing any determination include the degree of ground disturbance, proximity to the historic-era lake shore, sediment characterization/visibility, and association with natural features such as spring mounds. Given the sparse and dispersed nature of artifacts on the lake bed, along with the potential for these data to nonetheless contribute information important to regional research issues, following definitions for what constitutes a site versus an isolate are proposed.

- *Prehistoric Isolates* include those resources containing between one and five artifacts in a concentrated area (roughly 25 x 25 meters), representing less than three artifact types (e.g., four flakes + one biface = isolate; and four chert flakes + one obsidian flake = isolate). An item is typically considered isolated if it is separated by at least 25-30 meters from other resources. Common prehistoric isolates can include single projectile points, flakes, cores, lithic tools, ground stone, ceramics (including pot drops), etc.

- *Prehistoric Sites* include those resources containing six or more artifacts in a concentrated area (e.g., six flakes), or three different artifact types, regardless of the number of artifacts (e.g., one biface + one point or sherd + one flake = site). All isolated *presumed prehistoric* features (hearths, stone rings, cairns, etc.) are recorded as sites. Prehistoric site types found on and near the lake bed are more limited than those found in other contexts. For our purposes, we recognize three main site types:

    - *Short-term Resource Extraction Sites*: contain debitage and stone tools such as bifaces and/or projectile points. Tabular tools, ceramics and/or ground stone artifacts or bedrock milling features, may also be present in limited quantities/concentrations.

    - *Long-term Occupation Sites*: contain evidence of sustained occupation in the form of midden sediment, intact hearth features, and/or residential structures, in addition to the constituents found in Limited Occupations.

    - *Features* include bedrock mortars, rock rings or cleared circles ("sleeping circles"), trails, cairns, rock alignments, or fire hearths. These can occur alone (isolated) or in association with other types of features and artifacts.

- *Tribal Cultural Resources* are an additional type of resources that merits consideration in this document. Such resources may (or may not) fit traditional archaeological site definitions. However, these resources are important to Tribal peoples and can therefore constitute important cultural resources. For the purposes of this Investigation, such resources include rock clusters which can occur in archaeological sites or as isolated features on the landscape. These features may be related to traditional mortuary practices (e.g., Halford and Carpenter 2005, Haverstock 2016, personal communication).

New Finds in Sites Previously Recommended as Ineligible

During previous work, several sites within the Investigation area were evaluated and found not eligible for inclusion in the California Register. It is possible that the discovery of new features, artifact types, and densities of artifacts during the Investigation implementation, may require re-evaluation of these sites. Specific finds that would require re-evaluation and/or onsite treatment would include new features (especially rock cairns, hearth features, and house floors). Other finds would include the addition of a substantial number and diversity of artifacts relative to what was recovered during the previous test phase. The field archaeologist shall have ready access to the site records for sites previously recommended ineligible so that an informed decision can be made as to whether new finds indicate the site needs to be protected and re-evaluated.

Procedures for New Discoveries

When a discovery is made, the Archaeological Monitor, in coordination with the Tribal Monitor, will first determine if it is a site or an isolated find. Construction will not be stopped for isolated artifacts or scatters not reaching the concentration density/diversity thresholds outlined above. The coordinates of isolated finds will be obtained by the Archaeological Monitor. The artifacts will be collected, catalogued, and curated by the Lone Pine Paiute-Shoshone Reservation.

If the find meets the criteria for a site as defined above, the Archaeological Monitor, in conjunction with the Tribal Monitor, will secure the location and consult with LADWP and LADWP will halt work briefly in a single location as necessary to examine soils and possible archaeological features. The Archaeological Monitor and Tribal Monitor shall coordinate with the Construction Manager to divert work around the discovery of any potentially significant archaeological resource, if any are encountered.

In the event of a cultural resources discovery, avoidance and preservation in place is the preferred manner of mitigation. Preservation in place shall be accomplished by relocating geotechnical boring locations that overlap or are located immediately adjacent to (within 25 feet of) the cultural resource. The boring location shall be relocated no closer than 100 feet to the identified cultural resource and the placement of the new boring location shall be determined in the field by the Construction Manager in consultation with Archaeological monitor and the Tribal Monitor.

In the event that preservation in place is demonstrated to be infeasible, a 100-foot buffer shall be staked around the find (or in case of human remains, steel plating) to prohibit or otherwise restrict access to sensitive areas until a qualified archaeologist can assess the significance of the find according to California Register criteria (see *Assessing Eligibility*, page 33). If the resource is determined to be significant, the qualified archaeologist shall prepare and implement the evaluation plan in consultation with LADWP. Construction will not recommence in the area until authorized to do so by LADWP.

Should new sites, features or a significant number of new and more diverse artifact types be found in sites previously recommended not eligible, construction may be stopped and the find will need to be evaluated. In the event of such a discovery, avoidance measures such as staking a 100-foot buffer will be used to prohibit or otherwise restrict access to sensitive areas until a qualified archaeologist can assess the significance of the find according to California Register criteria (see *Assessing Eligibility*, page 33). Construction will not recommence in the area until authorized to do so by LADWP.

The qualified archaeologist shall maintain daily monitoring logs during ground-disturbing activities that shall be submitted weekly to LADWP. A complete set of the daily monitoring logs shall be kept on-site throughout the ground-disturbing activities and be available for inspection. The daily monitoring log shall indicate the area monitored, the date, assigned personnel including tribal representatives, and the results of monitoring, including the recovery of archaeological resources, sketches of recovered materials, photographic record, and associated geographic site data. In addition, progress reports that describe new discoveries and issues in the field shall be submitted weekly to LADWP. Within 120 days of the completion of the Archaeological Monitoring, a monitoring report shall be submitted to LADWP, CSLC, and to the Eastern Information Center at the University of California, Riverside. The report, when submitted to LADWP, shall signify the completion of the program to mitigate impacts to unique archaeological resources or historical resources.

Late Discovery of Human Remains

Upon the discovery of human remains, there shall be no further excavation or disturbance of the site or any areas that are reasonably suspected to overlie adjacent human remains until the following conditions are met:

- The Inyo County Coroner has been informed and has determined that no investigation of the cause of death is required.
- If the remains are of Native American origin, the Native American Heritage Commission (Commission) will be contacted. In consultation with the Most Likely Descendant, the Commission and qualified archaeologist shall determine the treatment and disposition of the human remains and any associated grave goods, with appropriate dignity, as provided in Public Resources Code Section 5097.98. Avoidance of human remains shall be considered to the extent feasible.
- If the remains are not of Native American origin, the Inyo County Coroner will make a determination as to the disposition of the remains.

Ground-disturbing activities may continue once compliance with all relevant sections of the California Health and Safety Code have been addressed and authorization to proceed issued by the Inyo County Coroner and LADWP.

Communication Protocols

When a new discovery is made and secured, a 'chain of command' protocol for reporting finds must be followed. If any new discoveries of cultural resources are identified, the onsite monitor must initiate the chain of command by contacting Michael Vader, Mr. Ray Ramirez, and Ms. Kathy Bancroft immediately. Michael will contact Jaime Valenzuela, LADWP's project manager, immediately. Jaime Valenzuela will direct the Contractor, to halt work within a specific location and redirecting work elsewhere. If the Contractor or next person in the chain of command is not available, Jaime Valenzuela will direct the CM and CS to notify the operator to halt work within the specific area. If Jaime Valenzuela is not available, Michael will contact Jevon Lam directly to halt the field work. Michael will also contact Jane Hauptman of the discovery. Jaime will notify Nelson Mejia. Either Mr. Mejia or Mr. Valenzuela will direct the Contractor to halt work within a specific location. Mr. Valenzuela and will also contact Jennifer Mattox, CSLC's Tribal Liaison to report the find.

Assessing Eligibility

New discoveries made on private lands or on lands owned by the CSLC shall be evaluated relative to the CEQA criteria for significance which are outlined below.

Regulatory Framework

Once a find has been established as requiring evaluation (or reconsideration), its significance relative to the criterial outlined in CEQA must be determined. According to CEQA, a historical resource is a cultural resource listed in, or determined eligible for listing in, the California Register (PRC Section 5024.1, Title 14 CCR, Section 4852). As with the National Register, state and county agencies use the California Register as the guide for identifying the state's historical resources and determining what properties warrant protection from substantial adverse changes (PRC Section 5024.1[a]). A cultural resource, whether an individual archaeological site or an element of an archaeological district, may be listed on the California Register when the State Historical Commission determines (based on professional recommendations) that it meets one of four criteria that are modeled after National Register criteria (PRC Section 5024.1[c]):

1. The resource is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.

2. The resource is associated with the lives of persons important in the past.

3. The resource embodies distinctive characteristics of a type, period, region, or method of construction; represents the work of an important creative individual; or possesses high artistic values.

4. The resource has yielded, or may be likely to yield, information important in history or prehistory.

Prehistoric sites may be found eligible for the California Register using any of the four criteria, or any combination thereof. Criterion 1 (sites associated with events that have made significant contributions to broad patterns of California history) can be applied in prehistoric contexts if a resource represents a "type site" for a particular archaeological complex or time period. Under this criterion, an archaeological site might be eligible if it were directly related to some major event in state, local, or national history—for example, the California Indian Wars or if the findings reflect fundamental changes in Native American lifeways brought about by the arrival of Euro-Americans in the local area.

Criterion 2 (associated with lives of persons important in our past) is also uncommon in its application to prehistoric sites as the significance of a particular prehistoric person is rarely known. However, it is possible that the residence of an important contact period or historic-era person could be encountered and documented with a combination of archival, archaeological, and oral history data.

Criterion 3 (representing work of high artistic value) can be appropriate at archaeological sites with rock art, or at sites where specialized items (e.g., brownware pottery) were mass-produced, or where outstanding architecture is represented (e.g., a cliff dwelling or rock-ring village complex). Criterion 3 is more often invoked for standing structures (bridges, buildings, etc.) that represent high achievement in engineering, art, architecture, and the like.
The California Register eligibility of prehistoric sites is usually evaluated under Criterion 4—if they have yielded, or may be likely to yield, information important in prehistory or history.

Criterion 4 has two requirements, which must both be met for a property to qualify: (1) the property must have, or have had, information to contribute to our understanding of human history or prehistory, and (2) the information must be considered important.

Under the first of these requirements, a property is eligible if it has been used as a source of data and contains more, as yet retrieved data. A property is also eligible if it has not yet yielded information but, through testing or research, is determined a likely source of data. Under the second requirement, the information must be carefully evaluated within an appropriate context to determine its importance. Information is considered "important" when it is shown to have a significant bearing on a research design that addresses such areas as: (1) current data gaps or alternative theories that challenge existing ones or (2) priority areas identified under a State or Federal agency management plan [Andrus and Shrimpton 2002]. The information available from a prehistoric site is important if it can be used to address the outstanding local and regional research issues that have been developed over the years (see Hildebrandt et al. 2015 for example).

Sites with human remains, though likely significant under Criterion 4, have additional management considerations due to the concerns of local Native Americans and legislative mandates within the California Health and Safety Code Section (5097.98).

Integrity

Once significance per the criteria outlined above is established, the integrity of the site must be considered. Integrity is the ability of the property to convey its significance. While the assessment of integrity is sometimes a subjective judgment, it must be based on an understanding of the physical features of the historic property and how they relate to its significance (Andrus and Shrimpton 2002). Archaeology sites, however, do not exist today as they were formed; there are always natural and cultural processes that alter the deposited materials and their spatial relationship. Therefore the significant data contained within the site must remain sufficiently intact to yield the expected information if the appropriate study techniques are employed. Specifically, to retain its integrity an archaeological site must possesses a configuration of artifacts, soil strata, structural remains, and/or other natural and cultural features that make it possible to: (1) test a hypothesis about important research questions; and (2) reconstruct a sequence of archaeological cultures to examine continuities or discontinuities in the archaeological record. This second goal relates more to the integrity and significance of a multi-component archaeological site, while some lack of integrity would not necessarily reduce the significance of a single-component site.

Evaluation Methods

All late discoveries will be assessed for significance according to the California Register outlined in the preceding section. This will be accomplished using a combination of prefield research, fieldwork, laboratory analysis and Tribal consultation. The results of our prefield research and identified research issues were presented in Chapter 2. Proposed field, lab, and consultation methods are described below.

Prehistoric Sites

Prior to commencement of work at a particular site, a specific sampling plan will be developed in consideration of the type and density of artifacts and the geomorphological conditions observed when the find was made. This plan will be presented to LADWP, the Tribes, and CSLC for review and comment to ensure that adequate sampling is achieved. Comments on the plan shall be delivered within 48 hours of receipt.

Tribal Coordination

The Tribes with an interest in the Investigation shall be contacted via letter and be consulted regarding a site's potential to contribute to the California Register Criteria 1-4 as outlined above. The Tribes shall specifically be asked if they have information that can help demonstrate that (1) the resource is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage; (2) the resource is associated with the lives of persons important in the past; (3) the resource embodies distinctive characteristics of a type, period, region, or method of construction; represents the work of an important creative individual; or possesses high artistic values; and (4) the resource has yielded, or may be likely to yield, information important in history or prehistory. Any information provided by the Tribe shall be considered in conjunction with the information derived from the archaeological investigations.

Field Methods

Fieldwork at prehistoric sites will include site mapping, surface collection, and hand excavation. Different combinations of these methods will be applied to individual concentrations depending on the structure and composition of the deposits. Surface collection will begin by pin-flagging all formal tools and debitage within the targeted concentrations. If the latter is abundantly present (e.g., greater than 200 pieces), debitage concentrations will be identified and flagged without marking every item. With the exception of larger ground stone artifacts, all formal tools (e.g., projectile points, bifaces, handstones) identified at each concentration will be piece-plotted and collected. Large pieces of milling equipment and milling features will be mapped and then subject to in-field analysis using a series of standardized measurements and attributes.

Regardless of concentration type, hand-excavated sediments will be screened through 1/8-inch mesh. This work will begin with a series of probes, measuring 50 x 25 centimeters and excavated in 10-centimeter levels, to efficiently determine the presence or absence of subsurface deposits. Where subsurface deposits are present, a series of 1-x-1-meter and/or 1-x-2-meter control units will be excavated. Control units will also be excavated in 10-centimeter levels, unless natural stratigraphic breaks are identified. In cases where artifacts are found only in surface or near-surface contexts, surface scrapes will be used in lieu of the excavation units. These will be 2 x 2 meters in size and excavated to a depth of five centimeters.

If subsurface materials are found, a more comprehensive data recovery program will be applied geared to the excavation of either 1-x-1- or 1-x-2-meter units. Total excavation volumes will vary within this range depending on artifact density and diversity, and size of the concentration. If any of the excavations reveal evidence of subsurface features (e.g., hearths, house structures) or rich

midden deposits, contiguous units will be excavated to more fully expose these findings. These places also require the collection of multiple 10-liter flotation samples or 10-x-10-centimeter column samples for plant macrofossil, fish bone, shellfish, and radiocarbon samples (off-site flotation samples will also be collected as a control). In addition to standard documentation of the excavation efforts (e.g., level records), stratigraphic profiles for all exposures and features will be drawn and photographed.

Isolated Features

Most Isolated Features include bedrock milling facilities, hearths, and informal cooking areas composed of fire-affected rock and discolored soils. Bedrock milling features will be described photographed, measured, drawn, and sampled for starch grains if deemed appropriate. In addition to these basic recording techniques, isolated hearths and cooking facilities will be excavated. Excavations will begin with a unit designed to create a section of the feature (e.g., using a 1-x-1-meter unit to excavate the northern half of a hearth), allowing a profile to be drawn and a flotation sample collected from an optimal part of the exposed profile. The number of units applied to these features is determined by their size and complexity.

Analytical Methods

All recovered material will be catalogued under accession numbers obtained from the Lone Pine Paiute-Shoshone Tribe curation facility, where they will be curated in perpetuity. Cataloguing procedures will follow a standardized format, with all materials processed in sequential order (by site, unit, feature, and level). Each tool will receive an individual catalogue number, while fauna, flora, debitage, etc., will be assigned a group or lot number; debitage will be grouped by basic raw material type (e.g., obsidian, CCS, basalt).

Beyond cataloguing, a variety of special studies and analyses should be carried out. For example, radiocarbon, obsidian hydration, and X-ray fluorescence trace-element analyses will probably need to be conducted by experts in these respective fields, while projectile points, pottery, and beads can typically be analyzed by the archaeological contractor using modern, up-to-date methods applied throughout the Great Basin. Provided below is a brief review of the analytical methods associated with common-place artifacts and subsistence remains that will comprise the balance of the testing collection.

Flaked Stone

Flaked stone artifacts recovered from the site may include projectile points, bifaces, formed flake tools, simple flake tools, cores, core tools, and debitage. Bifaces show percussion and/or pressure flaking on opposing sides of a continuous margin. Most are basically symmetrical in plan and cross-section. In addition to the basic measurements, technological observations noted during analysis of the biface assemblage should include reduction stage, presence of cortex, fracture type, presence of a flake detachment scar, and reason for rejection or discard (structural flaw, human error). Reduction stage should be the primary attribute used throughout analyses and, hence, warrants additional discussion. Stage-1 bifaces display rough bifacial edges, thick sinuous margins, with fewer than 60% of the perimeter edge shaped. Stage-2 bifaces are percussion-

shaped specimens with a rough outline. Stage-3 bifaces are percussion-thinned, well-formed items. Evidence of intermittent pressure flaking is seen on Stage-4 bifaces, which are further reduced, more-or-less symmetrical preforms. Stage-5 bifaces are fragments of extensively pressure-flaked implements, and are considered finished tools (e.g., non-diagnostic projectile point fragments or knives).

Formed flake tools are flakes that have been modified, usually unifacially, to the degree that the original edge shape has been highly altered. They typically show steep, intrusive flaking on one or more margins. Technological observations on formed flake tools include flake type, presence of cortex, flake termination angle, whether the item might have been intended as a flake blank (i.e., a biface formed by fairly minimal modification on the margins of a flake), striking platform type, number and shape of worked edges, working edge angle, length and thickness of the tooled edge, and edge modification type (unifacial microchipping, bifacial pressure flaking, etc.). Simple flake tools exhibit limited edge modification and/or retouch that may be intentional or may result from casual use. In contrast to formed flake tools, the basic outline of the original flake remains essentially unaltered; these are equivalent to "used" or "utilized" flakes. Simple flake tools should be subjected to the same analysis as the formed flake tools.

Attributes collected for cores and core tools include the pattern of flake removals (non-patterned, unidirectional, etc.), original artifact form (flake, cobble, etc.), and primary and secondary platform types (cortical, interior). For core tools, number of worked edges (if applicable), shape and length of worked edges, and type of edge modification are also recorded. Core tools also show flake removals, with subsequent damage or use evident, e.g., grinding or battering of a flaked edge. In addition to examining the same attributes as for cores, type of modification (e.g., end battering, edge grinding, edge flaking), its extent, and angle of the working edge is observed.

A sample of the debitage from each single component area should be subjected to technological analysis. Diagnostic flakes are initially grouped into material type, and then into two primary types, percussion and pressure. Percussion flake types are then sorted into primary decortication, secondary decortication, simple interior, complex interior, linear, early biface thinning, middle-stage biface thinning, late-stage biface thinning, angular shatter, and indeterminate percussion. Several non-diagnostic flake types are also recognized including edge preparation/pressure and indeterminate fragments.

Ground and Battered Stone

This class of artifacts typically includes millingstones, handstones, mortars, pestles, and battered cobbles. Basic metrical information for all ground stone artifacts should be collected, as well as information on completeness, evidence of burning, material type, and presence and type of cortex. In the case of millingstones, handstones, mortars, and pestles additional attribute analysis should be directed at overall planar shape, cross-sectional shape, number of surfaces, plan view surface wear, and other types of wear (pecking, striations). The battered cobble analysis should focus on characterization of both face and edge wear.

Pottery Analysis

Brownware pottery could be found during the testing effort. At a minimum, wall color, wall thickness, decoration, artifact part, ceramic paste and temper should be recorded. It might also be useful to use gas chromatography-mass-spectrometry on the residues within the interior walls to determine what people were processing within the pots, and neutron activation to identify the possible source location of the clays that were used.

Flotation Analysis

Ten-liter sediment samples will be collected from any identified single-component midden deposits and feature contexts. A manual flotation technique for water separation can be employed, using 0.4-millimeter mesh (40 mesh per inch). The buoyant light fractions are dried and size-sorted using the following mesh sizes: 2-millimeter (10 mesh per inch); 1-millimeter (16 mesh per inch); 0.7-millimeter (24 mesh per inch); and 0.5-millimeter (35 mesh per inch). Light-fraction sorting requires a binocular microscope at magnifications ranging from 7X to 30X power. Constituents should be tallied and summed for all size grades by sample. Charred seeds and uncharred modern contaminants should be segregated from light fractions. Segregated constituents should be sorted in translucent hard plastic centrifuge tubes with acid-free paper tags denoting site trinomial, sample number, size grade, and code for constituent type. All items of a single type or taxon are stored in plastic bags with acid-free paper labels.

Starch Grain Extraction and Analysis

Starch grain extraction is most effectively done in the lab with relatively small artifacts that can be submerged into an ultrasonic bath. This discussion, however, focuses on extraction methods used in the field, as there will be several samples obtained from bedrock milling features that cannot be transported to the lab. More detailed descriptions of these methods are found in Herzog (2014) and Scholze (2011).

The first step is to continuously rinse the milling surface with distilled water, while simultaneously brushing it with an ultrasonic tooth brush for about 10 minutes. Once this is accomplished, the cleaned milling surface is rinsed with distilled water over a beaker, or collected with a pipette, to recover any adhering particles. Once the aqueous sediment is in the beaker, it is transported to the lab where it is centrifuged, and much of the water is decanted from the sample. The starch grains can then be separated from the sediment using Sodium Polytungstate flotation technique, and mounted on a slide and observed with a microscope.

Faunal Remains

Identification of faunal remains should be made based on comparisons with a comprehensive reference collection; such collections can be found at a variety of University of California facilities. All specimens should be initially sorted into identifiable and unidentifiable categories, first by element (e.g., humerus, femur), then by taxon. Specimens are then identified to the genus or species level where possible. When that is not possible due to the condition of the bone, elements are identified to the family, order, or class level. Those which cannot be assigned to class are listed as indeterminate bone (vertebrate). The unidentifiable mammal elements are

further sorted into animal size categories including medium- to large-sized (i.e., artiodactyl), small- to medium-sized (i.e., rabbit), and small-sized (i.e., rodent).

Where the skeletal element can be identified, portions of that element, such as proximal, distal, or shaft fragment, will be recorded. Cultural modifications (burning, cut marks, polishing, etc.) as well as non-cultural (weathering, as well as gnawing and digestive pitting or staining) will also be recorded. Many specimens in the assemblage will be non-cultural in origin, resulting from natural depositional processes. Such specimens typically include burrowing rodents and/or insectivores, as well as reptiles and amphibians which also tend to burrow or "den" below the ground surface. For example, whole or nearly complete rodent, reptile, and small bird bones, as well as those specimens which exhibit digestive pitting, staining, gnawing and other marks might reflect a natural origin.

Historic-era Sites and Features

For many of these sites, prior documentary research by those working on the lake may contain sufficient information to identify ownership or activities. For others, additional research will be conducted. Initially, field visits will be made by the Investigation's Historic Archeologist to each identified historical site in order to ascertain the physical attributes of each site and their relation to the historical documents and other resources.

If required, additional documentary research may include following:

- Interviews of local informants with knowledge of the historical uses of the Area of Potential Effects (APE);
- The extensive files, maps, and oral histories on Eastern California History located at Foothill Resources, Ltd.
- California State Library and California State Archives, Sacramento, to obtain information and plats on construction camps related to the Mojave-Owenyo branch of the Southern Pacific Railroad.
- The Inyo-Mono Title Company, the Bureau of Land Management, California Department of Transportation, and the Laws Railroad Museum, Bishop, to obtain information on historic-era land ownership, and routes of historic-era roads.
- In Independence, research will be conducted at the Eastern California Museum, and the offices of the Inyo County Recorder, Assessor, and Library to obtain information on land ownership and agricultural and settlement patterns.
- If necessary, research will be conducted in the Research Library and Water Resources Division of the Los Angeles Department of Water and Power to determine land ownership and history of the properties acquired in 1986.

Field Investigations

The historic-era sites will be investigated with techniques that may include clearing brush, cleaning and mapping of site features, hand excavation and sampling of identified artifact features, metal detector survey, and backhoe scraping. The first task on each site will be a systematic surface survey to verify and augment prior recordings. Site boundaries will be verified and potential site features identified. Where documentary research has provided additional information, efforts will be made to identify historically referenced structures and activity areas. Features may be exposed or further defined by sub-surface scraping exposures, probing, limited test units, or backhoe excavations.

Recording Surface Artifact Collections

Identified trash deposits sites can be studied through use of Systematic Samples and Selective Inventories. Both methods assist in deducing activities, historical associations, and date ranges represented by surface artifact deposits without removing artifacts from the field.

Systematic Sampling produces an unbiased and comprehensive view of artifact deposits. It involves stringing off a rectangular unit and collecting and recording all artifacts larger than approximately 1/2-inch within that area. The size of the unit can be varied depending on the density of the deposit, and it is positioned to obtain a representative sample (analysis depends on the proportions of functional classes of artifacts, not absolute numbers). The sample unit is mapped and photographed prior to and after collecting, and also mapped within the context of the overall site. Collected artifacts are photographed in layouts (by functional or material categories) and a preliminary evaluation made as to the potential significance of the feature. If the collection does not appear to satisfy AIMS-R criteria, the items are returned to the unit and the testing of that feature concluded. If they do appear to support eligibility for the site, additional sampling may take place to mitigate any Investigation impacts. In the case of eligibility, the artifacts will be taken to the laboratory for cataloguing and analysis.

Selective Inventories produce a somewhat biased record of the artifact collection as they consist of diagnostic or dateable artifacts selected by the archaeologist. It is often valuable, however, to record artifacts that can provide clear manufacture dates, are representative of specific activities, or are unique. Items recorded in selective inventories are recorded separately from the systematic inventories which provide information on relative quantities of functional types.

Sub-Surface Test Excavation

Although it is unlikely that hollow, artifact-filled features such as privies, wells, and buried trash pits are present within the Investigation area, the following procedures will be used if necessary. Testing of sub-surface features is efficiently and effectively accomplished using a backhoe mounted with a flat-bladed bucket. The feature is located through surface scrapes, exposed in section, and a sample of its contents taken by natural stratigraphic layers. The artifacts are subjected to a preliminary field analysis, and the deposit is evaluated according to criteria such as AIMS-R. Ineligible artifact features are abandoned, while those deemed potentially eligible, are either excavated in their entirety or a sufficient sample recovered to qualify as mitigation. Excavation will be by natural stratigraphy, following procedures outlined by Harris (1989). At

least one sidewall from each excavation unit will be drawn depicting stratigraphy, bioturbation, and exposed site constituents.

In the unlikely event significant historic-era buildings or structures are newly identified during construction activities, Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) documentation would be prepared to reduce impacts below a level of significance.

Radiocarbon Samples and Dating

If organic materials suitable for radiocarbon dating are found (e.g., bone, shell, charcoal, buried soils), appropriate samples will be collected for dating analysis. Radiometric analyses are needed to establish and refine the chronology of the natural and/or cultural deposits at the site. The selection and submission of samples for dating will be based on a careful consideration of the stratigraphy and overall research agenda, with priorities placed on those areas that contain buried soils, cultural deposits, and/or vertically stratified sequences.

Historic-era Component Field Investigations

Prior to fieldwork, an effort will be made to research the historic-era use of the site area to formulate research questions and tailor field methods to the resource's specific context. Historic-era artifacts may be obtained from all units described in the preceding section. If deemed necessary in the field to obtain a sufficient sample of historic-era artifacts, additional procedures will be engaged. The historic-era artifact assemblage will be subject to systematic sampling to produce an unbiased and comprehensive view of artifact deposits. This will involve stringing off a rectangular unit and collecting and recording all artifacts larger than approximately 1/2 inch within that area. The size of the unit will depend on the density of the deposit, and it is positioned to obtain a representative sample (analysis depends on the proportions of functional classes of artifacts, not absolute numbers). The sample units will be mapped and photographed prior to and after collecting, and also mapped within the context of the overall site. Collected artifacts are photographed in layouts (by functional or material categories). If the collection does not appear to satisfy AIMS-R criteria, the items are returned to the unit and the testing of that feature concluded. If they do appear to support eligibility for the site, additional sampling may take place to mitigate any Investigation impacts. In the case of potential eligibility, the artifacts will be taken to the laboratory for cataloguing and analysis.

Historic-era Artifacts

Laboratory methods for recovered collections will involve inventory and cataloguing, followed by selected analyses. Archaeological materials will undergo initial processing and cataloguing according to standards set forth at 36 CFR Part 79. The process will be supervised by a historical archaeologist. Materials will be cleaned to the extent necessary for identification and analysis, sorted by class for material identification, described and catalogued individually or in lots. A computer-generated catalogue will be created using translatable database software (e.g., Microsoft Access®). The database and catalogue will be structured to include pertinent fields (accession and specimen numbers, provenience, material class, functional classification, fragment

count, minimum number of individuals count, descriptive attributes, etc.). Individual artifacts will be measured in English or metric units (as appropriate to their manufacture), weighed, and described.

Selected artifacts will undergo additional analysis and research. Selected materials may also be submitted for specialized analyses (such as faunal, pollen, and macrofloral) in accordance with approved mitigation plans. It is anticipated that collections from testing might primarily include glass, ceramic, and metal artifacts. A Discard Policy based on procedures proposed by Praetzellis and Costello (2002) will be developed for any recovered collections. All artifacts will be prepared for curation following standards set forth by the California Office of Historic Preservation's *Guidelines for the Curation of Archaeological Collections* (1993).

Curation of Cultural Resources

All materials collected during evaluation efforts shall be curated at the Lone Pine Paiute-Shoshone Tribe's curation facility. All artifacts will be prepared for curation following standards set forth by the California Office of Historic Preservation's *Guidelines for the Curation of Archaeological Collections* (1993). Prior to the transfer of any materials for permanent curation, authorization of the change in custody of the materials shall be approved by CSLC.

Paleontological Finds

Impacts to Surface and subsurface paleontological resources not previously identified shall be mitigated through preparation of a written paleontological monitoring plan to be implemented during Investigation implementation. LADWP shall require that construction monitoring, salvage, and recovery of unique paleontological resources is consistent with standards for such recovery established by the Society of Vertebrate Paleontology (SVP). The Paleontological Resources Construction Monitoring Program shall include:

- LADWP shall retain a qualified paleontologist to implement the mitigation plan and maintain professional standards of work. A "qualified paleontologist" is defined as a practicing scientist who meets the qualifications established by the SVP.

- The qualified paleontologist shall be required to secure a written agreement with a recognized repository, regarding the final disposition, permanent storage, and maintenance of any significant fossil remains and associated specimen data and corresponding geologic and geographic site data that might be recovered as a result of the specified monitoring program. The written agreement shall specify the level of treatment (i.e., preparation, identification, curation, cataloguing, etc.) required before the collection would be accepted for storage. In addition, a technical report shall be completed. The final disposition of paleontological resources recovered on State lands must be approved by the CSLC.

- The paleontological monitor may be a qualified paleontologist or a cross-trained archaeologist or geologist working under the supervision of a qualified principal

paleontologist. The function of the monitor is to identify potential resources and recover them with appropriate scientific data.

- LADWP shall require the qualified paleontologist to provide a paleontological resources briefing prior to the start of construction for all construction personnel. Construction personnel shall be briefed on procedures to be followed in the event that a unique paleontological resource is encountered during construction. A training log shall be kept on-site throughout the construction period. The qualified paleontologist will also prepare and distribute informative Fact Sheets regarding paleontological sensitivities that provide samples of possible finds and procedures to be followed in the event of a discovery. The Fact Sheet will also have relevant contact information for the paleontologist, including a telephone number where they can be reached by the construction contractor, as necessary.

- The paleontological monitor shall monitor Investigation-related ground-disturbing activities within the Investigation area, including DCAs T23SE, T23SW, T23NE, T23NW, T24, T24 Addition, T25S, T25N, T26, T27S, and T27N, as well as the portions of Mainline Road where Investigation ground-disturbance would occur. Monitors will move among construction locations as directed by LADWP in consultation with the Investigation cultural resources manager. The monitor shall coordinate with the Construction Manager to divert work around potentially significant paleontological resources, if any are encountered.

- Discovery of fossil-producing localities shall require that stratigraphic columns be measured and that geologic samples be taken for analysis.

- If fossil localities are discovered, the paleontologist shall collect controlled samples for processing. All fossils recovered shall be prepared, identified, and catalogued before submission to the accredited repository designated by the lead agency.

- In conjunction with the subsurface work, the paleontological monitor shall inspect exposed sediments, including microscopic examination of matrix, to determine if fossils are present. In addition, the qualified paleontologist shall be available on call to respond to late discoveries.

- If construction personnel discover a paleontological resource in the absence of a paleontological monitor, construction shall be halted as directed by LADWP and in accordance with SVP guidelines, a qualified paleontologist shall be contacted to evaluate the resource and make recommendations regarding its treatment. If the fossil material is determined to be significant, the qualified paleontologist shall prepare and implement a treatment plan in consultation with LADWP. Construction activity shall not resume until authorization has been provided by LADWP.

The qualified paleontologist or paleontological monitor shall maintain daily monitoring logs during ground-disturbing activities that shall be submitted weekly to LADWP. A complete set of the daily monitoring logs shall be kept on-site throughout the ground-disturbing activities and be available for inspection. The daily monitoring log shall indicate the area monitored, the date, assigned personnel including the tribal representative, and the results of monitoring, including the

recovery of paleontological resources, sketches of recovered materials, photographic record, and associated geographic site data. In addition, progress reports that describe new discoveries and issues in the field shall be submitted weekly to LADWP. Within 120 days of the completion of the paleontological monitoring, a final mitigation report shall be submitted to LADWP, and CSLC with an appended, itemized inventory of the specimens observed and collected. The report should include a list of specimens recovered, documentation of each locality, interpretation of fossils recovered and any technical or specialist's reports as appendices. The report and inventory, when submitted to LADWP, shall signify the completion of the program to mitigate impacts to paleontological resources.

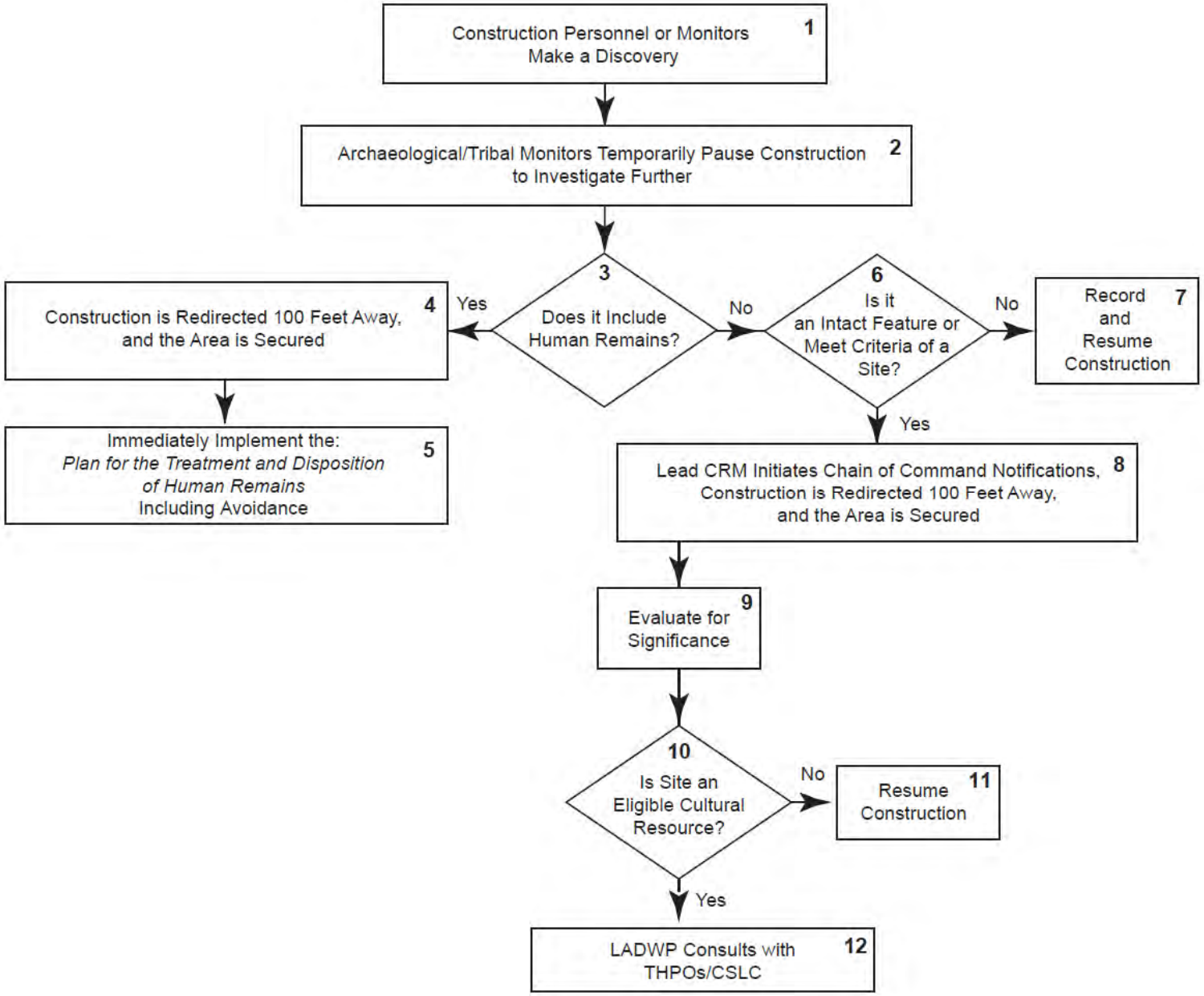
Decision Thresholds and Protocols

The full process for identifying and evaluating late discoveries is shown in **Figure 3**. This flow chart shows the decision tree for discovering, evaluating, avoiding, and if necessary, treating new discoveries found during the construction phase. As the first several steps have already been outlined in the preceding sections, this section focuses on what happens after a resource has been evaluated and determined either eligible or not eligible to the California Register.

Per the 2013 Stipulated Order for Abatement, LADWP's state-certified archaeologist shall be responsible for evaluating whether any of the newly discovered cultural resources are eligible to the California Register. Once the evaluation is complete and the report is accepted by LADWP, then the report shall be released for review to the Tribes and the CSLC. These groups shall each have 30 business days to review and comment on the findings. If there is additional information to be considered in the evaluation of the resources, it shall be provided to the qualified archaeologist and the draft report will be finalized in consideration of the additional input. If a resource is evaluated per the guidance provided in this document and is recommended as eligible to the California Register, then the resource shall be placed in the deferred process ("B" Phase) for further discussion (see below). Ineligible resources shall be released for construction.

It is recognized that while the qualified archaeologist may recommend a finding of ineligibility, the Tribes may still oppose releasing the site to construction. If Tribal concerns remain after the normal process has been completed, then the site may be discussed at a workshop held explicitly for the purpose of obtaining consensus about the disposition of the resource(s).

California Register eligible areas and necessary buffer areas shall be avoided through the establishment of an Avoidance Area.



SOURCE: Far Western, 2016

Figure 3
Procedures for Evaluating Late Discoveries During Construction

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