KEELER DUNES DUST CONTROL PROJECT

DRAFT ENVIRONMENTAL IMPACT REPORT / ENVIRONMENTAL ASSESSMENT

VOLUME III

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March 21, 2014

APPENDIX D
BIOLOGICAL RESOURCES TECHNICAL REPORT

KEELER DUNES DUST CONTROL PROJECT
BIOLOGICAL RESOURCES TECHNICAL REPORT

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EXECUTIVE SUMMARY

This Biological Resources Technical Report (BRTR) is based on biological surveys conducted in 2011, 2012, and 2013 and is supported by separate biological surveys conducted on Owens Lake in the 1990s and early 2000s. This BRTR determined that there would be no significant impacts to biological resources at the Keeler Dunes Dust Control Project (proposed project / proposed action) site. No major impacts are expected to occur due to current design and implementation of proposed dust control measures (DCMs). The DCMs will support the 2008 Supplemental Control Requirements for the 2008 Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan through selective planting within the proposed project / proposed action site.

The purpose of the proposed project / proposed action, in combination with other ongoing dust control projects that have been and are being implemented on the lake bed, is to improve air quality through the reduction of particulate matter (PM_{10}) emissions throughout the Owens Valley Planning Area, consistent with the 2008 State Implementation Demonstration of Attainment Project. In particular, the purpose of the proposed project / proposed action is to reduce the exposure of residents of the communities of Keeler and Swansea to unhealthy levels of PM_{10} emissions. DCMs are necessary at the proposed project / proposed action site to bring the communities of Keeler and Swansea into compliance with the National Ambient Air Quality Standards (NAAQS) for PM_{10} by 2017.

Elements of the proposed project / proposed action include planting and establishment of native vegetation and placement of straw bales as a temporary wind break, as well as long-term air monitoring. A random pattern would be used for straw bale placement in order to mimic natural vegetation patterns. Initially, the dust control reduction would be achieved through the array of straw bales. Over time, dust control will be taken over by the plants as they grow and mature. In addition, the straw bales provide a protective environment for the plants. The long-term goal would be the establishment of a self-sustaining native vegetation cover to control dust with minimal maintenance. Continued air monitoring would be required, and minimal long-term maintenance would be anticipated.

Biological surveys led to the following determinations:

- Absence of any known jurisdiction of the U.S. Army Corps of Engineers (USACOE) pursuant to Section 404 of the Clean Water Act. These areas are emissive and, therefore, require treatment to reduce emissions. The USACOE National Environmental Policy Act (NEPA) implementing guidelines include a categorical exclusion for habitat restoration.
- Absence of vegetated wetlands, springs/seeps, or stream channels
- Absence of areas designated as critical habitat or included in a conservation plan for federally or state-listed rare, threatened, or endangered species; no avoidance and minimization measures would be warranted
- One locally important insect species, Owens dune weevil, is present; no avoidance and minimization measures would be required.
- Absence of threatened, endangered, or sensitive species observations; no avoidance and minimization measures would be required
- Absence of state-designated sensitive habitats. No avoidance and minimization measures would be required.

SECTION 1.0
INTRODUCTION

The Keeler Dunes Dust Control Project (proposed project / proposed action) is located approximately 65 miles south of the City of Bishop, 10 miles southeast of the community of Lone Pine, and 58 miles north of the City of Ridgecrest, lying adjacent to the 110-square-mile (70,000-acre) dry Owens Lake bed (Figure 1-1, *Regional Vicinity Map*). The proposed project / proposed action is located immediately northwest of the community of Keeler in Inyo County, California, and is approximately 194 acres. The proposed project / proposed action is encompassed by a much larger study area of approximately 870 acres (1.36 square miles) (Figure 1-2, *Project Study Area Location Map*). The study area is located on the Keeler alluvial fan situated between the base of the Inyo Mountains to the east-northeast and the dried bed of Owens Lake to the west-southwest. The study area extends approximately 2.5 miles to the northwest from the community of Keeler and is bisected by California State Route (SR) 136.

1.1 PROPOSED PROJECT / PROPOSED ACTION

The purpose of the proposed project / proposed action, in combination with other ongoing dust control projects that have been and are being implemented on the lake bed, is to improve air quality through the reduction of particulate matter (PM_{10}) emissions throughout the Owens Valley Planning Area (OVPA), consistent with the 2008 State Implementation Demonstration of Attainment Project. In particular, the purpose of this proposed project / proposed action is to reduce the exposure of residents of the communities of Keeler and Swansea to unhealthy levels of PM_{10} emissions. Dust control measures (DCMs) are necessary at the Keeler Dunes to bring these communities into compliance with the National Ambient Air Quality Standards (NAAQS) and state standards for PM_{10} by 2017.

Elements of the proposed project / proposed action include placement of straw bales as a temporary wind break, planting and establishment of native vegetation, and long-term air monitoring. The placement of straw bales and native plants on approximately 194 acres within the dunes would achieve 85 percent (17 acres) and 95 percent (177 acres) dust control efficiency. A random pattern would be used for straw bale placement, to mimic natural vegetation patterns. Cattle spinach (*Atriplex polycarpa*) and a mixture of other types of native vegetation will be planted. Initially, the dust control will be achieved through the array of straw bales. Over time, dust control will be taken over by the plants as they grow and mature. In addition, the straw bales provide a protected environment for the plants. Periodic watering of the plants in the springtime (March) may be needed in low-rainfall years for up to 3 years until vegetation is sufficiently established. The long-term goal of this DCM would be the establishment of a self-sustaining native vegetation cover to control dust with minimal long-term maintenance. Continued air monitoring would be required and minimal long-term maintenance would be anticipated with this DCM.

1.1.1 Elements

The DCM involves the establishment of a mix of native vegetation and straw bales within specified dust-emitting areas of the Keeler Dunes. The goal would be to create a natural vegetated dune environment that mimics comparable natural environments such as the existing Swansea Dunes (located to the northeast) and other stable shoreline dunes in the region. The establishment of native vegetation would act to prevent high emissions of dust by breaking up the wind and lowering the wind speed at the ground surface.

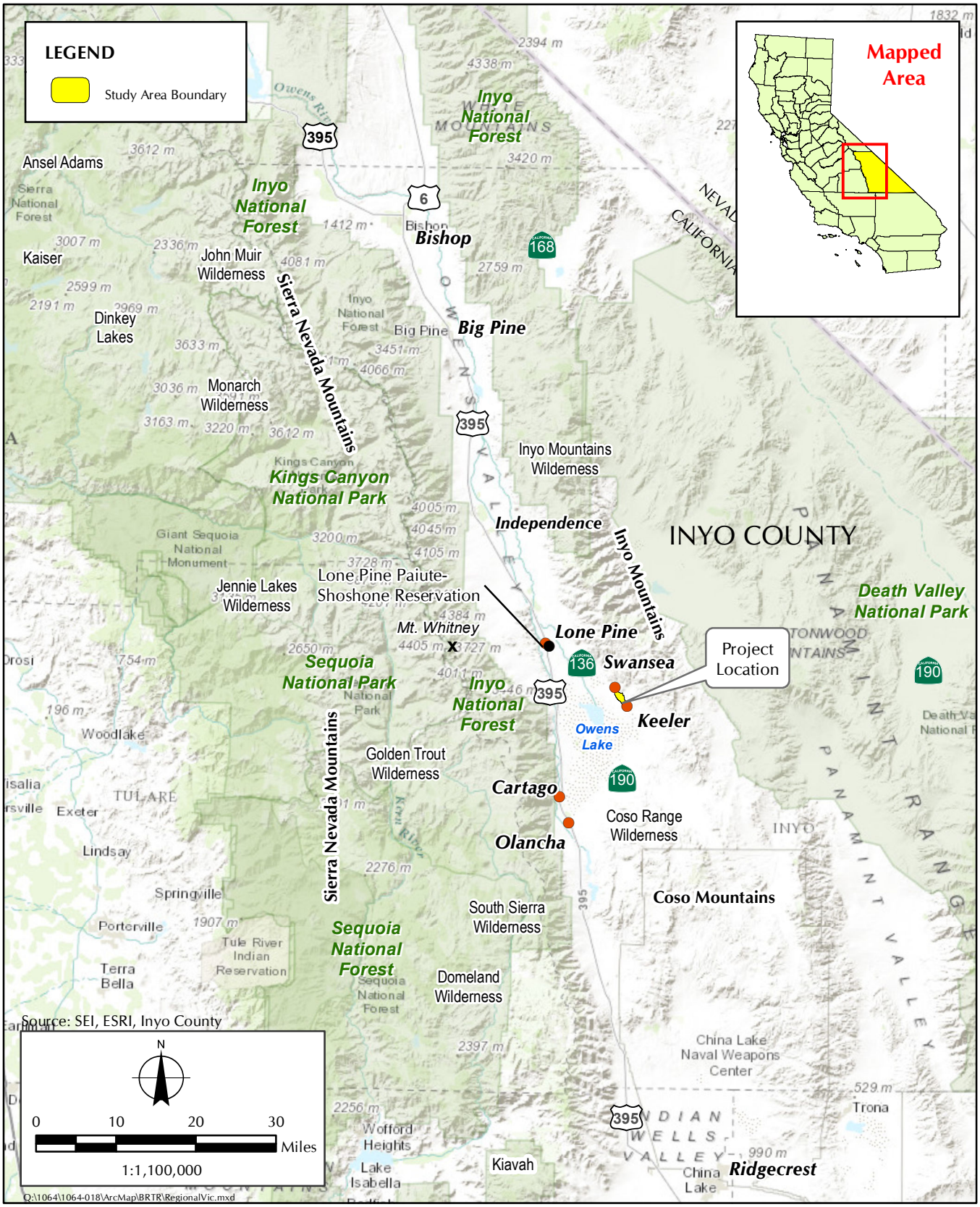

FIGURE 1-1

Regional Vicinity Map

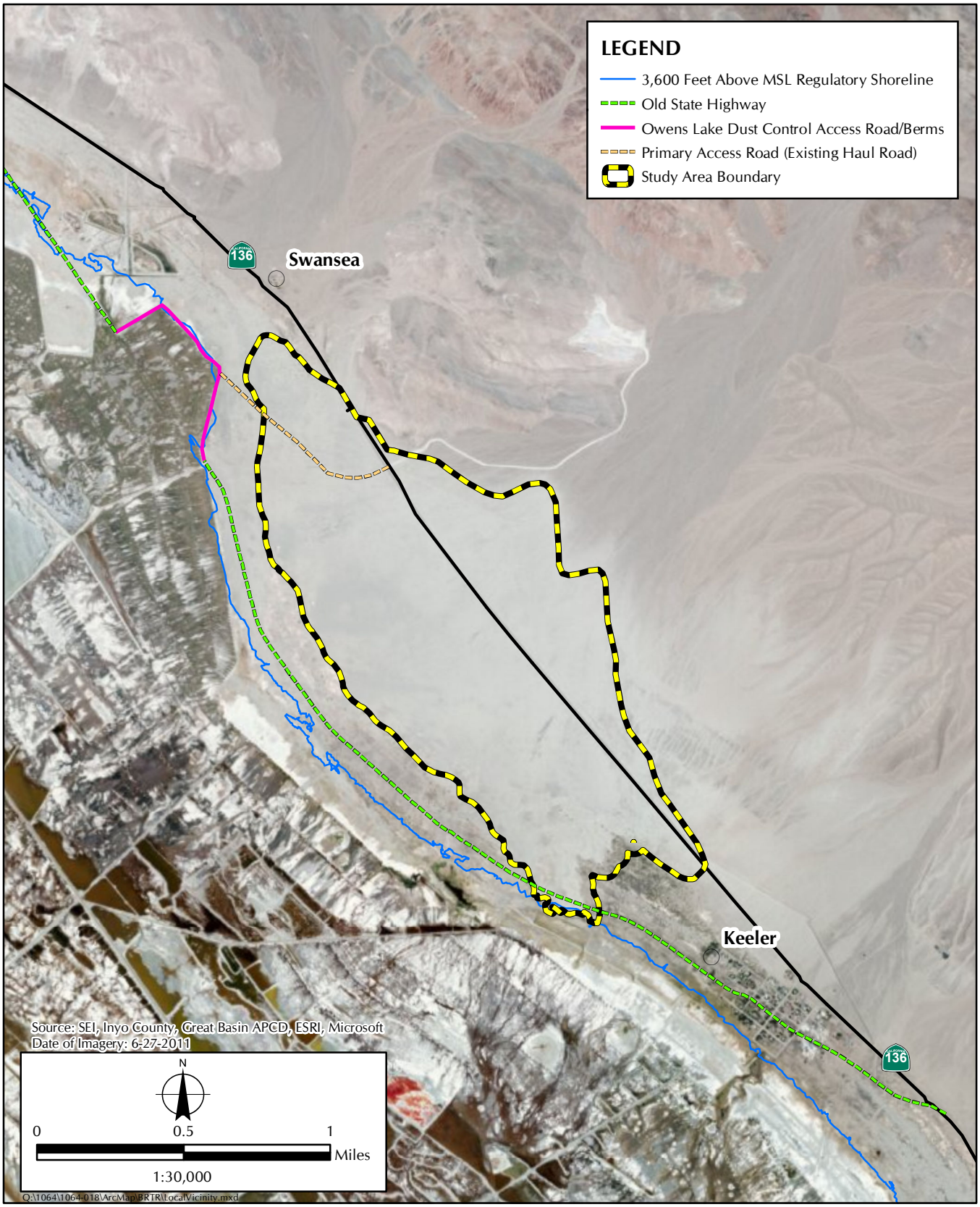

FIGURE 1-2

Project Study Area Location Map

Native Vegetation

This DCM involves the establishment of a mix of native vegetation within the dust-emitting areas shown on Figure 1.1.1-1, *Location of Infrastructure Elements Common to All Action Alternatives*. The goal would be to create a natural vegetated dune environment, similar to the existing Swansea Dunes and other stable shoreline dunes in the region that would act to prevent high emissions of dust by breaking up the wind and lowering the wind speed at the surface. The existing percent cover is estimated at 3 percent to 6 percent. The percentage of vegetative cover required for 85 percent and 95 percent dust control is 15 percent and 27.5 percent, respectively. The approximate number of plants and straw bales necessary to achieve an estimated 85 and 95 percent dust control efficiency is summarized in Table 1.1.1-1, *Dust Control Measure Elements*. Examples of native vegetation that may be planted at the dunes are shown in Table 1.1.1-2, *Native Vegetation List*.

TABLE 1.1.1-1
DUST CONTROL MEASURE ELEMENTS

Element	Minimum Control Efficiency (%)	Number of Acres	No. Required per Acre	Total No. Required
Native plants	95	177	1,983	350,991
Native plants	85	17	1,092	18,564
Total plants				**369,555**
Straw bales*	95	177	661	116,997
Straw bales*	85	17	364	6,188
Total straw bales				**123,185**

NOTE: * The dimensions of the straw bales are 24 x 16 x 48 inches or similar size.

TABLE 1.1.1-2
NATIVE VEGETATION LIST

Scientific Name	Common Name
Atriplex polycarpa (ATPO)	Cattle spinach, cattle saltbush
Atriplex confertifolia (ATCO)	Shadscale saltbush
Atriplex parryi (ATPA)	Parry's saltbush
Atriplex phyllostegia (ATPH)	Arrowscale
Cleomella obtusifolia (CLOB)	Mojave stinkweed, Mojave cleomella
Cleome sparsifolia (CLSP)	Fewleaf cleome, fewleaf spiderflower
Psathyrotes ramosissima (PSRA)	Turtleback
Sarcobatus vermiculatus (SAVE)	Greasewood
Suaeda moquinii (SUMO)*	Inkweed, Mojave seablite

**Sueada moquinii* is the old name for this species. The new name is currently *Suaeda nigra*. [1]

Atriplex polycarpa (ATPO; 66 percent) and a mixture of other types of native vegetation (33 percent) will be planted. Native plants will be cultivated in a nursery and will be approximately 15 centimeters in height. Planting will involve initial placement of a straw bale (see Other Elements below) followed by installation of native plants along the base of the straw bale. In addition, seeds of native plants may be dispersed in open areas between the straw bales.

[1] Jepson Flora Project (eds.) [2013] *Jepson eFlora*, http://ucjeps.berkeley.edu/IJM.html

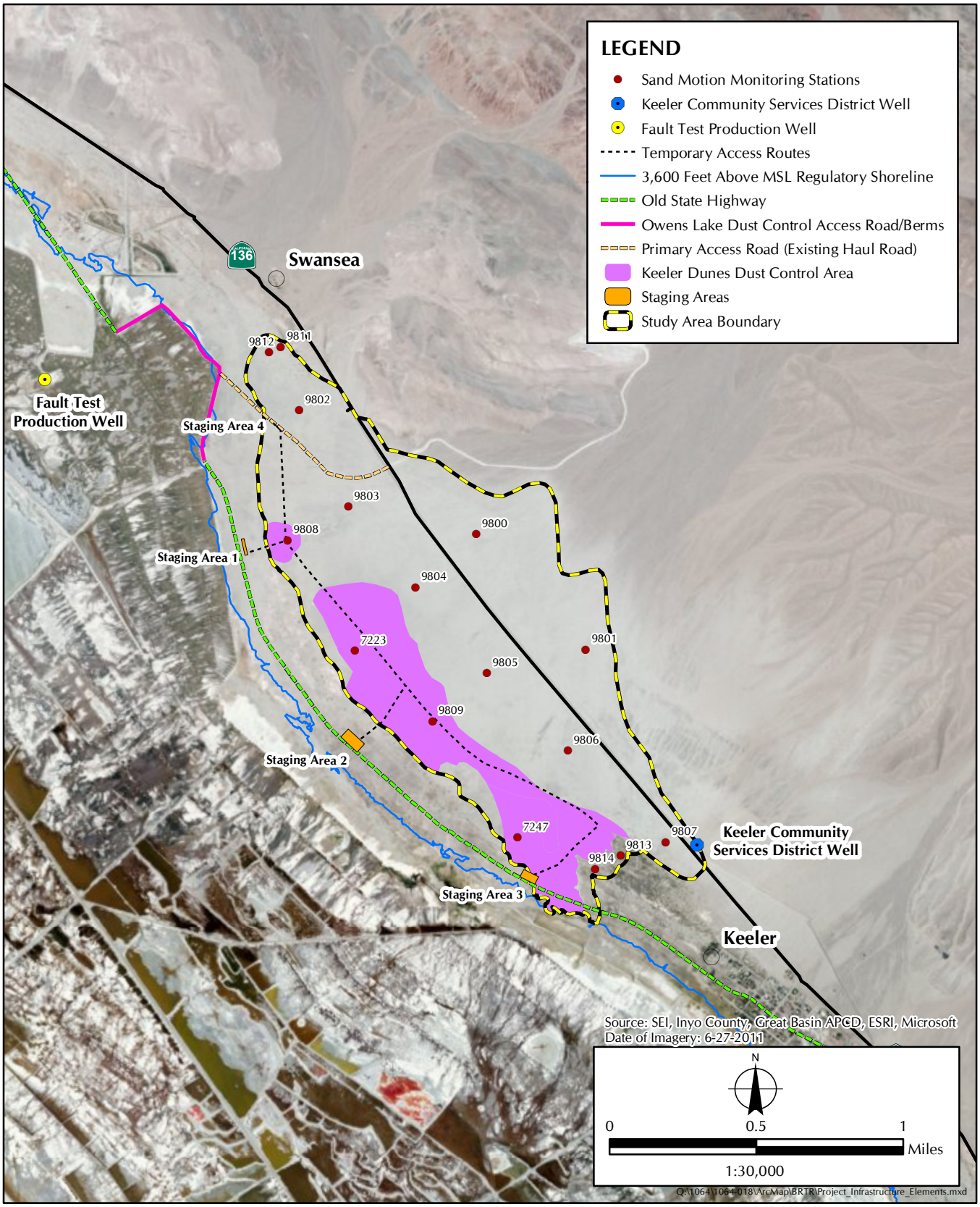

FIGURE 1.1.1-1

Location of Infrastructure Elements
Common to All Action Alternatives

Periodic watering of the plants is conservatively included in the description of the proposed project / proposed action for once per year for up to 3 years following the initial planting. It is anticipated that supplemental watering, if needed, would occur in March/April and in September/October.

Straw Bales

This is a temporary element of the dust control measure that would be used to stabilize emissive dust areas and provide a sheltered environment for plants during establishment. The proposed project / proposed action will utilize straw bales installed in an irregular pattern across the emissive areas. Table 1.1.1-1 provides the number of straw bales (24 x 16 x 48 inches or similar size) necessary for 85 and 95 percent dust control. All straw bales used at the dunes would be certified weed-free to minimize the threat from invasive weeds. Straw bales are anticipated to degrade over a period of several years and would provide organic material to the existing soil. Limited maintenance of straw bales (replacement of broken bales) is anticipated.

Other Elements

Other elements consist of infrastructure elements including temporary access routes; temporary staging areas for equipment, straw bales, and plants; a water storage tank; and an effectiveness monitoring program (existing air monitoring stations). The estimated time period for construction is approximately 11 months. Supplemental watering, if necessary, would be conducted in late winter / early spring and would require approximately 10 weeks to complete. More specific details of the proposed project / proposed action elements are detailed below.

Staging Areas

Four temporary staging areas will be established to provide contractor(s) with storage and placement of equipment, straw bales, native plants, supplies, and in Alternative 3 only, temporary water storage tanks. The staging area(s) will be located on land near the proposed project / proposed action area (Figure 1.1.1-1). The total area of the proposed staging areas is approximately 3.2 acres, all of which are considered temporary impacts. A portion of each staging area will have standard fencing installed to secure materials and equipment as necessary.

One main staging area (Staging Area 1) will be established within the northwestern edge of the proposed project / proposed action area on land administered by the BLM (Figure 1.1.1-1). Located immediately east of Old State Highway, the staging facility will measure 50 feet by 300 feet in area and will be used by the contractor(s) for the storage of equipment, fuel, all-terrain vehicles (ATVs), native plants, and other supplies.

Staging Area 2 will also be constructed for the proposed project / proposed action along the Old State Highway, on land managed by the LADWP (Figure 1.1.1-1). Staging area 2 will measure 200 feet by 400 feet and construction crew may park at this location.

Staging Area 3 is located on land managed by the BLM and will measure 150 feet by 300 feet, and has been designed to accommodate the ability for trucks to turn around. Both Staging Area 2 and 3 will be used for the temporary storage of equipment and materials needed for DCMs in the central and southern portions of the proposed project / proposed action area.

Staging Area 4 will be established adjacent to the gravel haul road constructed by the LADWP for dust mitigation on the Owens Lake, adjacent to the turn-off onto SR 136 (Figure 1.1.1-1). This staging area will be placed on previously disturbed land within the graveled limits of the existing road; thus, no vegetative removal is necessary. The area will measure approximately 10 feet by 200 feet and will be used primarily for temporary straw bale storage.

Staging Areas 1, 2, and 3 will require the brushing of vegetation in order for them to function. These staging areas will be restored and revegetated after the proposed project / proposed action has been completed.

Access Routes

A temporary access route for ATV travel will be constructed for use during placement of straw bales, planting, and watering activities. ATVs will be used to haul straw bales, plants, and water to the dust control areas. The temporary access route will be constructed without the use of supplemental materials such as asphalt or gravel. Following completion of planting and watering activities, the temporary access route will be restored utilizing straw bales and native plants for the dust control areas of the proposed project / proposed action. The temporary access route from the staging areas will be approximately 13,478 feet long (2.5 miles), 20 feet wide, and even with the existing grade (the total access route area is 6 acres of temporary impacts). The approximate location of access routes is shown in Figure 1.1.1-1.The proposed project / proposed action area can be accessed from SR 136 via the Gravel Haul Road and Old State Highway 136.

Water Supply, Conveyance, and Distribution

Approximately 5 gallons of water will be applied under each straw bale prior to planting.[2] The plants would also be watered with approximately 3 gallons of water per bale immediately after the plants are placed in the ground. Total water needs during planting are expected to amount to approximately 3.02 acre-feet (985,480 gallons). It is expected that supplemental watering may be provided to the plants during the first 3 years of the proposed project / proposed action when rainfall is less than 50 percent of the average annual rainfall or is needed based on poor plant health. A total of about 5.29 acre-feet of water may be applied during the first year of the proposed project / proposed action. During each of the second, third, years of the proposed project / proposed action the estimated total annual water duty would be about 2.27 acre-feet. The total water demand for the proposed project / proposed action and proposed project / proposed action alternatives is estimated at up to 9.83 acre-feet (3.2 million gallons) over the 3-year period (Table 2.1.5.2-2, *Water Requirements for Proposed Project / Proposed Action*.

[2] Groeneveld, D.P., HydroBio Advanced Remote Sensing. 12 September 2012. Telephone conversation with D. Grotzinger, Sapphos Environmental, Inc., Pasadena, CA.

TABLE 2.1.5.2-2
WATER REQUIREMENTS FOR PROPOSED PROJECT / PROPOSED ACTION

Irrigation Event	Year	Gallons per Bale	Gallons	Acre-feet
Initial irrigation	Fall 2014	5	615,925	1.89
Irrigation at time of planting	Fall 2014	3	369,555	1.13
Supplemental #1	Spring 2015	3	369,555	1.13
Supplemental #2	Fall 2015	3	369,555	1.13
Supplemental #3	Spring 2016	3	369,555	1.13
Supplemental #4	Fall 2016	3	369,555	1.13
Supplemental #5	Spring 2017	3	369,555	1.13
Supplemental #6	Fall 2017	3	369,555	1.13
		Total	**3,203,120**	**9.83**

During the time of planting there will be two irrigation events associated with planting. The first will be conducted prior to planting to pre-wet/pre-condition the soil. The second irrigation will be conducted immediately following planting of the shrubs. Additionally, during the first year of the proposed project / proposed action, the plants may be provided with supplemental water, if needed, in the spring time when they are breaking dormancy for the growing season and again in the late summer as they go into their late season growth spurt. A decision to provide supplemental water will be based on the precipitation and the overall health of the plants.

During each of the first, second, and third years of operation of the proposed project / proposed action, there may be up to two supplemental watering events. The decision to provide supplemental water will be based on the precipitation during the year and the overall health of the plants. The potential watering events will occur in the later winter / early spring and late summer/early fall.

The proposed project / proposed action and action alternatives 1, 2, 3, and 4 assume that the water for plant irrigation will be supplied from the District's 12-inch production well, located at the Fault Test Site, located about 0.7 mile northwest of the proposed project / proposed action boundary ((Figure 1.1.1-2, *Alternative 1, Dust Control Measures Applied to 214 Acres*; Figure 1.1.1-3, *Alternative 2, Dust Control Measures Applied to 197 Acres*; Figure 1.1.1-4, *Alternative 3, Manual Watering and Irrigation Schematic along Old State Highway*; Figure 1.1.1-5, *Alternative 4, Manual Watering and Irrigation Schematic along State Route 136*). The Fault Test well is an artesian (flowing) well and is capable of producing 250 gallons per minute (gpm) on a sustained basis.[3] An initial application of water at each straw bale installed in the dust control areas is expected to require approximately 985,480 gallons, which would be applied over a 2- to 4-month period (this includes the pre-planting watering as well as the watering at the time of planting). The Fault Test production well can produce a sustained flow rate of 250 gpm and thus only requires a total flow of 2.7 days to produce enough water for the initial watering. Flow tests conducted at the Fault Test Site have included continuous flows for periods up to 90 days with no observed impacts to the surrounding area. Thus production of the relatively small amount of water needed for the plants on the proposed project / proposed action would not be expected to cause impacts to the local area. Action alternative 5 identifies another available water source; purchased water from the Keeler Community Services District (KCSD) Well located within the southeastern portion of the proposed

[3] Holder, G., Great Basin Unified Air Pollution Control District, Bishop, CA. 9 October 2012. Telephone conversation with D. Grotzinger, Sapphos Environmental, Inc., Pasadena, CA.

project / proposed action study area (Figure 1.1.1-6, *Alternative 5, Manual Watering and Irrigation Schematic with KCSD Well*).[4]

Water will be transported to the proposed project / proposed action via water truck and transferred to small water storage tanks located at the four staging areas near the proposed project / proposed action area. Subsequent distribution to individual plants in the proposed project / proposed action would be conducted through hoses from small water tanks transported to the dust control areas via the access route.

As part of the proposed project / proposed action area alternatives, an irrigation system consisting of a network of rigid, above-ground, 2-inch and 4-inch PVC pipes is proposed be installed and constructed . The irrigation infrastructure will originate either from the four staging area tanks, three truck turnouts along Highway 136 or the Keeler Community Services District Well.

The temporary irrigation system would be designed such that irrigation laterals are placed every 150 feet across the site, rather than extending directly to each straw bale. The water from the lateral lines would be delivered to the plant locations through detachable hoses. This option includes travel into the proposed project /proposed action alternatives area by ATV from the staging areas to the hose attachment points along the lateral lines. Watering of individual plants in the vicinity of the hose attachment points will be conducted by a worker on foot. All travel associated with irrigation would be along the designated access routes and lateral lines. At locations where the access route crosses irrigation lines, temporary protective covers would be placed over the piping to allow travel over the system and prevent damage to the irrigation system. There would be approximately 124 total crossings of the irrigation lines (with 62 crossings of the 2-inch distribution laterals and 62 crossings of the 4-inch transmission line).

Effectiveness Monitoring Program

The Great Basin Unified Air Pollution Control District (District) is currently monitoring dust activity in the proposed project / proposed action area with a network of 16 sand motion monitoring sites (see Figure 1.1.1-1). The monitoring program will continue to operate during and after DCM implementation.

1.2 OBJECTIVES

The District regulates PM_{10} emissions in the OVPA consistent with the requirements of the NAAQS. The exposed dune sediments are dispersed into the air by prevailing winds, causing and contributing to exceedances of the NAAQS and California State Standard for PM_{10} in the community of Keeler.

The OVPA Revised 2008 State Implementation Plan[5] requires attainment of the NAAQS 24-hour PM_{10} standard by March 2017. Additionally, the District has a policy to achieve the California State PM_{10} standard within the District communities. The District and BLM identified and prioritized five basic objectives important to achieving the goals of the proposed project / proposed action:

[4] Holder, G., Great Basin Unified Air Pollution Control District, Bishop, CA. 20 September 2013. Email to Eric Charlton, Sapphos Environmental, Inc., Pasadena, CA.

[5] Great Basin Unified Air Pollution Control District. 2008. *2008 Owens Valley PM10 Planning Area Demonstration of Attainment State Implementation Plan*. Bishop, CA.

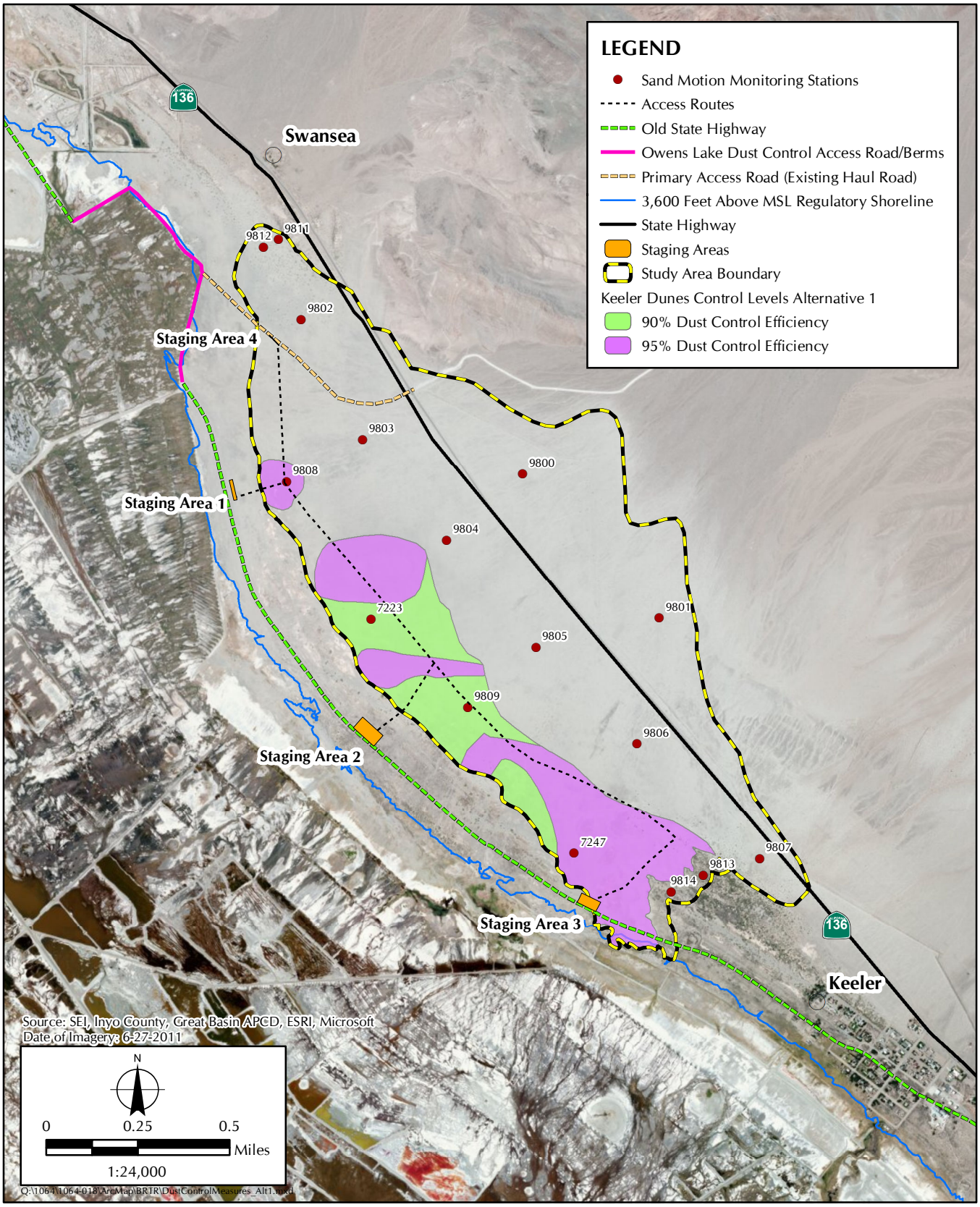

FIGURE 1.1.1-2

Alternative 1, Dust Control Measures Applied to 214 Acres

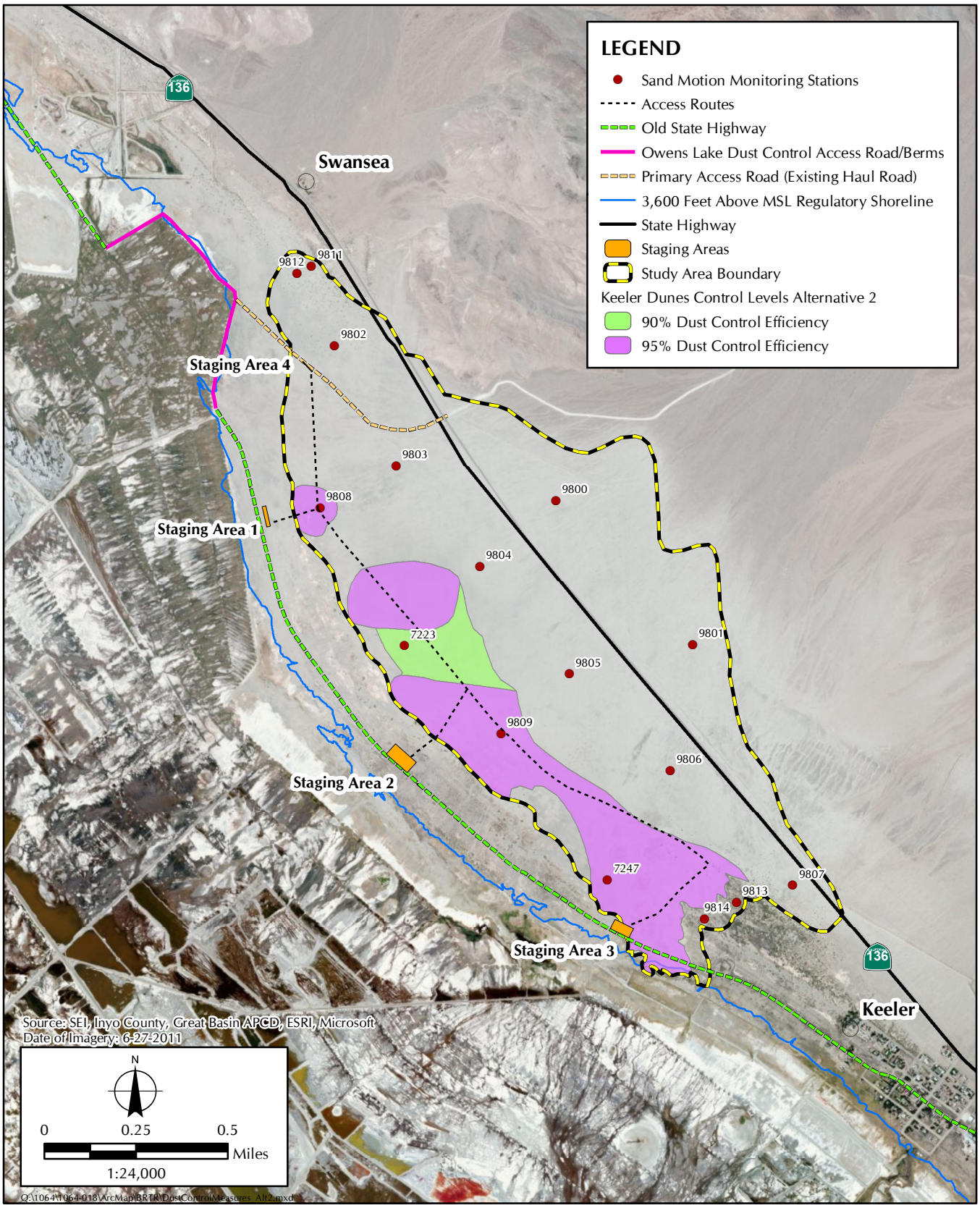

FIGURE 1.1.1-3

Alternative 2, Dust Control Measures Applied to 197 Acres

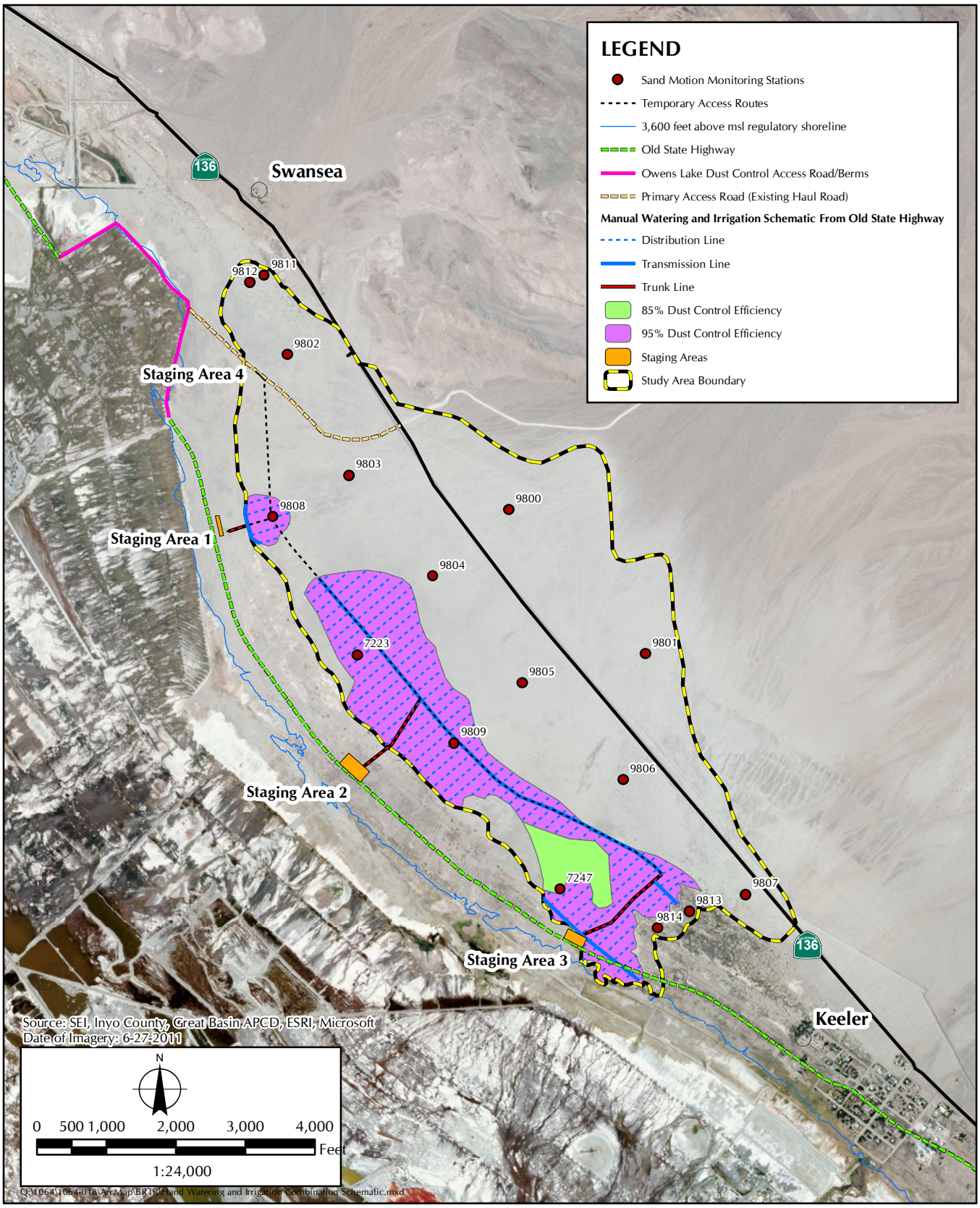

FIGURE 1.1.1-4

Alternative 3, Manual Watering and Irrigation Schematic From Old State Highway

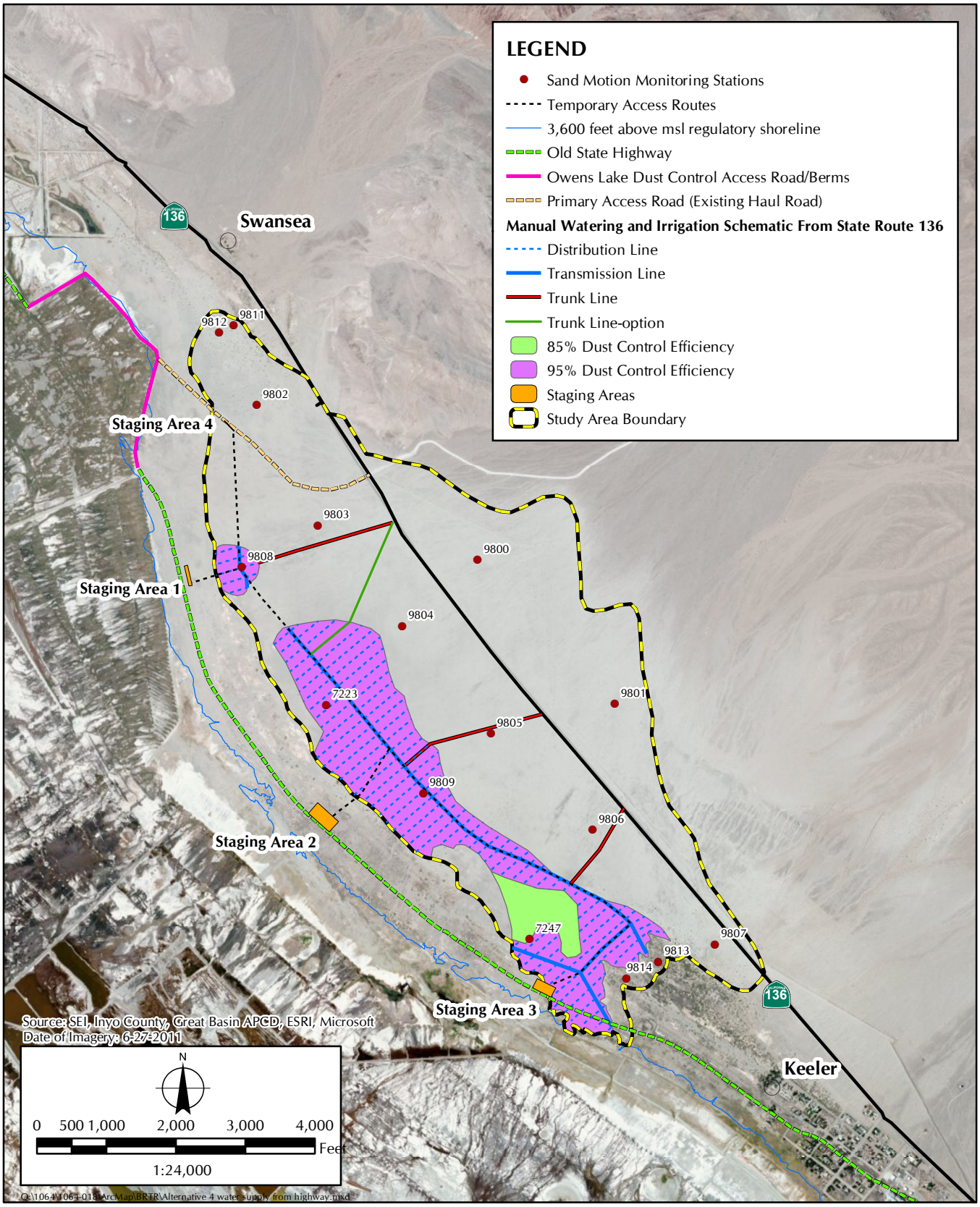

FIGURE 1.1.1-5

Alternative 4, Manual Watering and Irrigation Schematic From State Route 136

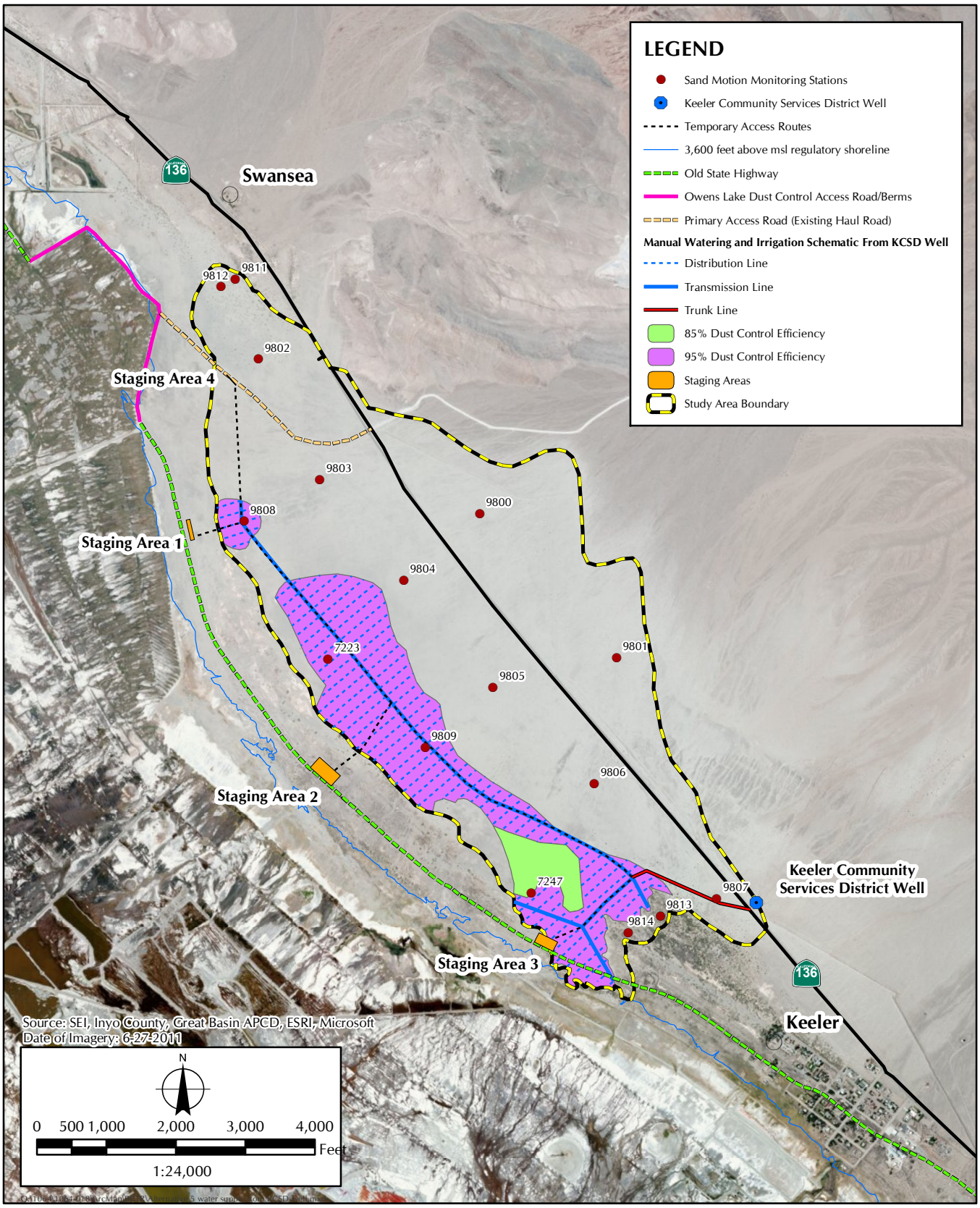

FIGURE 1.1.1-6

Alternative 5, Manual Watering and Irrigation Schematic From KCSD Well

- Reduce the levels of windblown dust that are causing and contributing to exceedances of the NAAQS and California State Standard for PM_{10} air pollution
- Attain NAAQS and state PM_{10} standards in the communities of Keeler and Swansea
- Minimize impacts to natural and cultural resources
- Create a landscape that is comparable to other natural stable dune environments in the region
- Create a landscape that is self-sustaining and can be operated with minimal resources

1.3 PURPOSE AND SCOPE

This BRTR will characterize and evaluate the biological resources that potentially would be affected by the implementation of the DCMs on the Keeler Dunes. In addition, land modifications required to accommodate the proposed project / proposed action constitute a project pursuant to the State of California Environmental Quality Act (CEQA) Guidelines and the National Environmental Policy Act (NEPA). Most of the Keeler Dunes land area is managed by the U.S. Department of the Interior, BLM. The District and the BLM Bishop Office are the joint lead agencies for the proposed project / proposed action pursuant to CEQA and NEPA.

The proposed project / proposed action would be subject to discretionary approval of the BLM and the District Governing Board. Acting in their capacity as lead agencies under CEQA, the District and BLM would need to determine the potential for the proposed project / proposed action to result in significant impacts to any biological resources.

This report constitutes the substantial evidence that was considered and evaluated to address the scope of analysis recommended in Appendix G of the State CEQA Guidelines, and required by the California Department of Fish and Wildlife (CDFW), the U.S. Fish and Wildlife Service (USFWS), the Inyo County General Plan, the Bishop Resource Management Plan Record of Decision, and zoning ordinances related to biological resources. It also addresses areas potentially subject to the jurisdiction of the U.S. Army Corps of Engineers (USACOE) pursuant to Section 404 of the Clean Water Act; riparian and other state-designated sensitive habitats, including those requiring a Streambed Alteration Agreement pursuant to Section 1600 of the State Fish and Game Code. A determination of special-status species and designated critical habitat; native resident or migratory species of fish and wildlife; and the consideration of federal, state, and regional conservation plans are also addressed in this report.

SECTION 2.0
METHODS

This section of the BRTR describes the methods employed in the characterization and evaluation of biological resources at the proposed project / proposed action site. The study methods were designed to provide the substantial evidence required to address the scope of analysis recommended regarding biological resources in Appendix G of the State CEQA Guidelines and the NEPA, including other related federal, state, and local statutes and regulations. Coordination was undertaken with resource agencies to further evaluate the potential presence of special-status species.

Prior to conducting field surveys within the proposed project / proposed action site, a query of the California Natural Diversity Database (CNDDB)[1] and a review of the California Native Plant Society (CNPS) database were undertaken to identify special-status species, including listed, sensitive, and locally important species with the potential to occur within, and adjacent to, the proposed project / proposed action site. The query was conducted for the following nine U.S. Geological Survey (USGS) 7.5-minute series topographic quadrangles: Bartlett,[2] Dolomite,[3] Keeler,[4] Lone Pine,[5] Owens Lake,[6] Cerro Gordo Peak,[7] Olancha,[8] Vermillion Canyon,[9] and Centennial Canyon;[10] as well as an additional two surrounding 7.5-minute series topographic quadrangles, Union Wash[11] and Haiwee Reservoirs.[12] The typical CNDDB search included any quadrangle that is directly adjacent to the quadrangle that contains the proposed project / proposed action site. A preliminary analysis of sensitive species using 11 quadrants was pared down to potential considerations based on proximity and habitat constraints, producing 61 species (Appendix A, *Potential Sensitive Species*). Further consideration, based on the change in elevation of habitats in adjacent quadrangles when compared to the proposed project / proposed action site and while comparing each species' habitats to the characteristics present within the proposed project / proposed action site, produced the 27 more closely scrutinized candidates detailed within Section 5.0, *Result and Discussions*. Reviewed literature included the following: *Bishop Resource Management Plan Record of Decision*;[13] the Conservation and Open Space Element of the Inyo

[1] California Department of Fish and Game. 2005. *Rarefind 3: A Database Application for the Use of the California Department of Fish and Game Natural Diversity Database*. Sacramento, CA.

[2] U.S. Geological Survey. 1987. *7.5-Minute Series, Bartlett, California, Topographic Quadrangle*. Denver, CO.

[3] U.S. Geological Survey. 1987. *7.5-Minute Series, Dolomite, California, Topographic Quadrangle*. Denver, CO.

[4] U.S. Geological Survey. 1987. *7.5-Minute Series, Keeler, California, Topographic Quadrangle*. Denver, CO.

[5] U.S. Geological Survey. 1994. *7.5-Minute Series, Lone Pine, California, Topographic Quadrangle*. Denver, CO.

[6] U.S. Geological Survey. 1987. *7.5-Minute Series, Owens Lake, California, Topographic Quadrangle*. Denver, CO.

[7] U.S. Geological Survey. 1987. *7.5-Minute Series, Cerro Gordo Peak, California, Topographic Quadrangle*. Denver, CO.

[8] U.S. Geological Survey. 1987. *7.5-Minute Series, Olancha, California, Topographic Quadrangle*. Denver, CO.

[9] U.S. Geological Survey. 1987. *7.5-Minute Series, Vermillion Canyon, California, Topographic Quadrangle*. Denver, CO.

[10] U.S. Geological Survey. 1987. *7.5-Minute Series, Centennial Canyon, California, Topographic Quadrangle*. Denver, CO.

[11] U.S. Geological Survey. 1982. *7.5-Minute Series, Union Wash, California Topographic Quadrangle*. Denver, CO.

[12] U.S. Geological Survey. 1982. *7.5-Minute Series, Haiwee Reservoirs, California Topographic Quadrangle*. Denver, CO.

[13] Bureau of Land Management. 1993. *Bishop Resource Management Plan Record of Decision*. Bishop, CA.

County General Plan;[14] previously completed environmental documentation, including field efforts conducted between April 2002 and May 2006 in preparation of the *2008 Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan*;[15] and *Rare Plant Survey Report Owens Dry Lake Dust Control Project Site*.[16]

Focused field surveys of the Keeler Dunes were conducted by a team of six biologists (one botanist, four wildlife biologists, and one entomologist). General biological surveys were conducted on April 12–13, 2011, June 6, 2012, and July 23, 2013. During the field visits, observations and recordings of plant and wildlife species, as well as plant communities, were documented using a number of methods including, but not limited to, terrestrial photographs, aerial support photographs, and global positioning system (GPS) units. Habitat assessment was performed to document the presence or absence of habitat suitable to support special-status species and communities within the proposed project / proposed action site, as well as to provide a baseline description of existing biological resources. The limited size of the proposed project / proposed action site allowed for 100 percent of the area to be surveyed by foot.

2.1 WETLANDS

The determination regarding the potential presence or absence of federally protected wetlands were reviewed using topographic maps and National Wetlands Inventory (NWI) maps, interpretation of aerial photographs, spatial analysis using geographic information systems (GIS) software, and plant community mapping along with field analysis conducted concurrent with the habitat assessment (Figure 2.1-1, *National Wetlands Inventory Map*). All potential wetlands identified on the NWI map were visited in the field to verify presence or absence, along with habitat functions and values. During ground-truthing, three essential criteria were looked for in evaluating the site for wetlands: (1) hydrophytic (wetland) vegetation; (2) hydric soils; and (3) wetlands hydrology, which is the presence of water at or above the soil surface for a sufficient period of the year to significantly influence the plant types and soils that occur in the area, where hydric soils have characteristics that indicate they were developed in conditions where soil oxygen was limited by the presence of saturated soil for long periods during the growing season.[17,18]

[14] Inyo County Planning Department. December 2001. *Inyo County General Plan, Conservation and Open Space Element*. Independence, CA.

[15] Schade, Theodore D., et al. *2008 Owens Valley PM10 Planning Area Demonstration of Attainment State Implementation Plan*. Bishop, CA: Great Basin Unified Air Pollution Control District.

[16] City of Los Angeles Department of Water and Power. 2001. *Rare Plant Survey Report Owens Dry Lake Dust Control Project Sites*. Los Angeles, CA.

[17] U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, and U.S. Department of Agriculture Soil Conservation Service. 1989. *Federal Manual for Identifying and Delineating Jurisdictional Wetlands*. An Interagency Cooperative Publication. Washington, DC.

[18] U.S. Army Corps of Engineers. n.d. "Recognizing Wetlands – An Informational Pamphlet." Available at: http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/techbio.aspx

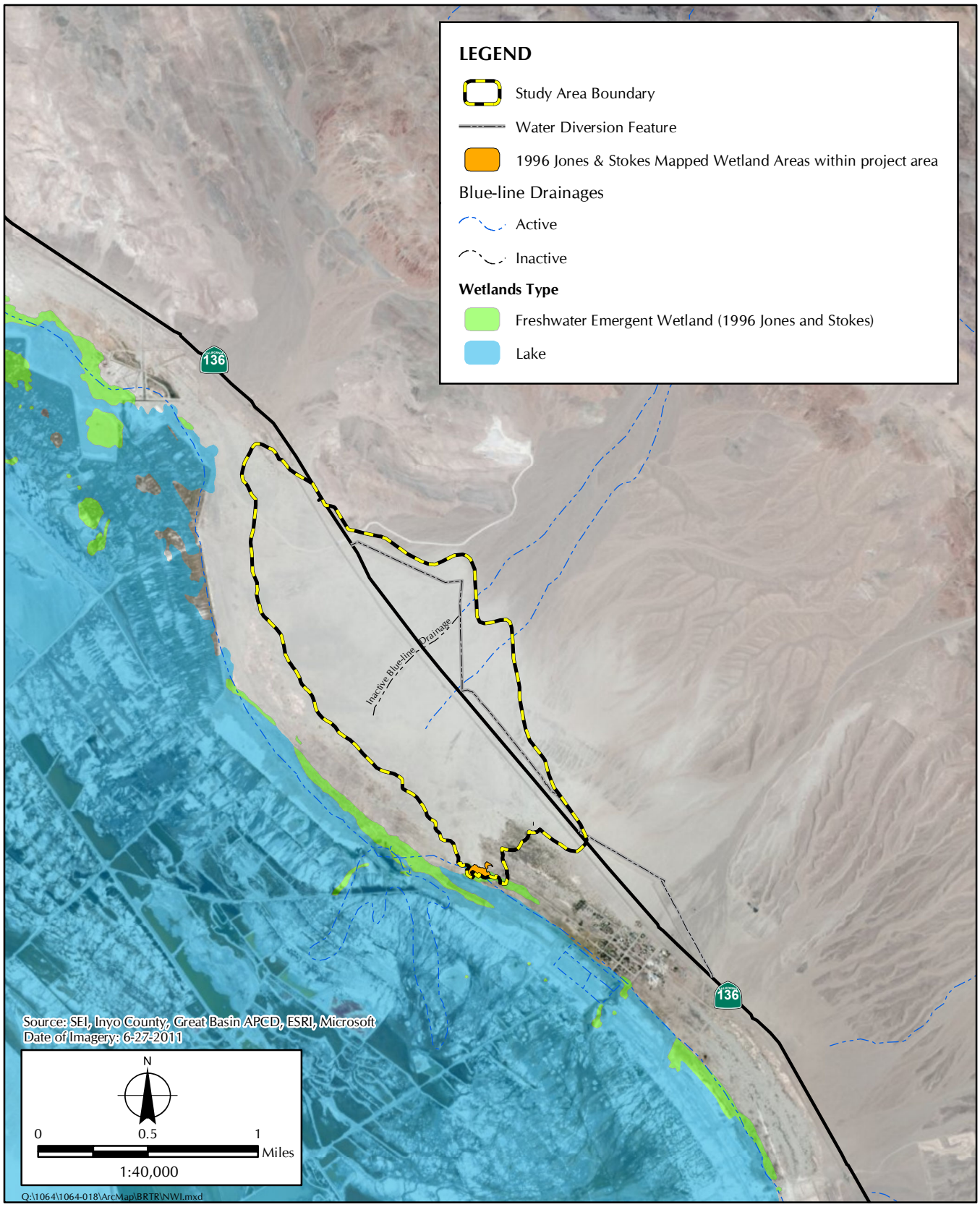

FIGURE 2-1

National Wetlands Inventory Map

2.2 PLANT COMMUNITIES

The evaluation of plant communities was undertaken in a two-phase effort consisting of a preliminary, data-driven field mapping effort on the CNPS rapid assessment protocol,[19] followed by verification and refinement of the field map in-house. The final plant community map was constructed on the field identification of regional assemblages of vegetation characterized by the presence of dominant plant species.[20] The vegetation assemblages described in this report follow a system used by the CDFW, the Sawyer and Keeler-Wolf classification,[21] rather than Holland classification.[22] The Sawyer and Keeler-Wolf classification focuses on floristics (i.e., the group of plant species occurring on a site) and dominance (i.e., which species are most abundant and which are less common) as the basis for their system.[23] Delineation of plant communities follows the current (2003) classification system of CDFW, the CNDDB of the State Resources Agency,[24] and was cross-referenced with Sawyer and Keeler-Wolf's *A Manual of California Vegetation*.[25] Where applicable, the plant community descriptions provided in *Preliminary Descriptions of the Terrestrial Natural Communities of California*[26] was used. Botanical names and common names used are according to *The Jepson Manual*.[27] Common names not available from *The Jepson Manual* are taken from Calflora.[28] Plant community surveys were completed in accordance with the CDFW protocol for special status plants.[29]

If no plants were visible, the area was marked as barren. If plants were visible, the field crews walked to all patches and determined species composition and estimated abundance. During field surveys, 13 photo stations were selected at strategic points throughout the site. At each photo station, four pictures were taken (Appendix B, *Photo Station Pictures*), one in each cardinal direction (Figure 2.2-1, *Photo Stations Map*).

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[19] California Native Plant Society Vegetation Committee. September 2004. *California Native Plant Society Vegetation Rapid Assessment Protocol*. Sacramento, CA. Available at: http://www.cnps.org/cnps/vegetation/pdf/rapid_assessment_protocol.pdf

[20] Munz, Philip A., and D.D. Keck. 1949. "California Plant Communities." *El Aliso*, *2*(1): 87–105.

[21] Sawyer, J.O., and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. Sacramento: California Native Plant Society.

[22] Holland, R.F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Sacramento, CA: California Department of Fish and Game.

[23] Sawyer, J.O., and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. Sacramento, CA: California Native Plant Society.

[24] California Department of Fish and Game, Wildlife and Habitat Data Analysis Branch. September 2003. *List of California Terrestrial Natural Communities Recognized by the California Natural Diversity Database*. Sacramento, CA. Available at: http://www.dfg.ca.gov/whdab/html/natural_communities.html

[25] Sawyer, J.O., and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. Sacramento, CA: California Native Plant Society.

[26] Holland, Robert F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Sacramento, CA: California Department of Fish and Game.

[27] Hickman, J.C., ed. 1993. *The Jepson Manual: Higher Plants of California*. Berkeley, CA: University of California Press.

[28] Calflora. n.d. Calflora Database. Available at: http://www.calflora.org. This database is continually updated, so it is an appropriate source of names for new species not described in *The Jepson Manual*.

[29] California Department of Fish and Wildlife. 2009. *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Communities*. Available at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/Protocols_for_Surveying_and_Evaluating_Impacts.pdf

2.3 VERTEBRATE COMMUNITY

Wildlife population assessment was undertaken by Sapphos Environmental, Inc. biologists (Ms. Lauren Dorough, Mr. John Ivanov, and Mr. Ryan Villanueva). The limited size of the proposed project / proposed action site allowed for 100 percent of the area to be surveyed by foot, and pedestrian surveys were supplemented by driving accessible roads around the entire site during the early morning hours and late afternoon hours. Identification of wildlife species was aided by the use of photography, binoculars, and a spotting scope.

While conducting pedestrian surveys, biological survey crews assessed habitat for special-status species and relevant habitat was scrutinized for target species. Invertebrates and reptiles were searched for by visually inspecting the ground and turning over rocks, as well as searching under vegetation. A visual and auditory search was performed for birds. Mammals were surveyed by sight and investigation of diagnostic sign (i.e., track, scat, nests, and burrows). All wildlife species were identified to taxonomic level and compiled into a compendium (Appendix C, *Floral and Faunal Compendium*).

2.4 INVERTEBRATE COMMUNITY

To survey for insects, nonlethal pitfall traps were placed along several transects. Pitfall traps were checked in the morning, evening, and throughout the night to sufficiently sample insects during different activity periods. Pitfall traps (6.7 × 6.7 × 3.1 inches) were located in a grid across the dune area, replicating the various habitat types (Figure 2.4-1, *Insect Sampling Locations*). Each trap was filled with a biodegradable, soapy water solution (<1 percent soap), which breaks surface tension, so that insects remain in the traps. Twenty-six traps were located within the area. In addition, nocturnal surveys used light sampling, which often attracts species that would not be detected in pitfalls. One two-sided white sheet and light source (propane lantern) were set at a central location near the alkali flats, near trap #7. This light was set at dusk and remained until dawn, with periodic monitoring throughout the night.

Dr. Sharon Martinson (contract entomologist) conducted surveys for summer insects at Keeler Dunes between May 3–4, 2011, and May 28–31, 2012. In addition, Dr. Sharon Martinson and Mr. Brian J. Bielfelt conducted surveys for *Tescalsia giulianiata*, a winter moth, between January 7 and January 13, 2012. Due to the number of traps and breadth of area sampled, each monitoring of the pitfall traps took 4 to 5 hours to complete (a single transect was about 6 miles' total linear distance). All traps were set between 2:00 p.m. and 7:00 p.m., sampled between 9:00 p.m. and 2:00 a.m., and sampled again between 6:00 a.m. and 11:00 a.m. All traps were removed, and displaced sand was returned to the holes.

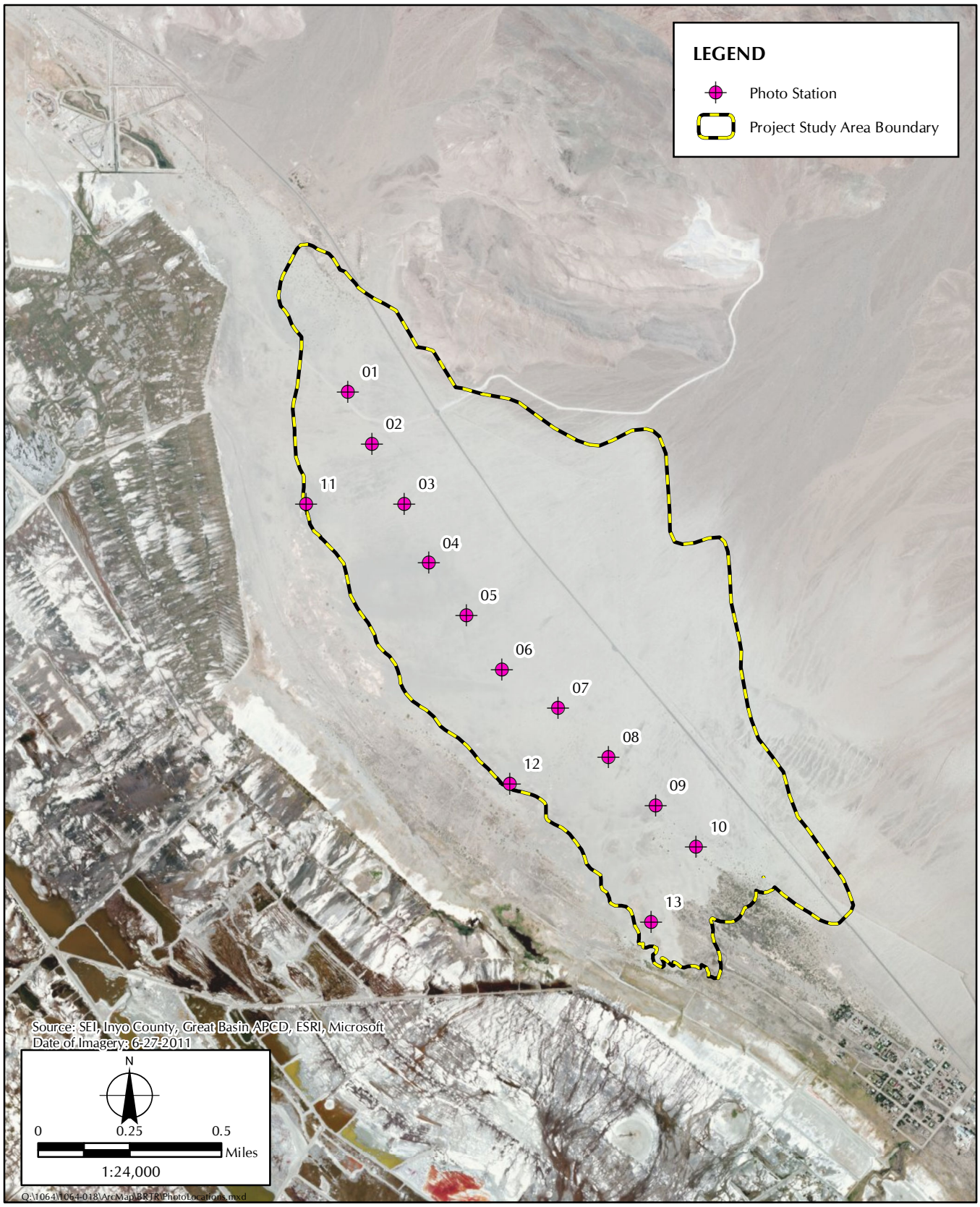

FIGURE 2.2-1

Photo Stations Map

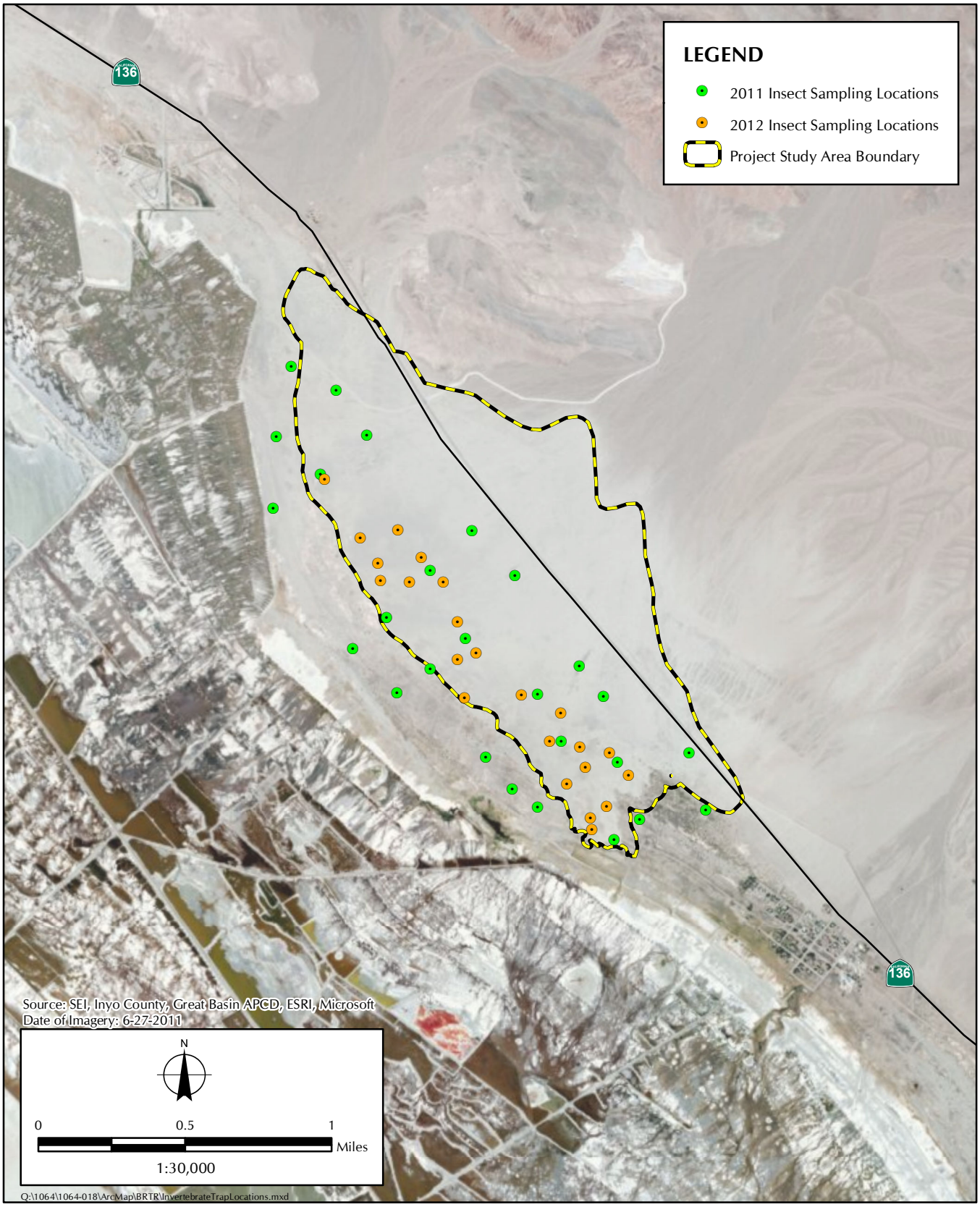

FIGURE 2.4-1

Insect Sampling Locations

SECTION 3.0
REGULATORY FRAMEWORK

This regulatory framework identifies the federal, state, and local statutes, ordinances, or policies governing the conservation and protection of biological resources that must be considered by the Great Basin Unified Air Pollution Control District (District) Governing Board and the Bureau of Land Management (BLM) Bishop Field Office during the decision-making process for projects that have the potential to affect biological resources.

3.1 FEDERAL

3.1.1 National Environmental Policy Act

The National Environmental Policy Act (NEPA) and its supporting federal regulations establish certain requirements that must be adhered to for any project "financed, assisted, conducted, or approved by a federal agency." The BLM is the lead agency pursuant to NEPA for the lands that it administers in the proposed action area. The U.S. Army Corps of Engineers (USACOE) would be the lead agency pursuant to NEPA for that portion of the proposed action requiring the issuance of a nationwide or individual permit under Section 404 of the Clean Water Act. The proposed action area contains wetlands that are subject to USACOE jurisdiction.

3.1.2 Federal Endangered Species Act

The purposes of the federal Endangered Species Act (ESA) are to provide a means to conserve the ecosystems on which endangered and threatened species depend and to provide a program for conservation and recovery of these species. The ESA defines species as endangered and threatened and provides regulatory protection for any species thus designated. Section 9 of the ESA prohibits the take of species that are listed by the U.S. Fish and Wildlife Service (USFWS) as threatened or endangered. As defined in the ESA, "take" means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in such conduct." In recognition that take cannot always be avoided, Section 10(a) of the ESA includes provisions for take that is incidental to, but not the purpose of, otherwise lawful activities. Section 10(a)(1)(B) permits (Incidental Take Permits) may be issued if take is incidental and does not jeopardize the survival and recovery of the species in the wild. No species listed under the ESA have been identified with the potential to occur near or within the proposed action study area.

Section 7(a)(2) of the ESA requires all federal agencies, including the USFWS, to evaluate the proposed action with respect to any species proposed for listing or already listed as endangered or threatened and their critical habitat, if any is proposed or designated. Federal agencies must undertake programs for the conservation of endangered and threatened species and are prohibited from authorizing, funding, or carrying out any action that will jeopardize a listed species or destroy or modify its critical habitat.

As defined in the federal ESA, "individuals, organizations, states, local governments, and other non-Federal entities are affected by the designation of critical habitat only if their actions occur on Federal lands, require a Federal permit, license, or other authorization, or involve Federal funding."

3.1.3 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 USC 668–668c), enacted in 1940 and as amended, prohibits anyone, without a permit issued by the USFWS, from "taking" bald and golden eagles, including their parts, nests, or eggs. The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." For purposes of these guidelines, "disturb" means: "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

3.1.4 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) makes it unlawful to pursue, capture, kill, or possess or attempt to do the same to any migratory bird or part, nest, or egg of any such bird listed in wildlife protection treaties among the United States, Great Britain, Mexico, Japan, and the countries of the former Soviet Union. As with federal ESA, the MBTA authorizes the Secretary of the Interior to issue permits for incidental take. Nesting birds and the contents of the nest within the construction area of the proposed action study area are protected pursuant to the MBTA.

3.1.5 Section 404 of the Federal Clean Water Act

The proposed action does not involve any wetlands or other designated waters of the United States, nor does it involve any potential wetland designated on the National Wetlands Inventory (NWI). Wetlands designated on the NWI are present along the western border of the proposed action study area but occur outside impact areas.

3.1.6 Bishop Resource Management Plan

The BLM is the predominant land owner in the Keeler Dunes area. The Keeler Dunes are located within the Owens Lake Management Area and South Inyo Management Area, two of nine management areas managed by the BLM pursuant to the Bishop Resource Management Plan.[1] The proposed DCMs would be implemented within the Owens Lake Management Area, with the exception of the KCSD well tank (Alternative 5), which is located within the South Inyo Management Area. The BLM's responsibilities include managing public land and associated natural resources to provide a variety of uses. The Bishop Resource Management Plan provides planning direction for the future use of land in the Bishop Resource Area. Policies relevant to the proposed action include the following:

RMP Decision

Provide Yearlong Protection of endangered, threatened, candidate and sensitive plant and animal habitats. Yearlong Protection is defined in the RMP as: No discretionary actions which would adversely affect target resources would be allowed.

[1] U.S. Department of the Interior, Bureau of Land Management, Bakersfield District. 1993. *Bishop Resource Management Plan Record of Decision*. Bakersfield, CA.

Wildlife

1. Consult with the California Department of Fish and Wildlife (CDFW) prior to design and accomplishment of wildlife habitat improvement projects.
2. Notify the CDFW one year in advance of any revegetation or vegetation manipulation projects.
3. Manage candidate species, sensitive species and other species of management concern in a manner to avoid the need for listing as state or federal endangered or threatened species.

In addition, the Bishop Resource Management Plan has identified several goals and decisions that apply to the Owens Lake Management Area, which includes the dry Owens Lake bed and surrounding areas including the proposed action study area west of Highway 136. The plan states the following Decisions:

- Maintain and enhance habitat for Owens pupfish, Owens tui chub, western snowy plover, Owens Valley vole and Owens sand dune snout beetle.
- Enhance wildlife habitat and watershed conditions with the following Desired Plant Community (DPC) prescriptions:
  - Meet DPC goals on 3,214 acres (75 percent) of total dune habitat to maintain habitat for the Owens sand dune snout beetle.

The DPC for Sand Dunes in the Owens Lake and South Inyo Management Areas is:

- Desired plant community for stabilized and partially stabilized desert dunes along the periphery of Owens Lake: The goal is to insure adequate vegetative cover and microclimatic conditions for the Category 2 species *Trigonoscuta owensi*, Owens sand dune snout beetle. Dunes and sand accumulations would be maintained through retention of present vegetative cover which varies from scant cover of widely scattered shrubs and herbs to nearly closed shrub canopies. Plants which predominate in the dune areas and are primarily responsible for stabilization of dune hummocks are Parry's saltbush (*Atriplex parryi*), greasewood (*Sarcobatus vermiculatus*), bush seepweed (*Suaeda moquinii*). Maintain the current overall vegetative cover of approximately 7 percent in the dune habitat.

3.2 STATE

3.2.1 California Endangered Species Act

The California ESA (CESA) prohibits the take of listed species except as otherwise provided in state law. Unlike the federal ESA, CESA applies the take prohibitions to species petitioned for listing (state candidates). State lead agencies are required to consult with CDFW to ensure that any actions undertaken by that lead agency are not likely to jeopardize the continued existence of any state-listed species or result in destruction or degradation of required habitat. CDFW is authorized to enter into memoranda of understanding with individuals, public agencies, universities, zoological gardens, and scientific or educational institutions to import, export, take, or possess listed species for scientific, educational, or management purposes. CESA was considered due to the potential presence of state-listed rare, threatened, or endangered species within the region of the proposed project study area. One species listed under CESA has been identified with the potential to occur near or within the proposed project study area.

3.2.2 State Fish and Wildlife Code

The proposed project does not involve any river, stream, lake, ephemerally flooded dry washes, or altered or artificial waterways that provide benefits to fish and wildlife resources. There is one active drainage in the proposed project study area that brings water that is captured by the southern diversion berm and directs it through a series of channels that cross through the Keeler Dunes. Neither the main active drainage nor its series of channels contain riparian habitat. Additionally, the drainage and channels occur outside proposed project impact areas.

3.2.3 Sections 2080 and 2081 of the State Fish and Game Code

Section 2080 of the State Fish and Wildlife Code (Code) states that "no person shall import into [California], export out of this state, or take, possess, purchase, or sell within this state, any species, or any part or product thereof, that the [State Fish and Wildlife Commission] determines to be an endangered species or threatened species, or attempt any of those acts, except as otherwise provided in this chapter, the Native Plant Protection Act, or the California Desert Native Plants Act."

Under Section 2081 of the Code, the CDFW may authorize individuals or public agencies to import, export, take, or possess, any state-listed endangered, threatened, or candidate species. These otherwise prohibited acts may be authorized through permits or memoranda of understanding if (1) the take is incidental to an otherwise lawful activity, (2) impacts of the authorized take are minimized and fully mitigated, (3) the permit is consistent with any regulations adopted pursuant to any recovery plan for the species, and (4) the applicant ensures adequate funding to implement the measures required by CDFW. CDFW shall make this determination based on the best scientific and other information that is reasonably available and shall include consideration of the species' capability to survive and reproduce. Section 2081 of the State Fish and Wildlife Code was considered due to the potential presence of state-listed rare, threatened, or endangered species within the region of the proposed project study area. Several species listed under the CESA have been identified with the potential to occur near or within the proposed project study area.

3.2.4 Sections 3503 and 3503.5 of the State Fish and Game Code

Sections 3503 and 3503.5 of the State Fish and Wildlife Code provide regulatory protection to resident and migratory birds and all birds of prey within the state. These sections prohibit take of nests and eggs unless other provided for by the State Fish and Wildlife Code.

3.2.5 Native Plant Protection Act

The Native Plant Protection Act includes measures to preserve, protect, and enhance rare and endangered native plants. The definitions of rare and endangered differ from those contained in CESA. However, the list of native plants afforded protection pursuant to the Native Plant Protection Act includes those listed as rare and endangered under CESA. The Native Plant Protection Act provides limitations on take as follows: "No person shall import into this state, or take, possess, or sell within this state" any rare or endangered native plant, except in compliance with provisions of the act. Individual land owners are required to notify the CDFW at least 10 days in advance of changing land uses to allow the CDFW to salvage any rare or endangered native plant material. The Native Plant Protection Act was considered in this analysis due to the potential presence of state-listed rare, threatened, or endangered plant species in the region of the proposed project

study area. Several species listed under the Native Plant Protection Act have been identified with the potential to occur near or within the proposed project study area.

3.2.6 California Desert Native Plants Act

The California Desert Native Plants Act applies to the private and public lands that are not administered by the BLM or any other Federal agency. The California Desert Native Plants Act was passed in 1981 to protect non-listed California desert native plants from unlawful harvesting on both publicly and privately owned lands. Harvest, transport, sale, or possession of specific native desert plants is prohibited unless a person has a valid permit, or wood receipt, and the required tags and seals.

3.3 COUNTY

3.3.1 Inyo County General Plan

Conservation and Open Space Element

The Conservation and Open Space Element of the Inyo County General Plan contains policies related to biological resources.[2] The Conservation and Open Space Element contains a summary of the existing conditions in the planning area, major issues, and policies designed to aid the County to achieve its goals. The two goals identified by the County for biological resources include:

- **GOAL BIO-1.** Maintain and enhance biological diversity and healthy ecosystems in the county.

- **GOAL BIO-2**. Provide a balanced approach to resource protection and recreational use of the natural environment.

Biological resources policies relevant to the proposed project include the following:

- **Policy BIO-1.1, Regulatory Compliance.** The County shall review development proposals to determine impacts to sensitive natural communities, of both local and regional concern, and special-status species. Appropriate mitigation measures will be incorporated into each project, as necessary.

- **Policy BIO-1.2, Preservation of Riparian Habitat and Wetlands.** Important riparian areas and wetlands, as identified by the County, shall be preserved and protected for biological resource value.

- **Policy BIO-1.3, Restoration of Biodiversity.** Encourage the restoration of degraded biological communities.

- **Policy BIO-1.4, Limitations for ERAs.** The County shall discourage development in Environmental Resource Areas (ERA).

[2] Inyo County Planning Department. December 2001. *Inyo County General Plan, Conservation and Open Space Element*. Independence, CA.

- **Policy BIO-1.5, Develop Outside of Habitat Areas.** Work with regulatory agencies and private developers to direct development into less significant habitat areas. Discourage urban development in areas containing sensitive natural communities or known to contain special-status species.

- **Policy BIO-1.6, Wildlife Corridors.** The County shall work to preserve and protect existing wildlife corridors where appropriate.

- **Policy BIO-1.7, Noxious Weeds.** Avoid activities that will promote the spread of noxious weeds in the County.

- **Policy BIO-1.8, Owens River Restoration.** The County will work with the LADWP and regulatory agencies to complete the restoration of habitat values along the historic Owens River channel as mitigation for degradation done with water export activities. This policy shall apply to the portion of the Owens River identified as the Lower Owens River Project.

- **Goal BIO-2.** Provide a balanced approach to resource protection and recreational use of the natural environment.

- **Policy BIO-2.1 Coordination on Management of Adjacent Lands.** Work with other government land management agencies to preserve and protect biological resources while maintaining the ability to utilize and enjoy the natural resources in the County.

- **Policy BIO-2.2 Appropriate Access for Recreation.** Work with other government land management agencies to preserve and protect biological resources while maintaining the ability to utilize and enjoy natural resources in the County.

SECTION 4.0
RECOMMENDATIONS

This section covers recommendations for the proposed project / proposed action DCMs by stabilization of dunes via the incorporation of straw bales and natural vegetation enhancement. The BLM has recommendations in place to ensure sufficient habitat and microclimate conditions for the locally rare Owens dune weevil (*Trigonoscuta owensii*). These guidelines should be considered along with BLM consultation regarding the spacing, planting, and selection of appropriate plant populations and related activities on the proposed project / proposed action site. Also, although no state or federally listed species or sensitive habitats will be impacted by the DCMs, an informal consultation may be considered with the CDFW and USFWS regarding plans to enrich the Keeler Dunes environment, as the listed western snowy plover and sensitive aquatic habitats do exist adjacent to the proposed project / proposed action site on the Owen Lake.

Successful dune stabilization will be achieved if proper species selection, proper planting strategies, adequate watering, and adequate monitoring during the crucial first few months after planting are adhered to. Other important components to success while reducing negative impacts to the site are: to select pest-free and weed-free straw bales and plants; to react quickly to problems, such as inadequate watering, herbivore damage, or disease; and to avoid drawing the attention of vandals to the site, by not using pin flags or other obvious signs.

4.1 DETAILED ELEMENTS

4.1.1 Planting

Based on recommendations by Sapphos Environmental, Inc. and BLM resource specialists, plant selection was based on local thriving populations in dune environs with consideration of the BLM goal of producing habitat suitable for the locally rare Owens dune weevil. Plant species considered for incorporation were spiny saltbush (*Atriplex confertifolia*), Parry's saltbush (*Atriplex parryi*), allscale (*Atriplex polycarpa*), burrobush (*Franseria dumosa*), greasewood (*Sarcobatus vermiculatus*), and bush seepweed (*Suaeda nigra*). Varying plant populations of at least five species of local origin was ideal, while including both "r" selected species (early successional fast growing and high seed output) and "k" selected species (late successional slower growing and lower seed output) to induce conditions for long-term successional plant communities to evolve while taking advantage of any potentials vigorous candidates that happen to thrive on the dunes. Planting techniques included building meta-populations together with different species to allow for easier watering and for successful species to become established at more locations. Also, plants respond to gradients of resource quality within an area and will do better in one spot as opposed to another nearby location, so proper local site selection will increase success. Densities recommended by BLM and found in the Bishop Resource Management Plan are around 7 percent vegetative cover. Mature shrubs may provide approximately 7 to 10 percent vegetative cover.

Based on recommendations by BLM, if any special status plants are found prior to or during proposed project / proposed action activities, the proposed design would be modified to avoid impact.

4.1.2 Irrigation

The average rainfall for the Owens Lake is approximately 2.75 inches per year, with the rainy season occurring from October through March (Table 4.1.2-1, *Owens Lake North, Keeler: Rainfall and Temperatures*). Temperatures vary enough from season to season that it is advisable to plant during the beginning of the rainy season in October. Although numerous options are available for irrigation, many would require high maintenance and have an impact on the proposed project / proposed action site, such as a sprinkler system. A semi-low-tech method such as deep watering during planting and saturation of straw bales should be considered. Low-cost options (such as 2-liter bottles upside down in the ground) or 1-foot vertical pipes in the ground near each cluster of plants are labor-intensive and leave non-biodegradable components that would have to be picked up, could be conspicuous, and might draw unwanted attention.

TABLE 4.1.2-1
OWENS LAKE NORTH, KEELER: RAINFALL AND TEMPERATURES

	2012		2011		2010		2009	
Month	Avg. Temps*	Rain Total**	Avg. Temps*	Rain Total**	Avg. Temps*	Rain Total**	Avg. Temps*	Rain Total**
Jan	53/28	0.38	51/30	0.08	48/30	0.91	54/32	0.02
Feb	55/-144	0	54/33	0.23	55/36	0.56	53/33	1.24
Mar	63/-28	0.07	63/40	1.48	62/39	0.09	63/38	0
Apr	72/12	0.03	69/45	0	65/8	0.06	69/43	0
May	47/-80	0	74/50	0.03	74/49	0.01	85/59	0
Jun	90/60	0	85/60	0	89/63	0.01	82/59	0.19
Jul	93/65	0.56	93/30	0.38	97/69	0	98/68	0.07
Aug	96/69	0.06	96/-244	0.37	93/62	0	93/63	0
Sep	90/59	0	89/-222	0.02	90/54	1.11	89/59	0
Oct	76/49	0.1	76/-254	0.02	72/50	0.38	71/45	0.05
Nov	72/44	0	56/-413	0.05	59/36	0.05	62/36	0.3
Dec	n/a	n/a	48/-303	0.01	51/32	1.51	47/-5	0.55
Totals	n/a	1.2	n/a	2.67	n/a	4.69	n/a	2.42

NOTES: *Degrees Fahrenheit. **Inches.
SOURCE: University of California Cooperative Extension. 2012. Lake County. Agriculture and Natural Resources. Available at: http://celake.ucdavis.edu/about/weather_202/?weather=station&station=183

The proposed project / proposed action and alternatives 1, 2, 3, and 4 assume that the water for plant irrigation will be supplied from the District's 12-inch production well, located at the Fault Test Site, located about 0.7 mile northwest of the proposed project / proposed action boundary. The Fault Test well is an artesian (flowing) well and is capable of producing 250 gallons per minute (gpm) on a sustained basis.[1] An initial application of water at each straw bale installed in the dust control areas is expected to require approximately 985,480 gallons, which would be applied over a 2- to 4-month period (this includes the pre-planting watering as well as the watering at the time of planting). The Fault Test production well can produce a sustained flow rate of 250 gpm and thus

[1] Holder, G., Great Basin Unified Air Pollution Control District, Bishop, CA. 9 October 2012. Telephone conversation with D. Grotzinger, Sapphos Environmental, Inc., Pasadena, CA.

only requires a total flow of 2.7 days to produce enough water for the initial watering. Flow tests conducted at the Fault Test Site have included continuous flows for periods up to 90 days with no observed impacts to the surrounding area. Thus production of the relatively small amount of water needed for the plants on the proposed project / proposed action would not be expected to cause impacts to the local area. Action alternative 5 identifies another available water source; purchased water from the Keeler Community Services District (KCSD) Well located within the southeastern portion of the proposed project / proposed action study area.

Water will be transported to the proposed project / proposed action via water truck to the staging areas. Subsequent distribution to individual plants in the proposed project / proposed action would be conducted through hoses from smaller water tanks transported to the dust control areas via the access route or alternative temporary irrigation distribution system.

The alternative temporary irrigation distribution system may originate from several points depending on the alternative and include the three staging areas tanks, truck turnouts along Highway 136 or a direct connection from the Keeler Community Services District Well. PVC pipes will be constructed in a manifold at each of the delivery points to facilitate distribution throughout the irrigation system. The basis for the alternative temporary irrigation distribution system will consist of a network of rigid, 2-6 inch PVC lateral pipes stretched for a distance of up to 1,320 feet (1/4 mile), spaced about 150 feet apart. Along these pipes will be hose attachments spaced about 100 feet apart. To irrigate the plants, the booster pump will be activated, pressurizing the manifold. Workers on all-terrain vehicles (ATVs) with hoses on a reel will move along the lateral pipes, attaching the hose and irrigating the plants within reach of that hose attachment (a maximum of 75-100 feet away). The hose will then be detached, reeled up, and moved to the next attachment site. The pipe laterals with the hose attachments can be assembled using ATVs and trailers; there will be no need for any traffic other than ATVs along the lateral lines; only foot impacts will take place with the deployment of the hoses.

4.1.3 Monitoring

Once the project elements are in place, the site would be monitored regularly for a period of 3 years to evaluate the vegetation growth progress, assess plant mortality and herbivory, assess the need for additional watering, check the physical condition of straw bales, and replant as necessary. Review of DCM effectiveness will be completed at least one time per year and will be reported with recommendations, as appropriate, for adding supplemental plants and/or straw bales as needed to achieve the NAAQS for PM_{10}.

Monitoring for plant survivorship will occur more frequently in the first year of the proposed project / proposed action and less frequently as the plants establish themselves in subsequent years.

SECTION 5.0
RESULTS AND DISCUSSION

This section of the BRTR characterizes the environmental baseline conditions for biological resources within the proposed project / proposed action site, located in Inyo County, California. The potential for the proposed project / proposed action to result in impacts to sensitive biological resources due to dust control measures will likely be low. The results address the scope of analysis recommended in Appendix G of the CEQA Guidelines, the NEPA, the Bishop Resource Management Plan (RMP),[1] and the Inyo County General Plan and zoning ordinances related to biological resources, including but not limited to, special-status species and designated critical habitat; native resident or migratory species of fish and wildlife; and the consideration of federal, state, and regional conservation plans.

Review of previously prepared environmental documents along with a California Natural Diversity Database (CNDDB) search resulted in a total of 64 special-status species for consideration within the region of the proposed project / proposed action site (Appendix A, *Potential Sensitive Species*). Further analysis of species-specific range and, in particular, required habitats, produced a total of 29 special-status species for detailed attention. These special-status species include 1 listed plant species and 8 listed wildlife species, 10 sensitive wildlife species, and 4 locally important plant species and 6 locally important wildlife species that have the potential to occur within the region of the proposed project / proposed action site based on habitat requirements and known historic range.

Field surveys were undertaken by a Sapphos Environmental, Inc. botanist (Dr. Elizabeth Kempton), supported by Sapphos Environmental, Inc. biologists (Mr. Ryan Villanueva and Mr. John Ivanov). Sapphos Environmental, Inc. personnel (Dr. Elizabeth Kempton and Mr. Ryan Villanueva) conducted wildlife and plant surveys at the proposed project / proposed action site on April 12 and 13, 2011. In addition, Dr. Sharon Martinson and Mr. Brian J. Bielfelt conducted surveys for *Tescalsia giulianiata*, a winter moth, between January 7 and January 13, 2012. A follow-up visit was performed on June 6, 2012 by a Sapphos Environmental, Inc. biologist (Mr. John Ivanov) and July 23, 2013 (Ms. Lauren Dorough and Mr. Ryan Villanueva). Entomological surveys were conducted by Dr. Sharon Martinson (contract entomologist) on May 3 and 4, 2011. Sapphos Environmental, Inc. compiled a list of sensitive plants and wildlife with the potential to occur in the proposed project / proposed action area, including wildlife observed during the field surveys (Appendix A).

5.1 WETLANDS

The determination regarding the findings of absence of federally protected wetlands within the impact areas was assessed via ground-truthing and using the topographic map provided by the National Wetlands Inventory (NWI) to direct and focus attention. The southeast corner of the proposed project / proposed action site is indicated as wetlands by the most current NWI map, which is from the 1980s (Figure 2-1). According to the NWI, this wetland area is classified as a freshwater emergent wetland. Subsequent wetlands mapping conducted by Jones and Stokes Associates, Inc. in this area in 1995 identified a wetland located at the regulatory 3,600 feet above

[1] U.S. Department of the Interior, Bureau of Land Management. April 1993. *Bishop Resource Management Plan, Record of Decision*. . Bishop, CA.

mean sea level shoreline.[2] The District has indicated that this area was a former wetland that has been covered by sand migration.[3] The proposed project / proposed action DCMs would not be located below the 3,600-foot regulatory shoreline. Based on site surveys, no apparent wetland features were identified where the NWI or Jones and Stokes records exists.

Although both species of commonly occurring plants on site, Parry's saltbush (*Atriplex parryi*) and greasewood (*Sarcobatus vermiculatus*) can occur as a hydrophyte, they are facultative species that can either occur as uplands species or wetlands species.[4] The site does not appear to exhibit wetlands hydrology, as much of the site is sandy and will not hold water. No direct indication of wetlands was noted during site surveys within the proposed project / proposed action site based on the lack of all three key criteria being present at any given point on site: hydrophytic vegetation, hydric soils, and wetland hydrology.

5.2 PLANT COMMUNITIES

The results of field mapping were incorporated into the plant community map using GIS, approximating the total area of each plant population in acres, as well as the relative distribution or percentage of the total proposed project / proposed action site. All plants were compiled taxonomically into a compendium (Appendix C, *Floral and Faunal Compendium*).

The proposed project / proposed action site contains two plant communities, Shadscale Scrub and Creosote Bush–White Burr Sage Scrub. Shadscale Scrub is dominated by three distinct communities: Parry's saltbush, greasewood, and Parry's saltbush and greasewood. Much of the proposed project / proposed action site is open dry barren areas with little or no vegetation present (Figure 5.2-1, *Plant Community Map*). In most areas, plant densities on the proposed project / proposed action site vary from about 3 percent cover to approximately 6 percent cover with small isolated clumped areas of vegetation consisting of higher concentrations of the above mentioned species.[5] The plant community mapping evaluated all areas of the proposed project / proposed action site. There are no riparian plant communities present within the proposed project / proposed action site. The Shadscale Scrub and Creosote Bush–White Burr Sage Scrub plant communities that are present within the proposed project / proposed action site are not state-designated sensitive plant communities. The acreage of plant communities on the proposed project / proposed action site is summarized in Table 5.2-1, *Plant Communities Present within the Proposed Project / Proposed Action Site*.

[2] Jones & Stokes Associates, Inc. 1996. *Delineation of Waters of the United States for the Owens Lake Playa* (JSA 95-330). Prepared for: U.S. Army Corps of Engineers, Los Angeles District, Ventura, CA. Prepared by: Jones & Stokes Associates, Inc., Sacramento, CA, and Great Basin Unified Air Pollution Control District, Bishop, CA.

[3] Holder, G., Great Basin Unified Air Pollution Control District, Bishop, CA. 28 September 2011. Email to D. Grotzinger, Sapphos Environmental, Inc., Pasadena, CA.

[4] U.S. Department of Agriculture Natural Resources Conservation Service. 2012. *National Wetland Plant List*. Available at: http://plants.usda.gov/wetland.html

[5] Great Basin Unified Air Pollution Control District. 2011. *Vegetation Cover Analysis*. Available at: http://gbuapcd.org/keelerdunes/presentations/VegetationCoverAnalysis.pdf

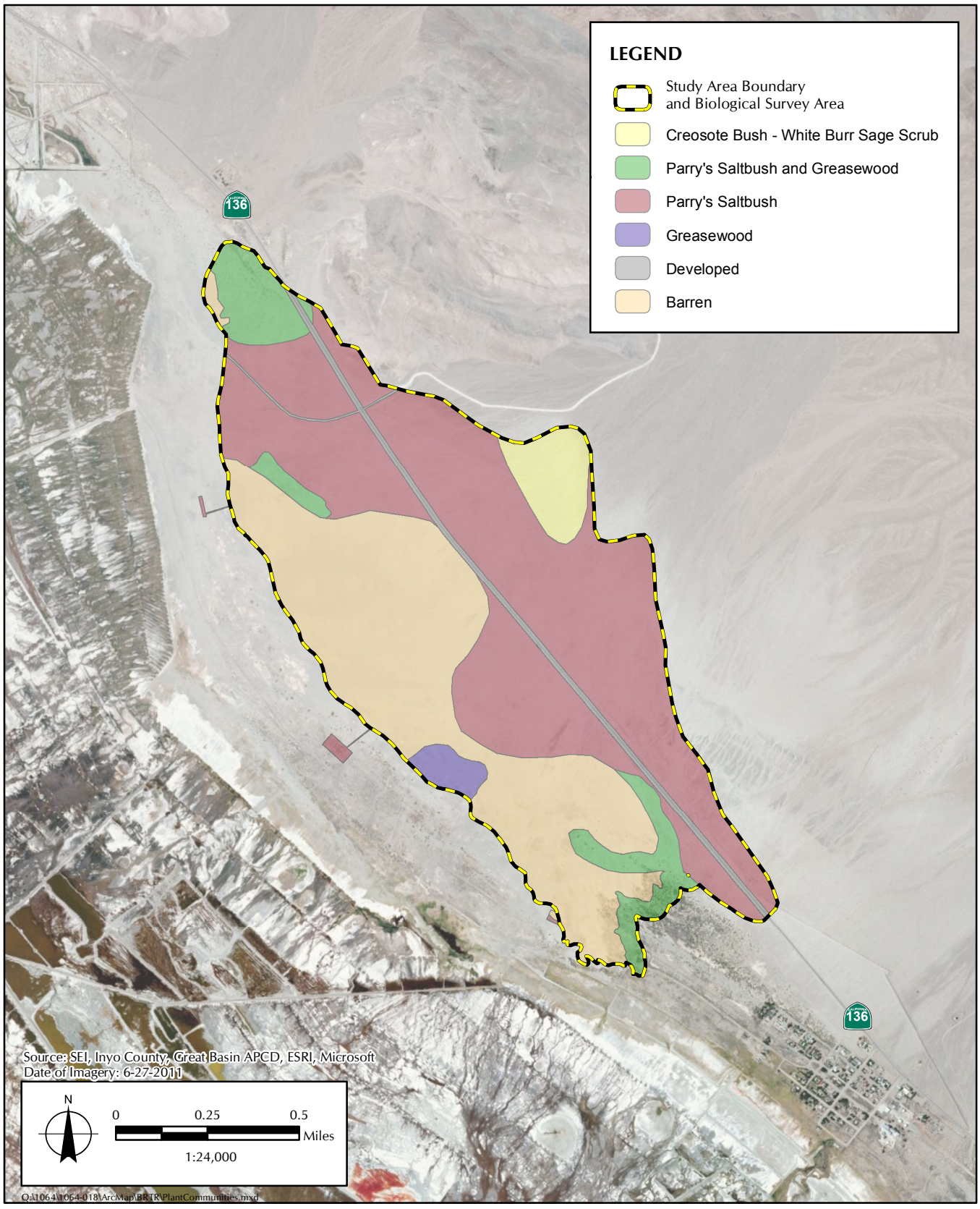

FIGURE 5.2-1

Plant Community Map

TABLE 5.2-1
PLANT COMMUNITIES PRESENT WITHIN THE PROPOSED PROJECT / PROPOSED ACTION SITE

Plant Community	Type	Element Code/Type	Current Status	Acres (Percentage)
Shadscale Scrub	Parry's Saltbush	California Natural Diversity Database Code 36.320.000	G4, S4	428 (49%)
	Parry's Saltbush and Greasewood	California Natural Diversity Database Code 36.320.000	G4, S4	12 (1%)
	Greasewood	California Natural Diversity Database Code 36.320.000	G4, S4	71 (8%)
Creosote Bush – White Burr Sage Scrub	N/A	California Natural Diversity Database Code 33.140.00	G5, S5	33 (4%)
Barren	N/A	N/A	N/A	306 (35%)
Developed	N/A	N/A	N/A	24 (3%)
			Total	874 (100%)

NOTE:
The *global rank* (G-rank) is a reflection of the overall condition of an element throughout its global range.

G1 = Less than 6 viable element occurrences (EOs) OR less than 1,000 individuals OR less than 2,000 acres.
G2 = 6–20 EOs OR 1,000–3,000 individuals OR 2,000–10,000 acres.
G3 = 21–100 EOs OR 3,000–10,000 individuals OR 10,000–50,000 acres.
G4 = Apparently secure; this rank is clearly lower than G3 but factors exist to cause some concern, i.e., there is some threat, or somewhat narrow habitat.
G5 = Population or stand demonstrably secure to ineradicable due to being commonly found in the world.

The *state rank* is assigned much the same way as the global rank, except state ranks in California often also contain a threat designation attached to the S-rank.

S1 = Less than 6 EOs OR less than 1,000 individuals OR less than 2,000 acres
S1.1 = very threatened
S1.2 = threatened
S1.3 = no current threats known
S2 = 6–20 EOs OR 1,000–3,000 individuals OR 2,000–10,000 acres
S2.1 = very threatened
S2.2 = threatened
S2.3 = no current threats known
S3 = 21–100 EOs or 3,000–10,000 individuals OR 10,000–50,000 acres
S3.1 = very threatened
S3.2 = threatened
S3.3 = no current threats known
S4 = Apparently secure within California; this rank is clearly lower than S3 but factors exist to cause some concern, i.e., there is some threat, or somewhat narrow habitat. NO THREAT RANK.
S5 = Demonstrably secure to ineradicable in California. NO THREAT RANK.

SOURCES:
California Department of Fish and Game. 2005. *Rarefind3: California Natural Diversity Database*. Sacramento, CA.
Holland, Robert F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Sacramento, CA: California Department of Fish and Game.

5.2.1 Shadscale Scrub

Parry's saltbush (*Atriplex parryi*) is the dominant species within the survey area. This Shadscale community type includes a few other species, such as greasewood (*Sarcobatus vermiculatus*) and bush seepweed (*Suaeda nigra*). This community corresponds to Sawyer and Keeler-Wolf's

Shadscale series (CNDDB Code 36.320.00) and Holland's Shadscale scrub (Element Code: 36140). Shadscale scrub occurs on approximately 511 acres. Shadscale scrub dominated by Parry's saltbush accounts for approximately 428 acres and is located in a wide swath spanning the length of the study area. Shadscale scrub dominated by greasewood accounts for approximately 71.3 acres, and one patch of the plant community is located near the middle of the study area along the southern boundary. Shadscale scrub co-dominated by Parry's saltbush and greasewood accounts for approximately 12 acres of the study area and is located in the northwest corner and southeast corner of the study area with an additional patch near the northwest corner.

5.2.2 Creosote Bush–White Burr Sage Scrub

Creosote bush (*Larrea tridentata*) and white burr sage (*Ambrosia dumosa*) were the dominant species within this plant community. This Creosote Bush–White Burr Sage Scrub community type includes a few other species, such as desert holly (*Atriplex hymenelytra*) and cheesebush (*Ambrosia salsola*). This community corresponds to Sawyer and Keeler-Wolf's Creosote Bush–White Burr Sage Scrub series (CNDDB Code 33.140.00] and Holland's Mojave Creosote Bush Scrub (Element Code: 34100). Creosote Bush–White Burr Sage Scrub occurs on approximately 33.1 acres of the study area and is located near the middle of the study area along the northern boundary.

5.2.3 Barren

Barren aeolian sand deposits occur on approximately 306 acres and is located along the length of the southern boundary of the study area. Very few vascular plants grow in these areas.

5.2.4 Developed

Developed areas include existing dirt and paved roads within the study area. Developed areas generally lack vegetation and cover approximately 24 acres of the study area.

5.3 SPECIAL-STATUS SPECIES: LISTED, SENSITIVE, AND LOCALLY IMPORTANT SPECIES

The purpose of the literature review and field surveys of special-status species, within and adjacent to the proposed project / proposed action site, was to assess the potential for the proposed project / proposed action to have an adverse effect, either directly or through habitat modifications, on any species or their respective habitats, identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations by the CDFW, USFWS, or BLM. All listed species identified were further analyzed with sensitive and locally important species being analyzed only if it was observed on or adjacent to the proposed project / proposed action or potentially suitable habitat was present for the species on the proposed project / proposed action site. See Appendix A, *Potential Sensitive Species*, for a list of all special status species identified for the proposed project / proposed action.

5.3.1 Listed Species

There is very limited potential for the nine listed and one candidate species considered (Owens valley checkerbloom [*Sidalcea covillei*], Owens tui chub [*Gila bicolor snyderi*], Owens pupfish [*Cyprinodon radiosus*], desert tortoise [*Gopherus agassizii*], Swainson's hawk [*Buteo swainsoni*], western snowy plover [*Charadrius nivosus nivosus*], western yellow-billed cuckoo [*Coccyzus americanus occidentalis*], least Bell's vireo [*Vireo bellii pusillus*], Townsend's big-eared bat

(*Corynorhinus townsendii*) and Mohave ground squirrel [*Spermophilus mohavensis*]) to utilize the site to any extent due to a lack of suitable habitat. Thus, there were no federal or state-designated plants or animals identified as being present within the proposed project / proposed action site as a result of surveys. The proposed enhancements to the site only would increase the rare likelihood of such utilization and would not be detrimental to any known sensitive population. As a result of the habitat assessment, no significant potentially suitable habitat was identified for any listed species except for a small amount of marginally suitable habitat for Mohave ground squirrel. Following is a summary of the potential occurrence of state or federally listed species after consideration of the habitat and location of the proposed project / proposed action.

Plants

Owens Valley Checkerbloom

The Owens Valley checkerbloom was determined to be absent from the proposed project / proposed action area as a result of directed surveys conducted during the blooming period. The Owens Valley checkerbloom is a perennial herb listed by the State of California as endangered and a BLM sensitive species. This species is a perennial herb with pale pinkish-lavender flowers that blooms during May and June. The Owens Valley checkerbloom occurs throughout the Owens Valley in alkaline meadows. It is found in moist alkaline meadows and seeps between 3,500–4,700 feet above mean sea level (msl). Based on the review of the CNDDB, it was determined that the three closest occurrences are 1.4 miles west of the intersection of U.S. Route 395 and SR 136, 2.4 miles west southwest of the intersection of U.S. Route 395 and SR 136, and 2.4 miles southwest of the intersection of U.S. Route 395 and SR 136. As a result of the habitat assessment and field surveys, habitat suitable to support Owens Valley checkerbloom was not identified nor was the species found within the proposed project / proposed action site.

Animals

Owens Tui Chub and Owens Pupfish

Owens tui chub and Owens pupfish were determined to be absent as a result of presence/absence surveys. There is no suitable habitat within the proposed project / proposed action area for Owens tui chub or Owens pupfish. Owens tui chub and Owens pupfish are both state and federally endangered species. These two fishes occur in aquatic habitats in the Owens Basin. Owens tui chub and Owens pupfish were not observed as a result of plant community mapping, habitat assessment, and presence/absence surveys and were determined not likely to occur at the proposed project / proposed action site due to the absence of habitat suitable to support this species. The proposed project / proposed action site lacks aquatic habitats such as rivers or pools supporting fish populations.

Although Owens pupfish and Owen tui chub are not present in the area, the U.S. Fish and Wildlife Service has identified them in the Owens Basin Wetland and Aquatic Species Recovery Plan, which includes portions of the western margin of Owens Lake between the Owens River Delta and Olancha (Figure 5.3.1-1, *Southern Owens Conservation Area*).

Desert Tortoise

This species was determined to be absent as a result of presence/absence surveys. There is no suitable habitat within the proposed project / proposed action area. Desert tortoise is a state and

federally threatened species. Desert tortoise is typically found on flats and alluvial fans with scattered shrubs and herbaceous plants growing in between. Soils range from sand to sandy gravel. Desert tortoise was not observed as a result of plant community mapping, habitat assessment, and presence/absence surveys and was determined not likely to occur at the proposed project / proposed action site due to the absence of habitat suitable to support this species. The proposed project / proposed action site lacks friable soils in open desert scrub, desert wash, and Joshua tree woodland habitats.

Swainson's Hawk

Swainson's hawk was determined to be absent as a result of presence/absence surveys. There is no suitable habitat within the proposed project / proposed action area. Swainson's hawk is a BLM sensitive and state-threatened species. Swainson's hawk breeds in areas with few trees adjacent to grasslands with adequate rodent populations. Swainson's hawk was not observed as a result of plant community mapping, habitat assessment, and presence/absence surveys and was determined not likely to occur at the proposed project / proposed action site due to the absence of habitat suitable to support this species. The proposed project / proposed action site lacks nest sites as well as a large prey population that would allow for regular foraging during any season.

Western Snowy Plover

Western snowy plover is a state species of special concern. A distinct population segment does occur along the Pacific Coast and is federally threatened. However, the proposed project / proposed action study area does not fall within the distinct population segment for the species. Based on the review of the CNDDB, it was determined that the three closest occurrences include two records within Owens Lake and one record 7.5 miles northwest of Keeler. The presence of western snowy plover at Owens Lake is well documented. Western snowy plover breeds on barren to sparsely vegetated ground at alkaline or saline lakes, reservoirs, and ponds.[6] At the Owens Lake, snowy plovers nest in relatively flat areas of barren playa with sandy and gravelly substrate and other gravel-covered surfaces, including berms and roadways. The proposed project / proposed action site lacks nest sites as well as suitable foraging habitat needed for plovers.

Western Yellow-Billed Cuckoo and Least Bell's Vireo

Western yellow-billed cuckoo and least Bell's vireo were determined to be absent as a result of presence/absence surveys. The western yellow-billed cuckoo is federally proposed as a threatened species and a state-endangered species. The least Bell's vireo is listed by both the state and federal governments as endangered. Western yellow-billed cuckoo and least Bell's vireo require riparian woodland habitats for all or portions of their life cycle. Western yellow-billed cuckoo and least Bell's vireo were not observed as a result of plant community mapping, habitat assessment, and presence/absence surveys and were determined not likely to occur at the proposed project / proposed action site due to the absence of habitat suitable to support this species. The proposed project / proposed action site lacks riparian woodland habitat suitable to support these two species.

[6] Page, G.W., J.S. Warriner, J.C. Warriner, and P.W.C. Paton. 1995. "Snowy Plover (Charadrius alexandrinus)." In *The Birds of North America*, No. 154, eds. A. Poole and F. Gill. Philadelphia, PA: Academy of Natural Sciences and Washington, DC: American Ornithologists' Union.

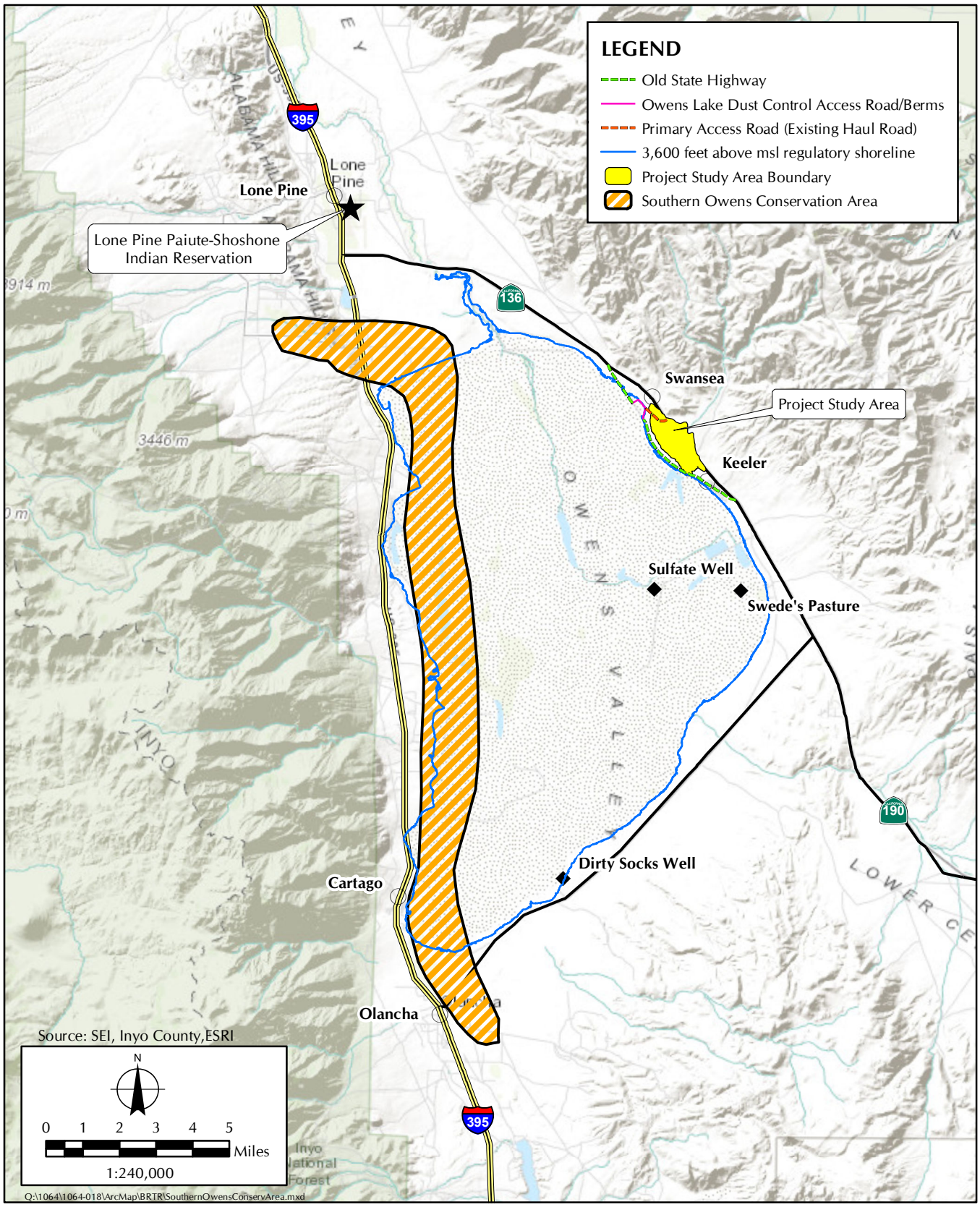

FIGURE 5.3.1-1

Southern Owens Conservation Area

Townsend's Big-Eared Bat

There is no roosting habitat within the proposed project / proposed action area for Townsend's big-eared bat. Bats utilize the Owens Lake bed and dunes for foraging only. However, this BLM sensitive and state candidate species has the potential to occur within the proposed project / proposed action site based on habitat requirements needed for foraging. Based on the review of the CNDDB, it was determined that the three closest occurrences of Townsend's big-eared bat include 16 miles east of Lone Pine, 2.2 miles north northwest of Keeler, and 11 miles southeast of Lone Pine.

Mohave Ground Squirrel

Mohave ground squirrel was determined to be absent as a result of presence/absence surveys. The Mohave ground squirrel is a BLM sensitive and state-threatened species. Habitat suitable to support Mohave ground squirrel consists of desert scrub, alkali scrub, and Joshua tree woodland habitats. The Mohave ground squirrel was not observed as a result of plant community mapping, habitat assessment, and presence/absence surveys and was determined not likely to occur at the proposed project / proposed action site due to the presence of a small amount of marginally suitable habitat to support this species. However, the marginally suitable habitat for the species is located north of Highway 136 and all proposed project / proposed action site activities are planned for areas south of Highway 136.

5.3.2 Sensitive Species

Sensitive species include all species not federally or state listed, but exclude the locally important species referenced in the section below and all other non-sensitive species. This includes all species listed as sensitive species by the BLM and/or California species of special concern by CDFW. Having identified suitable potential habitat with the study area, Sapphos Environmental, Inc. identified 16 sensitive species: Creamy blazing star (*Mentzelia tridentata*), Inyo County star-tulip (*Calochortus excavatus*), Sagebrush loeflingia (*Loeflingia squarrosa* var. *artemisiarum*), Sanicle cymopterus (*Cymopterus ripleyi* var. *saniculoides*), golden eagle (*Aquila chrysaetos*), American peregrine falcon (*Falco peregrinus anatum*), California horned lark (*Eremophila alpestris actia*), Le Conte's thrasher (*Toxostoma lecontei*), Loggerhead shrike (*Lanius ludovicianus*), Merlin (*Falco columbarius*), northern harrier (*Circus cyaneus*), prairie falcon (*Falco mexicanus*), American badger (*Taxidea taxus*), Owens Valley vole (*Microtus californicus vallicola*) and Southern grasshopper mouse (*Onychomys torridus ramona*). Certain species are excluded if suitable habitat for the species is not present on site (see Appendix A). An example of this would be Cooper's hawk, whose area of sensitivity is during the breeding season; due to a lack of suitable breeding habitat, even though limited suitable foraging habitat is available on site, this species has been excluded.

Although numerous sensitive species could potentially utilize the site in a very limited fashion, only the most likely were included. Taxa, such as Aves, are very mobile and could end up almost anywhere, at the very least, utilizing the air space above. Many such transient populations could utilize the Owens Lake adjacent to the proposed project / proposed action site. As a result of the habitat assessment, no significant potentially suitable habitat was identified for any sensitive species. Following is a summary of the considered inclusion for potential occurrence of sensitive species after consideration of the habitat and location of the proposed project / proposed action site.

Plants

Creamy Blazing Star

Creamy blazing star was determined to be absent within the proposed project / proposed action area as a result of directed surveys of the plant community, which provides potentially suitable habitat for this species, undertaken during the flowering period. Inyo County star-tulip is designated as a list 1B.3 plant (rare, threatened, or endangered in California and elsewhere) by CNPS. Creamy blazing star has been determined to be absent from the proposed project / proposed action area as a result of literature review, agency coordination, consultation with experts, and detailed field surveys. Based on the review of the CNDDB, the closest occurrence of this species is located 27 miles south of the proposed project / proposed action boundary.

Inyo County Star-Tulip

Inyo County star-tulip was determined to be absent within the proposed project / proposed action area as a result of directed surveys of the plant community, which provides potentially suitable habitat for this species, undertaken during the flowering period. Inyo County star-tulip is designated as a list 1B plant (rare, threatened, or endangered in California and elsewhere) by CNPS. Inyo County star-tulip has been determined to be absent from the proposed project / proposed action area as a result of literature review, agency coordination, consultation with experts, and detailed field surveys. Based on the review of the CNDDB, it was determined that the three closest occurrences are 2.5 miles southwest, 2.4 miles west-southwest, and 2.9 miles west of the U.S. Route 395 / SR 136 intersection.

Sagebrush Loeflingia

Sagebrush loeflingia was determined to be absent within the proposed project / proposed action area as a result of directed surveys of the plant community, which provides potentially suitable habitat for this species, undertaken during the flowering period. Sagebrush loeflingia is designated as a list 2.2 plant (rare, threatened, or endangered in California but more common elsewhere) by CNPS. Sagebrush loeflingia has been determined to be absent from the proposed project / proposed action area as a result of literature review, agency coordination, consultation with experts, and detailed field surveys. Based on the review of the CNDDB, it was determined that the closest occurrence is 35 miles northwest of the proposed project / proposed action.

Sanicle cympoterus

As a result of literature review, agency coordination, consultation with experts, and directed surveys undertaken during the flowering period, sanicle cymopterus was determined to be absent within the proposed project / proposed action study area. Sanicle cymopterus is designated as a CNPS List 1B.2 plant (rare, threatened, or endangered in California and elsewhere) and BLM sensitive species. Based on the review of the CNDDB, the closest occurrence of this species is located 17 miles south of the proposed project / proposed action boundary. As a result of the habitat assessment and field surveys, habitat suitable to support sanicle cymopterus was identified, but individuals were not found within the proposed project / proposed action.

Sanicle cymopterus was determined to be absent within the proposed project / proposed action area as a result of directed surveys of the plant community, which provides potentially suitable habitat for this species, undertaken during the flowering period. Sanicle cymopterus is designated

as a list 1B.2 plant (rare, threatened, or endangered in California and elsewhere) by CNPS. Sanicle cymopterus has been determined to be absent from the proposed project / proposed action area as a result of literature review, agency coordination, consultation with experts, and detailed field surveys. . Based on the review of the CNDDB, the closest occurrence of this species is located 17 miles south of the proposed project / proposed action boundary.

Animals

American Peregrine Falcon

As a result of the habitat assessment and plant community mapping, low-grade suitable foraging habitat for American peregrine falcon was found throughout the proposed project / proposed action site, primarily in the western areas closer to marsh habitats and shallow flooding areas of the Owens Lake bed. American peregrine falcon is a California species of special concern. CNDDB records for this species are suppressed. No observations of American peregrine falcon were made during Sapphos Environmental, Inc. conducted surveys in the proposed project / proposed action area. The American peregrine falcon was previously listed as endangered under the state Endangered Species Act (ESA). The entire proposed project / proposed action area was determined to be of very limited use for foraging by the American peregrine falcon.

California Horned Lark

California horned lark has been determined to be present in the proposed project / proposed action area as a result of detailed field surveys and literature review. Observations of the Le Conte's thrasher were made during Sapphos Environmental, Inc. conducted surveys in the proposed project / proposed action area. Suitable habitat for the species is present on the proposed project / proposed action site.

Golden Eagle

As a result of the habitat assessment and plant community mapping, low-grade suitable foraging habitat for golden eagle was found throughout the proposed project / proposed action site. Golden eagle is a California fully protected species and BLM sensitive species. Listing as a fully protected species means that pursuant to state law, golden eagles may not be taken at any time and no state-issued licenses or permits may be issued for their take. Based on the review of the CNDDB, it was determined that the closest occurrence is 15.9 miles south. No observations of golden eagle were made during Sapphos Environmental, Inc. conducted surveys in the proposed project / proposed action area. The entire proposed project / proposed action area was determined to be of very limited use for foraging by the golden eagle.

Le Conte's Thrasher

Le Conte's thrasher has been determined to be present in the proposed project / proposed action area as a result of detailed field surveys and literature review. Observations of the Le Conte's thrasher and their nests were made during Sapphos Environmental, Inc. conducted surveys in the proposed project / proposed action area. Suitable habitat for the species is present on the proposed project / proposed action site.

Loggerhead Shrike

Loggerhead Shrike has been determined to be present in the proposed project / proposed action area as a result of detailed field surveys and literature review. Observations of the loggerhead shrike were made during Sapphos Environmental, Inc. conducted surveys within the proposed project / proposed action area. Suitable habitat for the species is present on the proposed project / proposed action site.

Merlin

As a result of the habitat assessment and plant community mapping, low-grade suitable foraging habitat for merlin was found throughout the proposed project / proposed action site. Merlin is a California species of special concern. CNDDB records for this species are suppressed. No observations of merlin were made during Sapphos Environmental, Inc. conducted surveys in the proposed project / proposed action area. The entire proposed project / proposed action area was determined to be of very limited use for foraging by the golden eagle.

Northern Harrier

As a result of the habitat assessment and plant community mapping, low-grade suitable foraging habitat for northern harrier was found throughout the proposed project / proposed action site. There was no suitable breeding habitat for northern harrier breeding identified within the proposed project / proposed action site as a result of directed surveys. The proposed project / proposed action site lacks riparian habitats and open grasslands. Northern harriers, a California species of special concern, were observed foraging on the western portion of the proposed project / proposed action area. Northern harriers usually return to the same area to nest. They nest on the ground in well-concealed locations, often near low shrubs or in tall clumps of vegetation. Nesting locations are usually in abandoned fields, wet meadows, and coastal and inland marshes. CNDDB records for this species are suppressed.

Prairie Falcon

Prairie falcons, a California species of special concern, have been frequently seen foraging west of the proposed project / proposed action site over Owens Lake and may utilize the site for hunting. CNDDB records for this species are suppressed. One observation of prairie falcon was made during Sapphos Environmental, Inc. conducted surveys in the proposed project / proposed action area. Prairie falcon is a desert and grassland species that nests in cliffs and preys mainly on birds and small mammals.

Pallid Bat and Spotted Bat

There is no roosting habitat within the proposed project / proposed action area for pallid bat or spotted bat. Bats utilize the Owens Lake bed and dunes for foraging only. However, these special-status bat species (all are California species of concern and BLM sensitive species) have the potential to occur within the proposed project / proposed action site based on habitat requirements needed for foraging. Based on the review of the CNDDB, it was determined that the three closest occurrences of pallid bat include three records from Owens Lake. Based on the review of the CNDDB, it was determined that the closest occurrences of spotted bat include six records from Owens Lake. No observations of pallid bat or spotted bat were made during Sapphos Environmental, Inc. conducted surveys in the proposed project / proposed action area.

American Badger

American Badger is a California species of special concern. As a result of directed field investigations, the American badger was determined to be present in the proposed project / proposed action area. Although no dens or evidence of on-site breeding was recorded, American badger is known to occasionally frequent the proposed project / proposed action site, most likely for foraging. The American badger is a wide-ranging species that occurs throughout most of the western United States, except for humid coastal plains. Reduction in numbers is primarily attributed to the conversion of grassland habitats to farmland.

Owens Valley Vole

Owens Valley vole, a BLM sensitive species and state species of special concern, is found in friable soils of wetlands and lush grassy ground in the Owens Valley. Based on the review of the CNDDB, it was determined that the closest occurrences include four records located approximately 500 feet east of U.S. Route 395 in Olancha. No observations of Owens Valley vole were made during Sapphos Environmental, Inc. conducted surveys in the proposed project / proposed action area. Marginally suitable habitat occurs in the Owens Lake bed, but not on the proposed project / proposed action site. Owens Valley vole has been found during focused surveys in other parts of Owens Lake.

Southern Grasshopper Mouse

Southern grasshopper mouse is a California species of special concern that is found in prairies and deserts in grass, sagebrush, and greasewood with sandy or gravelly soil. Based on the review of the CNDDB, there are no occurrences located within Inyo County. No observations of southern grasshopper mouse were made during Sapphos Environmental, Inc. conducted surveys in the proposed project / proposed action area. Suitable habitat occurs within the boundary of the proposed project / proposed action study area. Southern grasshopper mouse has been found during focused surveys in other parts of the Owens Lake bed.

5.3.3 Locally Important Species

As a result of the habitat assessment potentially suitable within the species concern area, Sapphos Environmental, Inc. identified four locally important plant species and six locally important wildlife species that were then the subject of detailed surveys: Booth's evening primrose (*Camissonia boothii* ssp. *boothii*), Lincoln rock cress (*Boechera lincolnensis*), Naked milk-vetch (*Astragalus serenoi* var. *shockleyi*), Nevada oryctes (*Oryctes nevadensis*), Alkali flats tiger beetle (*Cicindela willistoni pseudosenilis*), alkali skipper (*Pseudocopaeodes eunus*), *Tescalsia giulianiata* (no common name), Owens dune weevil (*Trigonoscuta owensii*), Owens Valley tiger beetle (*Cicindela tranquebarica inyo),* short-legged tiger beetle (*Cicindela tenuicincta*), and Bell's sparrow (*Amphispiza belli canensis*). Locally important species are defined as a plant or animal that lacks a formal listing, from either federal or state agencies, but is considered to be regionally unique, limited, or imperiled. Certain species are excluded if it was not observed during surveys or suitable habitat for the species is not present on site (see Appendix A).

Plants

Booth's Evening Primrose

Booth's evening primrose was determined to be absent within the proposed project / proposed action area as a result of directed surveys of the plant community that provides potentially suitable habitat for this species, undertaken during the flowering period. Booth's evening primrose is designated as a list 2.3 plant (rare, threatened, or endangered in California, but more common elsewhere) by CNPS. Booth's evening primrose has been determined to be absent from the proposed project / proposed action area as a result of literature review, agency coordination, consultation with experts, and detailed field surveys. Based on the review of the CNDDB, it was determined that the closest occurrences are located in the Lone Pine quadrangle, a minimum of 10.8 miles west of the proposed project / proposed action.

Lincoln's Rock Cress

Lincoln's rock cress was determined to be absent within the proposed project / proposed action area as a result of directed surveys of the plant community that provides potentially suitable habitat for this species, undertaken during the flowering period. Lincoln's rock cress is designated as a list 2.3 plant (rare, threatened, or endangered in California, but more common elsewhere) by CNPS. Lincoln's rock cress has been determined to be absent from the proposed project / proposed action area as a result of literature review, agency coordination, consultation with experts, and detailed field surveys. Based on the review of the CNDDB, it was determined that the closest occurrence is located 9.4 miles northeast of the proposed project / proposed action.

Naked Milk-Vetch

As a result of directed surveys, naked milk-vetch was determined to be absent within the proposed project / proposed action study area. Naked milk-vetch is designated as a CNPS List 2.2 plant (rare, threatened or endangered in California but more common elsewhere). naked milk-vetch has been determined to be absent in the proposed project / proposed action study area as a result of literature review, agency coordination, consultation with experts, and detailed field surveys. Based on the review of the CNDDB, the closest occurrence of this species is located 3.1 miles north of the proposed project / proposed action boundary. As a result of the habitat assessment and field surveys, habitat suitable to support naked milk-vetch was identified, but individuals were not found within the proposed project / proposed action.

Nevada Oryctes

Nevada oryctes was determined to be absent within the proposed project / proposed action area as a result of directed surveys of the plant community that provides potentially suitable habitat for this species, undertaken during the flowering period. Nevada oryctes is designated as a list 2.1 plant (rare, threatened, or endangered in California, but more common elsewhere) by CNPS. Nevada oryctes has been determined to be absent from the proposed project / proposed action area as a result of literature review, agency coordination, consultation with experts, and detailed field surveys. Based on the review of the CNDDB, it was determined that the closest occurrences are located in the Lone Pine quadrangle, a minimum of 5 miles west of the proposed project / proposed action.

Animals

Alkali Flats Tiger Beetle

Literature review, agency coordination, consultation with experts, and detailed field surveys determined alkali flats tiger beetle to be potentially present in the proposed project / proposed action study area. Although no alkali flats tiger beetles were observed during field surveys, a review of insect collections revealed that at least three individuals have been collected in the vicinity. Several specimens of alkali flat tiger beetle have been collected from the Owens Lake area in 1937 and 1946 and from Keeler in 1953, but it is not possible to identify exactly where these specimens were collected.

Alkali Skipper

Alkali skipper has been determined to be absent from the proposed project / proposed action area as a result of literature review, agency coordination, consultation with experts, and detailed field surveys. Insect collections reveal that this species has been observed around Lone Pine, but there are no other records documenting this species closer to Keeler Dunes. Alkali skipper was not observed during detailed field surveys but the plant community may be potential habitat for this species.

Tescalsia giulianiata

T. giulianiata has been determined to be potentially present at the proposed project / proposed action area as a result of literature review, agency coordination, consultation with experts, and detailed field surveys. This species is very cryptic and has not been well described. For example, the larval food plant for *T. giulianiata* is unknown. *T. giulianiata* has only been recorded from a few locations, with most of the insects collected around dunes at Deep Spring, within the Alabama Hills, and around Owens Lake, including a specimen collected 9 miles northwest of Keeler in the entomology collection at the Essig Museum. Reportedly, the leading expert on *T. giulianiata*, the late Derham Giuliani, said the ecosystems around Keeler Dunes appeared to be suitable for *T. giulianiata*. It is best to assume that this species is potentially present at the proposed project / proposed action area because of the accounts from Mr. Giuliani, the absence of detailed habitat-related information for this species, its limited flight period each year, and known records around Owens Lake.

Owens Dune Weevil

Owens dune weevil has been determined to be present in the proposed project / proposed action area as a result of detailed field surveys. Owens dune weevil was observed seven times during May 2011 and once during May 2012 surveys. These individuals were observed in sandy, barren areas (two individuals); in Parry's saltbush (three individuals); and in Parry's saltbush/greasewood (one individual) vegetation type areas. Prior to May 2011, two additional incidental observations of the species were made in sandy, barren areas along the dunes.

Owens Valley Tiger Beetle

Owens Valley tiger beetle has been determined to be potentially present on the proposed project / proposed action area as a result of literature review, agency coordination, consultation with experts, and detailed field surveys. This species has been detected and collected within the Owens

Valley, including an individual observed around Owens Lake within several miles of the proposed project / proposed action boundary.[7] The presence of this species around Owens Lake increased the probability that this species may be present within the study area, even though it was not detected during surveys.

Short-Legged Tiger Beetle

Short-legged tiger beetle has been determined to be absent from the proposed project / proposed action area as a result of literature review, agency coordination, consultation with experts, and detailed field surveys. Previous documents in support of Owen's Lake projects have called this species the "slender-girdled tiger beetle"; however, a majority of scientific literature refers to this genus and species as the "short-legged tiger beetle." Reviewed insect collections have not documented short-legged tiger beetle in the vicinity of the study area. Therefore, evidence suggests that this species is absent from the proposed project / proposed action area.

Bell's Sparrow

Bell's sparrow has been determined to be present in the proposed project / proposed action area as a result of detailed field surveys. Observations of Bell's sparrow on the proposed project / proposed action study area have been made. Suitable foraging habitat for the species is present on the proposed project / proposed action site.

5.4 NATIVE RESIDENT OR MIGRATORY SPECIES

5.4.1 Mammals

Having identified suitable potential habitat within the study area, Sapphos Environmental, Inc. identified 12 native resident or migratory wildlife species that were the subject of analysis: deer mouse (*Peromyscus maniculatus*), Merriam's kangaroo rat (*Dipodomys merriamii*), little pocket mouse (*Perognathus longimembris*), western harvest mouse (*Reithrodontomys megalotis*), chisel-toothed kangaroo rat (*Dipodomys microps*), Panamint kangaroo rat (*D. panamintinus*), tule elk (*Cervus elaphus nannodes*), Ringtail (*Bassariscus astutus*), Desert kit fox (*Vulpes macrotis arsipus*), Yuma myotis *(Myotis yumanensis),* California myotis *(Myotis californicus),* and Mexican free-tailed bat *(Tadarida brasiliensis).*

Small Mammals

Sapphos Environmental, Inc. conducted small mammal trapping at three locations on the Owens Lake bed in 2007, adjacent to the proposed project / proposed action location, including a proposed shallow flooding site, previously established revegetation site, and a wet meadow site. The proposed shallow flooding site had the lowest capture rate of 2 percent, with only deer mice captures. Deer mice captured at the proposed shallow flooding site were observed. Post-release, deer mice returned to areas previously revegetated. Small mammal trapping efforts in the established revegetated grid resulted in the capture of two species, deer mouse (*Peromyscus maniculatus*) and Merriam's kangaroo rat (*Dipodomys merriamii*), with a capture rate of 7.3 percent. The Bartlett Springs wet meadow site and associated margin had moderate capture rates of 4.6 percent with the highest diversity of small mammals captured with five species represented:

[7] Sapphos Environmental, Inc. 2008. *Owens Valley PM_{10} Planning Area Final Biological Resources Technical Report*. Pasadena, CA.

little pocket mouse (*Perognathus longimembris*), western harvest mouse (*Reithrodontomys megalotis*), Merriam's kangaroo rat, chisel-toothed kangaroo rat (*Dipodomys microps*), and Panamint kangaroo rat (*D. panamintinus*). Although these species were documented adjacent to the proposed project / proposed action site, there is foraging potential for all six species in and around the proposed project / proposed action site.

Tule Elk

Tule elk has been determined to be absent in the proposed project / proposed action study area as a result of detailed field surveys and literature review. The proposed project / proposed action site is located in close proximity to a calving area for tule elk (*Cervus elaphus nannodes*). In addition, the Owens River delta is a calving area for the Owens Valley population of tule elk. Tule elk occur in wooded, shrubby, grassland, and riparian habitats. One of nine Owens Valley tule elk calving areas exists on the north end of Owens Lake. The calving period for tule elk occurs from May to June. This is the period tule elk would be expected to found on the lake bed, but not within the Keeler Dunes. The proposed project / proposed action site does not have suitable habitat for Owens Valley tule elk; any occurrences would be of a transient nature. The Owens Valley tule elk herd is managed at a population size of 300 individuals through hunting.

Ringtail

Ringtail has been determined to be present in the proposed project / proposed action study area as a result of detailed field surveys and literature review. Although no observations of the ringtail were made during Sapphos Environmental, Inc. conducted surveys, observations of ringtail sign indicate the species frequently utilizes the proposed project / proposed action area, particularly in the past year. The proposed project / proposed action site does not have suitable habitat for ringtail. Occurrences would be of a transient nature with individuals passing through the proposed project / proposed action area in search of a patch of suitable habitat.

Desert Kit Fox

Desert kit fox has been determined to be present in the proposed project / proposed action area as a result of detailed field surveys and literature review. Although no observations of the desert kit fox were made during Sapphos Environmental, Inc. surveys, observations of adults and pups utilizing the proposed project / proposed action area have been made. Dens, including breeding dens, have been observed in and around the proposed project / proposed action site.

Migratory Bat Species

As a result of the biological surveys and literature review, Sapphos Environmental, Inc. identified three common migratory bat species that are present in the proposed project / proposed action site: Yuma myotis, California myotis, and Mexican free-tailed bat. Sapphos Environmental, Inc. took into consideration habitat preferences and known range of each species to make a determination as to which species could potentially be present. There is no roosting habitat within the proposed project / proposed action area for Yuma myotis, California myotis, and Mexican free-tailed bat. Bats utilize the Owens Lake bed and dunes for foraging only. However, these bat species have the potential to occur within the proposed project / proposed action site based on habitat for foraging.

Terrestrial Corridors

The proposed project / proposed action site contains sparse, monotypic Shadscale scrub habitat and lacks known or documented terrestrial mammal corridors. Terrestrial mammal movement through the site will not be hindered by the proposed project / proposed action. Revegetation will take place on approximately 194 acres and cover is anticipated to be patchy, ranging from 15 percent to 27.5 percent cover, leaving terrestrial mammals the capability to easily travel through the proposed project / proposed action property.

5.4.2 Birds

The proposed project / proposed action area does not support breeding areas for the western snowy plover and other shorebirds protected under the Migratory Bird Treaty Act. The Owens Valley is part of the Pacific Flyway for migrating shorebirds, waterfowl, and other species. The National Audubon Society and Bird Life International have designated Owens Lake as a Nationally Important Bird Area, but would not include the Keeler Dunes due to a lack of suitable foraging and breeding habitat for most birds.

Of the 39 avian species recorded at the proposed project / proposed action property as a result of biological surveys in 2011 and 2012, after excluding listed and sensitive species, it was determined that 6 common species of interest, all raptors, were observed:

- Turkey vulture (*Cathartes aura*)
- Cooper's hawk (*Accipiter cooperii*)
- Red-tailed hawk (*Buteo jamaicensis*)
- American kestrel (*Falco sparverius*)
- Barn owl (*Tyto alba*)
- Great horned owl (*Bubo virginianus*)

Turkey Vulture

Turkey vultures are abundant in many areas of North America and slightly less common throughout California, including Owens Valley.[8] Turkey vultures do not usually breed in desert habitats away from foothills and mountains. They may breed locally but are more common as migrants.[9,10,11] Turkey vulture was observed flying over the proposed project / proposed action site during biological surveys.

[8] Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society, p. 408.

[9] Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society, p. 408.

[10] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

[11] Rowe, S. P., and T. Gallion. 1996. "Fall Migration of Turkey Vultures and Raptors through the Southern Sierra Nevada, California." *Western Birds*, *27*: 48–53.

Cooper's Hawk

Cooper's hawk populations have dramatically increased over the last 20 to 30 years in North American and the species has become fairly common to common in Southern California.[12,13,14] It breeds in many areas of the Owens Valley and eastern Inyo County,[15,16] but does not breed within the proposed project / proposed action property because suitable breeding habitat (riparian forest and other closed woodlands) is absent. Cooper's hawk was observed flying over the proposed project / proposed action site during biological surveys and utilized the site for foraging.

Red-tailed Hawk

Red-tailed hawk is common to abundant throughout North America and Southern California, including Inyo County.[17,18,19] but does not breed on the proposed project / proposed action property because suitable breeding habitat (large trees and cliffs) is absent. Red-tailed hawk was observed flying over the proposed project / proposed action site during biological surveys and utilized the site for foraging.

American Kestrel

The American kestrel is a common raptor species that will breed and winter in the Owens Valley and Inyo County.[20,21] It will nest in small and large trees, including Joshua tree cavities or other available cavity nest sites, but the proposed project / proposed action site lacks suitable breeding habitat. American kestrel was observed flying over the proposed project / proposed action site during biological surveys and utilized the site for foraging.

Barn Owl

The barn owl is fairly common in agricultural regions and grassland habitats that are intermixed with scattered ranch yards, groves of trees, and cliffs at lower elevations through much of Southern California.[22,23] Barn owls would be unlikely to nest on the proposed project / proposed action site

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[12] Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society, p. 408.

[13] Sibley, D.A. 2000. *The Sibley Guide to Birds*. New York, NY: Knopf.

[14] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

[15] Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society, p. 408.

[16] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

[17] Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society, p. 408.

[18] Sibley, D.A. 2000. *The Sibley Guide to Birds*. New York, NY: Knopf.

[19] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

[20] Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society, p. 408.

[21] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

[22] Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society, p. 408.

because of scarcity of suitable nest sites (mine shafts and caves). Barn owl was observed flying over the proposed project / proposed action site during biological surveys and utilized the site for foraging.

Great Horned Owl

The great horned owl is a common raptor species of interest in California. Great horned owls are numerous in appropriate habitat in many areas of Southern California and North America, including the Owens Valley and Inyo County.[24,25,26] Great horned owls would be unlikely to nest on the proposed project / proposed action site because of scarcity of suitable nest sites (large trees and snags). Great horned owl was observed flying over the proposed project / proposed action site during biological surveys and utilized the site for foraging.

5.4.3 Herpetofauna

As a result of the literature review and habitat assessment, three commonly occurring species of herpetofauna were found to be present within the proposed project / proposed action site, including desert spiny (*Sceloporus magister*), zebra-tailed lizard (*Callisaurus draconoides*), and common side-blotched lizard (*Uta stansburiana*). All three species were noted on site during surveys.

5.4.4 Fish

Standing water is absent within the proposed project / proposed action property. Consequently, no fish were identified within the proposed project / proposed action property.

5.5 IMPACT ANALYSIS

5.5.1 Mammals

The construction, operation, and maintenance of the proposed project / proposed action would not be expected to result in significant adverse impacts to, or adversely affect, the survival and recovery in the wild of common small mammal species that may be resident in the vicinity of the proposed project / proposed action area and that may forage within the proposed project / proposed action study area. Therefore, the consideration of mitigation measures for these species is not warranted.

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[23] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

[24] Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society, p. 408.

[25] Sibley, D.A. 2000. *The Sibley Guide to Birds*. New York, NY: Knopf.

[26] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

5.5.2 Resident or Migratory Birds

Due to the lack of suitable breeding and migratory stopover habitat, the proposed project / proposed action would not result in significant adverse impacts to, or adversely affect, the survival of common birds identified within the proposed project / proposed action study area. Therefore, direct, indirect, or cumulative impacts would not be anticipated for common bird species and the consideration of mitigation measures for these species is not warranted.

5.5.3 Herpetofauna

Due to the low numbers of herpetofauna, the proposed project / proposed action would not result in significant adverse impacts to, or adversely affect, the survival of common herpetofauna identified within the proposed project / proposed action study area. Therefore, direct, indirect, or cumulative impacts are not anticipated for common herpetofauna and the consideration of mitigation measures for these species is not warranted.

5.5.4 Fish

No fish species were identified within the proposed project / proposed action study area; therefore, there would be no anticipated impacts to biological resources related to migratory fish. The consideration of mitigation measures for these species is not warranted.

5.5.5 Invertebrates

One locally important species, the Owens dune weevil, was observed on the proposed project / proposed action study area and has potential to be impacted as part of the proposed project / proposed action. The Owens dune weevil is not listed or proposed for listing under the federal or state endangered species acts and has no required mitigation for impacts to the species. However, the goal of the proposed project / proposed action is to enhance and stabilize the dunes for a reduction in dust emissions and may mitigate for impacts to the species due to the enhancement and stabilization of the species habitat, the Keeler Dunes.

The construction, operation, and maintenance of the proposed project / proposed action would not be expected to result in significant adverse impacts to, or adversely affect, the survival and recovery in the wild of other common invertebrate species that may be resident in the vicinity of the proposed project / proposed action area and that may forage within the proposed project / proposed action study area. Therefore, the consideration of mitigation measures for these species is not warranted.

The goal of the proposed project / proposed action is to stabilize the dunes and establish native vegetation that would increase vegetation coverage for 194 acres that have been degraded by migrating sand. In 1993, when the BLM Resource Management Plan (RMP) was written, the Owens dune weevil had approximately 4,285 acres of suitable dune habitat. Based on the amount of habitat listed in the RMP, the proposed project / proposed action contains approximately 4.5 percent of the overall Owens dune weevil habitat. The BLM's RMP notes that *Atriplex polycarpa* and *Sarcobatus vermiculatus* are important species for dune stabilization. *Atriplex polycarpa* is the primary native species chosen for the proposed project / proposed action, in addition to other species on the RMP list and, hence, does not conflict with the RMP guidance.

The BLM has recommendations in place to ensure sufficient habitat and microclimate conditions for the Owens dune weevil. These recommendations can be found in the RMP and contains two goals for the Owens dune weevil:

1. Maintain and enhance habitat for Owens dune weevil.

2. Meet desired plant community (DPC) goals on 3,214 acres (75 percent) of dune habitat to maintain habitat for the Owens dune weevil.

With regards to conserving Owens dune weevil habitat, the DPC goals found in the RMP specifies the "retention of present vegetative cover which varies from scant cover of widely scattered shrubs and herbs to nearly closed shrub canopies."[27] This helps maintain diversity of the overall dune habitat. The DPC goals also seek to "maintain the current overall vegetative cover of approximately 7 percent in the dune habitat."

The percentage of vegetative cover required for 85 percent and 95 percent dust control is 7 percent and 10 percent, respectively. The existing cover is estimated at 3 percent to 6 percent. Although the 194 acres of dust control will exceed 7 percent vegetative cover for this specific area, the percent cover for the overall dune habitat will not significantly change. The overall coverage for the proposed project / proposed action area located west of SR 136 would be approximately 10 percent with fully implemented dust controls. Existing barren and sparsely vegetated areas will remain for the Owens dune weevil in the surrounding areas to the north, east, and southeast, providing a mixture of cover as expressed in the RMP.[28] Based on best prevailing science, it is unclear whether the Owens dune weevil will survive in areas with greater than 7 percent vegetative cover. However, it is anticipated that the Owens dune weevil will continue to use the proposed project / proposed action area and surrounding areas.

During grading activities for the proposed staging areas and access roads, it is possible that individuals of this species may perish. However, the proposed project / proposed action would provide a long-term net benefit by providing a stable dune habitat environment and mixture of vegetative cover for a variety of wildlife species including the Owens dune weevil.

5.6 CONSISTENCY WITH FEDERAL, STATE, AND REGIONAL CONSERVATION PLANS

5.6.1 Existing Conditions

Habitat Conservation Plans and Natural Community Conservation Plans

One habitat conservation plan, the Desert Renewable Energy Conservation Plan (DRECP), has been proposed for the proposed project / proposed action area.[29] The proposed project / proposed action area is adjacent to the West Mojave Plan,[30] but outside of the DRECP boundaries.

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[27] U.S. Department of the Interior, Bureau of Land Management, Bakersfield District. April 1993. *Bishop Resource Management Plan Record of Decision:* Appendix 1, *Desired Plant Community Definitions*. Bakersfield, CA.

[28] U.S. Department of the Interior, Bureau of Land Management, Bakersfield District. April 1993. *Bishop Resource Management Plan Record of Decision:* Appendix 1, *Desired Plant Community Definitions*. Bakersfield, CA.

[29] California Energy Commission. October 2011. *Preliminary Conservation Strategy – Desert Renewable Energy Conservation Plan (DRECP)*. Sacramento, CA. Available at: http://www.drecp.org/documents/docs/preliminary_conservation_strategy/02_Cover_and_Table_of_Contents.pdf

[30] Bureau of Land Management. January 2005. *Final Environmental Impact Report and Statement for the West Mojave Plan*. Moreno Valley, CA. Available at: http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-1-

Basin Wetland and Aquatic Species Recovery Plan

The proposed project / proposed action is located within the Owens Basin Wetland and Aquatic Species Recovery Plan: Inyo and Mono Counties, California.[31]

Bishop Resource Management Plan

The proposed project / proposed action is located within the within the area administered under the Bishop RMP by the BLM Bishop Field Office..[32]

Lower Owens River Project

The Inyo County General Plan Policy Goal BIO-1.8 (Owens River Restoration), which is the applicable policy goal for management of Owens Lake, states that Inyo County will work with the City of Los Angeles and regulatory agencies to complete the restoration of habitat values along the historic Owens River channel as mitigation for degradation resulting from water export activities. This policy applies to the portion of the Owens River identified as the Lower Owens River Project. An associated policy, Inyo County Land Use Policy LU-1.16, states that all General Plan land use designations shall allow for the implementation of enhancement/mitigation projects and/or mitigation measures as described in Inyo County, the City of Los Angeles's Long Term Ground Water Management Agreement,[33] and/or the 1991 Final Environmental Impact Report that addressed that agreement.[34]

5.6.2 Impact Analysis

Habitat Conservation Plans and Natural Community Conservation Plans

The DRECP is still under development at the time of this report. However, under all currently proposed DRECP alternatives, BLM lands in the proposed project / proposed action area would be encompassed within a proposed Area of Critical Environmental Concern (ACEC) to protect cultural and biological resources including dune habitat. Renewable energy projects would not be allowed within the ACEC. Anticipated effects of the proposed project / proposed action would be consistent with ACEC management as currently proposed under the DRECP.

Chapter1_Bookmarks.pdf

[31] U.S. Fish and Wildlife Service. 2006. *Owens Basin Wetland and Aquatic Species Recovery Plan: Inyo and Mono Counties, California*.

[32] U.S. Department of the Interior, Bureau of Land Management. April 1993. *Bishop Resource Management Plan, Record of Decision*. Bishop, CA.

[33] Inyo County. 1991. *Superior Court of California, County of Inyo, Case No. 12908*. Agreement between Inyo County and the City of Los Angeles and its Department of Water and Power on a Long Term Groundwater Management Plan for Owens Valley and Inyo County. Available at: http://www.inyowater.org/Water_Resources/long_term_water_agreement.pdf

[34] City of Los Angeles Department of Water and Power. 1991. *Water from the Owens Valley to Supply the Second Los Angeles Aqueduct 1970 to 1990, 1990 Onward, Pursuant to a Long Term Groundwater Management Plan Environmental Impact Report*. SCH #89080705. Los Angeles, CA. Available at: http://www.inyowater.org/Water_Resources/1991eir/default.htm

Owens Basin Wetland and Aquatic Species Recovery Plan

The Owens Basin Wetland and Aquatic Species Recovery Plan for Inyo and Mono Counties describes 16 recommended conservation areas that are integral to the recovery plan. The nearest of the conservation areas, the Southern Owens Conservation Area, is located along the western perimeter of the Owens Lake. The proposed project / proposed action site is not within the Southern Owens Conservation Area, but the goals and objectives specified in the recovery plan will be considered when implementing DCMs (Figure 5.3.1-1).

BLM Bishop Resource Management Plan

The BLM Bishop RMP identifies several statements, guidelines, and goals regionally, as well as in the Owens Lake Management Area, which includes Owens Lake and surrounding areas including the proposed project / proposed action site south of Highway 136. In accordance with applicable management guidelines, the CDFW has been consulted and notified with regards to the proposed project / proposed action and known listed or sensitive species. Candidate, sensitive, and other species of management concern have been identified and the proposed project / proposed action has been designed to minimize and avoid these species where possible.

The proposed project / proposed action is consistent with direction in the Bishop RMP related to biological resources.

Inyo County General Plan: Owens River Restoration

The proposed project / proposed action area is located approximately 3 miles away from the Lower Owens River Project and would not be expected to conflict with that project or impede the implementation of that project.

5.6.3 Mitigation Measures

There are no major impacts to biological resources related to consistency with adopted federal, state, or regional conservation plans; therefore, mitigation measures are not required.

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APPENDIX A
POTENTIAL SENSITIVE SPECIES

TABLE A-1
LISTED SPECIES WITH THE POTENTIAL TO OCCUR
IN THE REGION OF THE PROPOSED PROJECT / PROPOSED ACTION SITE

Species	Status	Habitat	Occurrence
Plants			
Owens Valley checkerbloom (*Sidalcea covillei*)	SE, BLM	Great basin scrub, limestone, meadow, seep, and wetlands. Associated with alkaline meadows in Owens Valley at elevation range of 3,500 to 4,650 feet above mean sea level (AMSL)	Not found during 1995–1996, 1999–2001, 2003, or 2007 surveys at the dry Owens Lake bed; not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Wildlife			
Owens pupfish (*Cyprinodon radiosus*)	FE, SE	Found among shallow water habitats in the Owens Valley, preferring warm, clear water	Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Owens tui chub (*Gila bicolor snyderi*)	FE, SE	Found among shallow water habitats in the Owens Valley, preferring warm, clear water	Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Desert tortoise (*Gopherus agassizii*)	FT, ST	Requires friable soils for burrow construction in open desert scrub, desert wash, and Joshua tree woodland	Surveyed for in 1995–1996 and 2002–2003 at the dry Owens Lake bed, but not found; potential burrows found. Known south of Owens Valley; an adult was observed in July 1995 to the east of Owens Lake. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Swainson's hawk (*Buteo swainsoni)*	ST, BLM	Breeds in stands with few trees in juniper-sage flats, riparian areas, and oak savannah, with suitable grasslands nearby that contain adequate rodent populations; migrants may occur throughout the desert	Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Western snowy plover (*Charadrius nivosus nivosus*)	FE (DPS), CSC	Prefers sandy beaches, salt pond levees, and shores of large alkali lakes	Observed nesting on Owens lake playa. Surveys conducted for the species since 1989; regular visitor and breeder at the dry Owens Lake. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.

TABLE A-1
LISTED SPECIES WITH THE POTENTIAL TO OCCUR
IN THE REGION OF THE PROPOSED PROJECT / PROPOSED ACTION SITE, *Continued*

Species	Status	Habitat	Occurrence
Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)	FP, SE	Prefers low riparian habitats in vicinity of water or dry river bottoms	Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Least Bell's vireo (*Vireo bellii pusillus*)	FE, SE	Prefers low riparian habitats in vicinity of water or dry river bottoms below 2,000 feet AMSL	Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Townsend's big-eared bat (*Corynorhinus townsendii*)	SC, BLM	Lives in a variety of habitats throughout the desert regions of California; forages over mesic and riparian corridors	Surveyed for in 1995–1996 at Owens lake, but not found; found east of State Highway 136 outside of project area. Not observed in proposed project / proposed action area. There is no suitable roosting habitat in the proposed project / proposed action area.
Mohave ground squirrel (*Spermophilus mohavensis*)	ST, BLM	Prefers sandy gravelly soils in open desert scrub, alkali scrub, and Joshua tree woodland	Not found during 1995–1996 and 2004 surveys at Owens Lake; record of occurrence from south of Keeler Dunes along State Highway 136 less than 1 mile from the proposed project study area. Not observed in proposed project / proposed action area. There is limited suitable habitat in the proposed project / proposed action area.

KEY:
BLM = Bureau of Land Management (BLM) Sensitive species
FE = Listed as endangered under the federal Endangered Species Act (ESA)
FP = Proposed for federal listing under the federal ESA
FT = Listed as threatened under the federal ESA
CSC = California Species of Special Concern
SC = Listed as a candidate under the State of California
SE = Listed as endangered by the State of California
ST = Listed as threatened under the State of California
DPS = Distinct population segment

TABLE A-2
SENSITIVE SPECIES WITH THE POTENTIAL TO OCCUR
IN THE REGION OF THE PROPOSED PROJECT / PROPOSED ACTION SITE

Species	Status	Habitat	Occurrence
Plant			
Creamy blazing star (*Mentzelia tridentata*)	BLM, CNPS 1B	Found in Mojavean desert scrub at elevation range of 2,297 to 3,806 feet AMSL; flowing period is March–May	Not observed in proposed project / proposed action area. There is suitable habitat in the proposed project / proposed action area.
Bald daisy (*Erigeron calvus*)	BLM, CNPS 1B	Found in Great Basin Scrub at an elevation range of 2,953-4,235 feet AMSL	Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Inyo County star-tulip (*Calochortus excavatus*)	BLM, CNPS 1B	Found among alkaline meadows in shadscale scrub at elevation range of 3,773 to 6,562 feet AMSL	Surveyed for in 1995–1996, 1999, 2000, 2001, 2003–2004, 2007 on project sites. Not observed in proposed project / proposed action area. There is suitable habitat in the proposed project / proposed action area.
Inyo phacelia (*Phacelia inyoensis*)	BLM, CNPS 1B	Found in alkaline meadows and seeps of Inyo County at elevation range of 2,953 to 10,499 feet AMSL	Surveyed for and not found in 1999–2001, 2003–2004 focused surveys Owen Lake. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Inyo rock daisy (*Perityle inyoensis*)	BLM, CNPS 1B	Found in Pinyon and Juniper Woodland at an elevation range of 6,562 to 9,843 feet AMSL	Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Parish's popcorn-flower (*Plagiobothrys parishii*)	BLM, CNPS 1B	Great Basin scrub	Found north of Cartago, Inyo County; threatened by groundwater pumping; flowering period is May–June (and uncommonly in November). Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Sagebrush loeflingia (*Loeflingia squarrosa* var. *artemisiarum*)	BLM, CNPS 2	Associated with desert dunes, great basin scrub of Inyo County at elevation range of 2,297 to 5331 feet AMSL; blooms April to May	Surveyed for in 1999, 2001, 2003, and 2004 in Owens Lake, but not found. Nearest CNDDB location in Tinemaha Reservoir quadrangle, approximately 35 miles to the northwest of the proposed project site. Not observed in proposed project / proposed action area. There is suitable habitat in the proposed project / proposed action area.

TABLE A-2
SENSITIVE SPECIES WITH THE POTENTIAL TO OCCUR
IN THE REGION OF THE PROPOSED PROJECT / PROPOSED ACTION SITE, *Continued*

Species	Status	Habitat	Occurrence
Sanicle cymopterus (*Cymopterus ripleyi* var. *saniculoides*)	BLM, CNPS 1B	Typically associated with Joshua tree woodland, Mojavean desert scrub of Inyo County at elevation range of 3,280 to 5,495 feet AMSL	Observed among scrub habitat near Dirty Socks well, Owens Lake basin. Not observed in proposed project / proposed action area. There is suitable habitat in the proposed project / proposed action area.
Wildlife			
Inyo Mountains slender salamander (*Batrachoseps campi*)	BLM, CSC	Riparian scrub, riparian woodland, talus slope, wetlands	Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Northern sagebrush lizard (*Sceloporus graciosus*)	BLM	Occurs in many habitats, chiefly at higher montane elevations, where it prefers open ground with scattered low bushes	Not found during surveys on west side of Owens Lake in 2004. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Panamint alligator lizard (*Elgaria panamintina*)	BLM, CSC	Riparian scrub	Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
American peregrine falcon (*Falco peregrinus anatum*)	CSC	Scarce migrants may occur at sites in the desert where suitable avian prey is concentrated, such as shorebird populations at flooded areas on Owens Lake	One seen near Cartago Creek during 1995–1996 surveys; none observed during spring 2003 surveys over Owens Lake; one observed during surveys over Owens Lake 2007. Very limited potential for utilization at proposed project site due to low prey base and lack of suitable habitat. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Burrowing owl (*Athene cunicularia*)	CSC	Nests and resides in desert scrub and agricultural habitats	Found during autumn 1995 surveys west of Point Bartlett; found along Cottonwood Creek during 2002 surveys; not found during spring/summer 2003, 2004 surveys within the at Owens lake. The Great Basin Unified Air Pollution Control District has documented use of pipes for burrows within Owens lake Project Areas. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.

TABLE A-2
SENSITIVE SPECIES WITH THE POTENTIAL TO OCCUR
IN THE REGION OF THE PROPOSED PROJECT / PROPOSED ACTION SITE, *Continued*

Species	Status	Habitat	Occurrence
California horned lark (*Eremophila alpestris actia*)	CSC	Nests on open grassland areas with exposed surfaces	Observed in proposed project / proposed action area. There is suitable habitat in the proposed project / proposed action area.
Cooper's hawk (*Accipiter cooperii*) (nesting)	CSC	Nests in thick oak and willow riparian habitats	Found in Owens River delta in 1995–1996; found roosting along the Owens River delta during 2002–2003 surveys; not found during spring 2003 at Owens Lake. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area. Very limited potential for utilization at proposed project site due to low prey base and lack of suitable habitat.
Ferruginous hawk (*Buteo regalis*) (wintering)	CSC	Nests on steep cliff faces or atop tall species of trees with snags	Found near Dirty Socks and Owens River delta during 1995–1996 and 2002 surveys; not found during spring 2003 surveys within proposed project area; determined absent as a result of presence/absence surveys in supplemental DCMs in 2007. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area. Limited potential for utilization at proposed project site due to low prey base and lack of suitable habitat.
Golden eagle (*Aquila chrysaetos*)	CSC FPS	Nests on steep cliff faces or atop tall species of trees with snags	Found foraging in Owens River delta in 1995–1996; found frequently foraging along margins of Owens Lake; not found at two air quality monitoring sites during surveys on west side of Owens Lake on August 4, 2004; observed flying over west side of Owens Lake in 2011. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area. Limited potential for utilization at proposed project site due to low prey base and no habitat for breeding, but low numbers of black-tailed jackrabbits (*Lepus californicus*) do occur on-site.

TABLE A-2
SENSITIVE SPECIES WITH THE POTENTIAL TO OCCUR
IN THE REGION OF THE PROPOSED PROJECT / PROPOSED ACTION SITE, *Continued*

Species	Status	Habitat	Occurrence
Le Conte's thrasher (*Toxostoma lecontei*)	CSC	Resides in desert habitats; primarily in open desert wash, desert scrub, alkali desert scrub, desert succulent scrub	Found in saltbush scrub habitats during 2002 surveys adjacent to the proposed project area, but not found during spring 2003. Found during 1995–1996 surveys in shadscale scrub north of Keeler Ponds, near Owens River, northeast of Dirty Socks and Cottonwood Creek. Observed breeding on the proposed project site. There is suitable habitat in the proposed project / proposed action area.
Loggerhead shrike (*Lanius ludovicianus*)	CSC	Nests and resides in desert scrub and savannah woodland habitats	Found at Keeler Ponds and Cottonwood Creek during 1995–1996 and 2002 surveys and found along the Owens River delta during 2002–2003 surveys; not found during spring 2003 surveys within Owens Lake; not found at two air quality monitoring sites during surveys on west side of Owens Lake on August 4, 2004; found during April 2006 surveys, when it was common at Managed Vegetation areas within the proposed project site. Observed foraging on the western portion of the proposed project site. There is limited suitable habitat in the proposed project / proposed action area.
Long-billed curlew (*Numenius americanus*)	CSC	Common to uncommon migrant through this region in California; forages in brine pools and shallow water habitats	Surveyed for in 1995–1996 and 2002–2003 at Owens lake, but not found; observed in evaporation ponds at Cartago Creek in January 1996 and Ash Creek Meadows in May 1996. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Merlin (*Falco columbarius*) (wintering)	CSC	Migrant and winter visitor found in areas in the desert where suitable avian prey is concentrated, such as shorebirds	Found wintering in the Owens River delta in January 1996; not found during spring 2003 surveys within over Owens Lake; determined absent as a result of presence/absence surveys at Owens Lake 2007. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.

TABLE A-2
SENSITIVE SPECIES WITH THE POTENTIAL TO OCCUR
IN THE REGION OF THE PROPOSED PROJECT / PROPOSED ACTION SITE, *Continued*

Species	Status	Habitat	Occurrence
Mountain plover (*Charadrius montanus*)	CSC	Agricultural fields and meadow areas	Four observed at meadow at Keeler Ponds (Horse Pasture) in 1995, north of project site; otherwise surveyed for in 1995–1996 and 2002–2003 at Owens lake. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Northern harrier (*Circus cyaneus*) (nesting)	CSC	Nests in riparian habitats and forages over open grasslands, marshes, and wetland areas	Found in marsh areas (nesting) during 1995–1996 and 2002 surveys at Owens River Delta, Keeler Ponds, and Swedes Pasture; not found during spring 2003 surveys around the proposed project area. Very limited potential for utilization at proposed project / proposed action area due to low prey base and lack of suitable habitat. Observed foraging over the western portion of the propose project site.
Prairie falcon (*Falco mexicanus*)	CSC	Regular visitor to Owens Valley; nests on cliff faces	Found at Cottonwood Spring, Cartago Creek, northeast of Dirty Socks, Swedes Pasture, and Owens River delta during 1995–1996 surveys; not found during 2002–2003 surveys within the proposed project area; observed foraging over Owens Lake in 2007, 2010, 2011, 2012. Limited potential for utilization at proposed project / proposed action area due to low prey base and lack of suitable habitat. Observed flying over the western portion of the proposed project site.
Sharp-shinned hawk (*Accipiter striatus*) (nesting)	CSC	Nests in thick oak and willow riparian habitats	Found south of State Highway 136 in winter 1995–1996; not found during 2002–2003 surveys over Owens Lake. Generally a mountain breeder. Not observed in proposed project / proposed action area. Very limited potential for utilization at proposed project / proposed action area due to low prey base and lack of suitable habitat.
Tricolored blackbird (*Agelaius tricolor*) (nesting)	CSC	Nests in emergent wetland vegetation, which includes bullrush and tules	Surveyed for in 1995–1996, 2002, and 2003 on Owen Lake, but not found; observed foraging over meadows in Owens River Delta, Horse Pasture, and Dirty Socks in 1995–1996. Not observed in proposed project /

TABLE A-2
SENSITIVE SPECIES WITH THE POTENTIAL TO OCCUR
IN THE REGION OF THE PROPOSED PROJECT / PROPOSED ACTION SITE, *Continued*

Species	Status	Habitat	Occurrence
			proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Vaux's swift (*Chaetura vauxi*)	CSC	Common migrant	Surveyed for in 1995–1996, 2002, 2003 at Owens Lake, but not found. Present as a vernal and autumnal migrant in Owens Valley. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Virginia's warbler (*Vermivora luciae*) (nesting)	CSC	Migrant along riparian margins	Limited potential for migrant utilization at proposed project site. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Yellow warbler (*Dendroica petechia brewsteri*) (nesting)	CSC	Nests in willow riparian habitats; occurs as a migrant	Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Yellow-breasted chat (*Icteria virens*) (nesting)	CSC	Resides in low, dense riparian habitat consisting of willow, blackberry, wild grape; uncommon regular migrant in the area	Surveyed for in 1995–1996 and 2002–2003 at Dust Control Project sites, but not found; not found at two air quality monitoring sites during surveys on west side of Owens Lake on August 4, 2004; found south of Cabin Bar Ranch in July 1995, but not found during 1996. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Pallid bat (*Antrozous pallidus*)	CSC, BLM	Resides in deserts, grasslands, shrublands; most common in open, dry habitats with rock areas	Not found during 1995–1996 sites over Owens Lake; not found at two air quality monitoring sites during surveys on west side of Owens Lake on August 4, 2004; found foraging over meadows at Owens River delta, Keeler Ponds, and Dirty Socks in 1995–1996; determined absent as a result of presence/absence surveys in supplemental surveys at Owens Lake in 2007. Not observed in proposed project / proposed action area. There is no suitable roosting habitat in the proposed project / proposed action area.

TABLE A-2
SENSITIVE SPECIES WITH THE POTENTIAL TO OCCUR
IN THE REGION OF THE PROPOSED PROJECT / PROPOSED ACTION SITE, *Continued*

Species	Status	Habitat	Occurrence
Spotted bat (*Euderma maculatum*)	CSC, BLM	Lives in a variety of habitats throughout California	Found foraging over Owens Lake during 1995–1996 and 2003 surveys; determined absent as a result of presence/absence surveys in supplemental DCMs in 2007. Not observed in proposed project / proposed action area. There is no roosting suitable habitat in the proposed project / proposed action area.
Western small-footed myotis (*Myotis ciliolabrum*)	BLM	Found throughout the desert; solitary species	Found foraging over aquatic habitats in 1995–1996, found foraging over Owens Lake in 2003; not found at two air quality monitoring sites during surveys on west side of Owens Lake on August 4, 2004. Not observed in proposed project / proposed action area. There is no suitable roosting habitat in the proposed project / proposed action area.
Long-eared myotis (*Myotis evotis*)	BLM	Found in coniferous forests; migrates through riparian habitat in Owens River Valley	Found in 1996 at cattle tank north of North Seep and west of Keeler; found in autumn 1995 and spring 1996 in Owens Lake area. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area..
Long-legged (hairy-winged) myotis (*Myotis volans*)	BLM	Found in the desert up to 8,202 feet above mean sea level in forested regions and brushy areas; roosts in buildings, trees, and crevices	Found foraging over aquatic habitats in 1995–1996 Owens lake; possibly detected by acoustic signature in 2003 at Owens Lake. Not observed in proposed project / proposed action area. There is no suitable roosting habitat in the proposed project / proposed action area.
Yuma myotis (*Myotis yumanensis*)	BLM	Found in the desert, especially along wooded canyon bottoms; common in southeastern California; colonial species, roosting in caves and old buildings	Found foraging over aquatic habitats in 1995–1996; found over Owens Lake in 2003. Not observed in proposed project / proposed action area. There is no suitable roosting habitat in the proposed project / proposed action area.

TABLE A-2
SENSITIVE SPECIES WITH THE POTENTIAL TO OCCUR IN THE REGION OF THE PROPOSED PROJECT / PROPOSED ACTION SITE, *Continued*

Species	Status	Habitat	Occurrence
Owens Valley vole (*Microtus californicus vallicola*)	CSC, BLM	Found in friable soils of wetlands and lush grassy ground in the Owens Valley	Surveyed for during May 1990 survey in support of Lake Minerals project;[1] several found during 1996 surveys at the north flood irrigation plot site; found during focused surveys in Swedes Pasture and Dirty Socks Spring; sign found at Sulfur Springs and Sulfur Springs Road in 2003; not found at two air quality monitoring sites during surveys on west side of Owens Lake on August 4, 2004; determined absent as a result of small mammal trapping for supplemental dust control measures (DCMs) on Owens lake in 2007. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Southern grasshopper mouse (*Onychomys torridus ramona*)	CSC	Present in prairies and deserts in grass, sagebrush, greasewood with sandy or gravelly soil	Two found during 2003 surveys; not found at two air quality monitoring sites during surveys on west side of Owens Lake on August 4, 2004. Not observed in proposed project / proposed action area. There is suitable habitat in the proposed project / proposed action area.
American badger (*Taxidea taxus*)	CSC	Most numerous in California in the Great Basin region, fluctuating with populations of squirrels and pocket gophers, in open areas including deserts	During surveys for predatory mammals conducted in the fall of 1995; one badger sign, a badger dig, was observed in the shadscale scrub west of the Owens River riparian area. Observed in proposed project / proposed action area. There is limited suitable habitat in the proposed project / proposed action area..

KEY:
CSC = California Species of Special Concern
BLM = Bureau of Land Management (BLM) Sensitive species
FPS = Federally Protected Species
SC = State Candidate Species
NOTE: [1]Inyo County, California State Lands Commission and Bureau of Land Management. 1994. *Draft Environmental Impact Report/Environmental Impact Statement, Owens Lake Soda Ash Company Soda Ash Mining and Processing Project.* Bishop, CA.

TABLE A-3
LOCALLY IMPORTANT SPECIES WITH THE POTENTIAL TO OCCUR IN THE REGION OF THE PROPOSED PROJECT / PROPOSED ACTION SITE

Species	Status	Habitat	Occurrence
Plants			
Lincoln rock cress (*Boechera lincolnensis*)	CNPS 2	Found on limestone among Chenopod scrub, Mojavean desert scrub in Inyo County at elevation range of 3,609 to 6808 feet AMSL	Not found during 1995–1996, 1999–2001, and 2003 surveys in Owens Lake. Not observed in proposed project / proposed action area. There is suitable habitat in the proposed project / proposed action area.
Naked milk-vetch (*Astragalus serenoi* var. *shockleyi*)	CNPS 2	Chenopod scrub, great basin scrub, pinyon and juniper woodland. Dry, alkaline soils. Found on course granitic alluvium among chenopod scrub, great basin scrub at elevation range of 4,921 to 7,382 feet AMSL	Not found during 1995–1996, 1999–2001, and 2003 surveys on sites over Owens Lake. Not observed in proposed project / proposed action area. There is suitable habitat in the proposed project / proposed action area.
Booth's evening primrose (*Camissonia boothii* ssp. *boothii*)	CNPS 2	Typically associated with Joshua tree woodland and pinyon and juniper woodland; observed among stabilized dunes at Owens Lake basin at elevation range of 2,953 to 7,874 feet AMSL; blooms April to September	Not observed in proposed project / proposed action area. There is suitable habitat in the proposed project / proposed action area.
Narrow-leaved cottonwood (*Populus angustifolia*)	CNPS 2	Found along creeks and rivers in riparian forest of Inyo County at elevation range of 1,640 to 6,972 feet AMSL; flowering period is March–April	Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Nevada oryctes (*Oryctes nevadensis*)	CNPS 2	Found in dry, sandy soil in washes and open scrub habitat in the Owens Valley at elevation range of 3,609 to 8,366 feet AMSL	Surveyed for in 1995–1996, 1999–2001, and 2003–2004 on Owens Lake and not found. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Alkali cord grass (*Spartina gracilis*)	CNPS 4	Found in alkali meadows and seeps of Inyo County; observed at Owens Lake basin at elevation range of 3,281 to 6,890 feet AMSL; blooms June to August	Surveyed for in 1995–1996, 1999, 2000, 2001, 2003–2004, 2007 on Owens Lake Dust Control Project sites, but not found. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.

TABLE A-3
LOCALLY IMPORTANT SPECIES WITH THE POTENTIAL TO OCCUR IN THE REGION OF THE PROPOSED PROJECT / PROPOSED ACTION SITE, *Continued*

Species	Status	Habitat	Occurrence
Wildlife			
Moth (no common name) (*Tescalsia giulianiata*)	Locally rare	Dune and alkali meadow habitats	Found at around Owens Lake at Olancha Dunes and Southwest Seeps during 1995–1996 surveys; records exists 9 miles northwest of Keeler Dunes; determined to be potentially present at the proposed project site based on known records and notes from the late Mr. Giuliani, the foremost expert on this species. Not observed in proposed project / proposed action area. There is suitable habitat in the proposed project / proposed action area.
Alkali skipper (*Pseudocopaeodes eunus*)	Locally rare	Dune and alkali meadow habitats	Not observed during 2011-2012 surveys in proposed project / proposed action area. There is suitable habitat in the proposed project / proposed action area.
Owens valley tiger beetle (*Cicindela tranquebarica inyo*)	Locally rare	Dune and alkali meadow habitats	Occurrences of this species around Owens Lake including observations around the Channel Area in 2007. Not observed in proposed project / proposed action area. There is suitable habitat in the proposed project / proposed action area.
Alkali flats tiger beetle (*Cicindela willistoni pseudosenilis*)	Locally rare	Dune and alkali meadow habitats	Historical records of this species at Keeler and around Owens Lake. Not observed in proposed project / proposed action area. There is suitable habitat in the proposed project / proposed action area.
Short-legged tiger beetle (*Cicindela tenuicincta*)	Locally rare	Dune and alkali meadow habitats	Minimal records around Owens lake; determined to be absent from the proposed project site. Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Owens dune weevil (*Trigonoscuta owensii*)	Locally rare	Dune and alkali meadow habitats	Several individuals detected in 2011 and one in 2012 at Keeler Dunes. There is suitable habitat in the proposed project / proposed action area.
Monarch butterfly (*Danaus plexippus*)	Locally rare	Closed-cone coniferous forest. Winter roost sites are typically located in wind-protected tree groves (eucalyptus, pine, and cypress), with nectar and water sources nearby	Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.

TABLE A-3
LOCALLY IMPORTANT SPECIES WITH THE POTENTIAL TO OCCUR IN THE REGION OF THE PROPOSED PROJECT / PROPOSED ACTION SITE, *Continued*

Species	Status	Habitat	Occurrence
Franklin's gull (*Larus pipixcan*)	Locally rare	Nests in marshes and along inland lakes; winters along coast in bays, estuaries, and along sandy beaches	Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Nuttall's woodpecker (*Picoides nuttallii*)	BCC	Mix of deciduous riparian and adjacent oak habitats; occurs as a vagrant in the Owens Valley	Not observed in proposed project / proposed action area. There is no suitable habitat in the proposed project / proposed action area.
Bell's sparrow (*Amphispiza belli canensis*)	BCC	Found in sagebrush, arid bushland, and chaparral habitats; desert populations breed during winter in the Owens Valley	Observed at Bartlett Spring during initial site visit in January 2007. Observed in proposed project / proposed action area. There is suitable habitat in the proposed project / proposed action area.

KEY:

California Native Plant Society (CNPS) ranking system =

List 1B: Rare, threatened or endangered in California and elsewhere.
List 2: Plants is rare, threatened or endangered in California but more common elsewhere.
List 3: Plants about which we need more information.
List 4: Plants of limited distribution.
Threat ranks:
0.1: Seriously threatened in California.
0.2: Fairly threatened in California.
0.3: Not very threatened in California.

Locally rare = Designated as locally important by Inyo County, the Audubon Society, or the California Department of Fish and Game (CDFG)

BCC = Bird of Conservation Concern

BLM = Bureau of Land Management (BLM) Sensitive species

APPENDIX B
PHOTO STATION PICTURES

Photo Station 1. Looking north

Photo Station 1. Looking east

Photo Station 1. Looking south

Photo Station 1. Looking west

Photo Station 2. Looking north

Photo Station 2. Looking east

Photo Station 2. Looking south

Photo Station 2. Looking west

Photo Station 3. Looking north

Photo Station 3. Looking east

Photo Station 3. Looking south

Photo Station 3. Looking west

Photo Station 4. Looking north

Photo Station 4. Looking east

Photo Station 4. Looking south

Photo Station 4. Looking west

Photo Station 5. Looking north

Photo Station 5. Looking east

Photo Station 5. Looking south

Photo Station 5. Looking west

Photo Station 6. Looking north

Photo Station 6. Looking east

Photo Station 6. Looking south

Photo Station 6. Looking west

Photo Station 7. Looking north

Photo Station 7. Looking east

Photo Station 7. Looking south

Photo Station 7. Looking west

Photo Station 8. Looking north

Photo Station 8. Looking east

Photo Station 8. Looking south

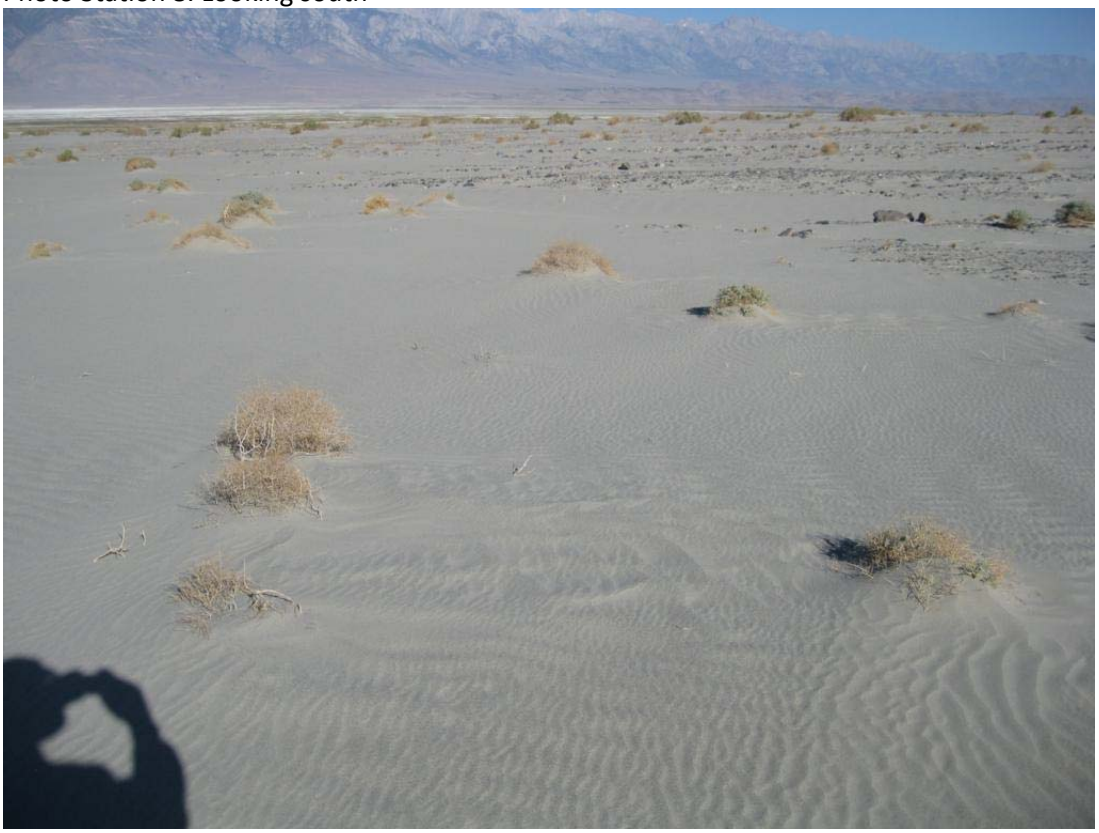

Photo Station 8. Looking west

Photo Station 9. Looking north

Photo Station 9. Looking east

Photo Station 9. Looking south

Photo Station 9. Looking west

Photo Station 10. Looking north

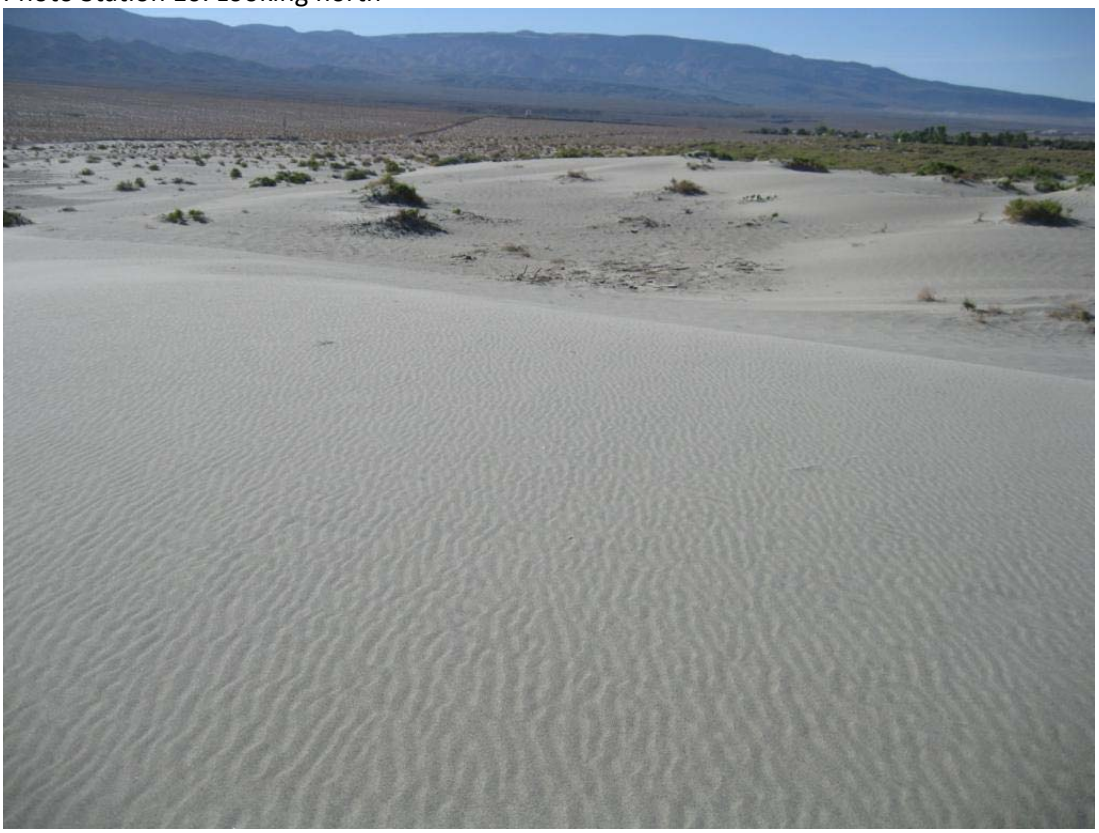

Photo Station 10. Looking east

Photo Station 10. Looking south

Photo Station 10. Looking west

Photo Station 11. Looking north

Photo Station 11. Looking east

Photo Station 11. Looking south

Photo Station 11. Looking west

Photo Station 12. Looking north

Photo Station 12. Looking east

Photo Station 12. Looking south

Photo Station 12. Looking west

Photo Station 13. Looking north

Photo Station 13. Looking east

Photo Station 13. Looking south

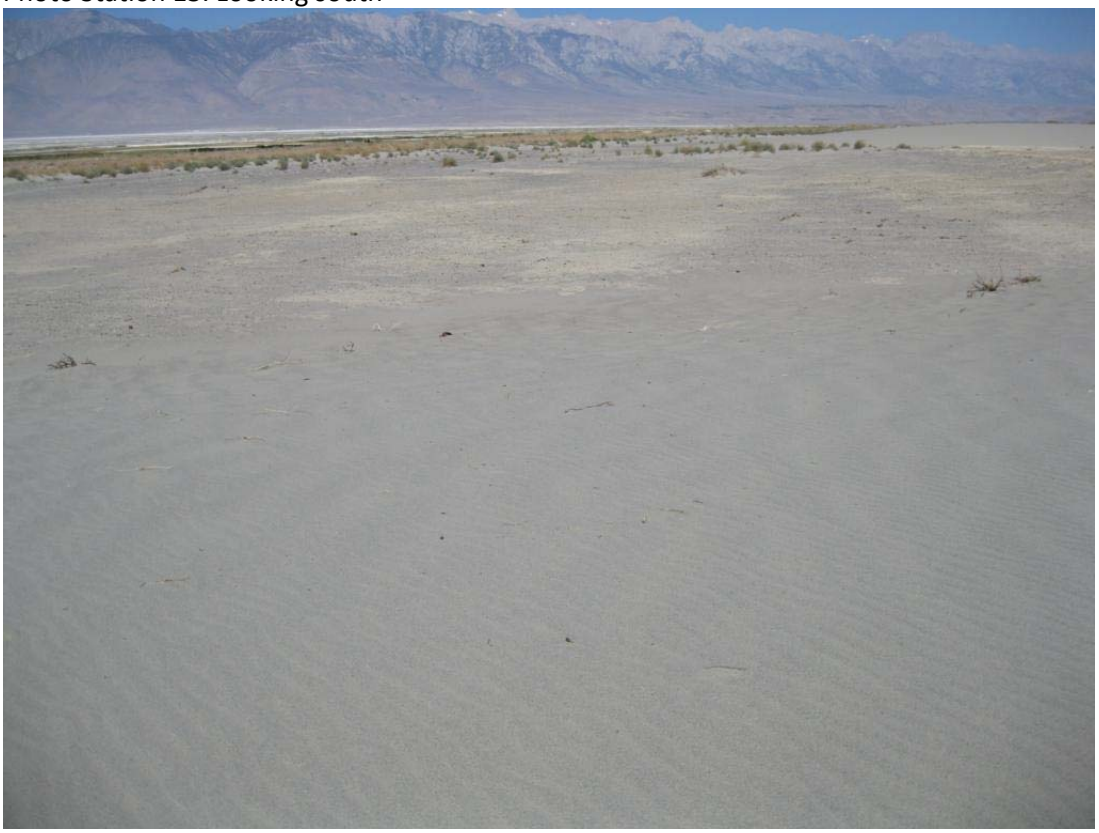

Photo Station 13. Looking west

Photo Station 14. Looking south

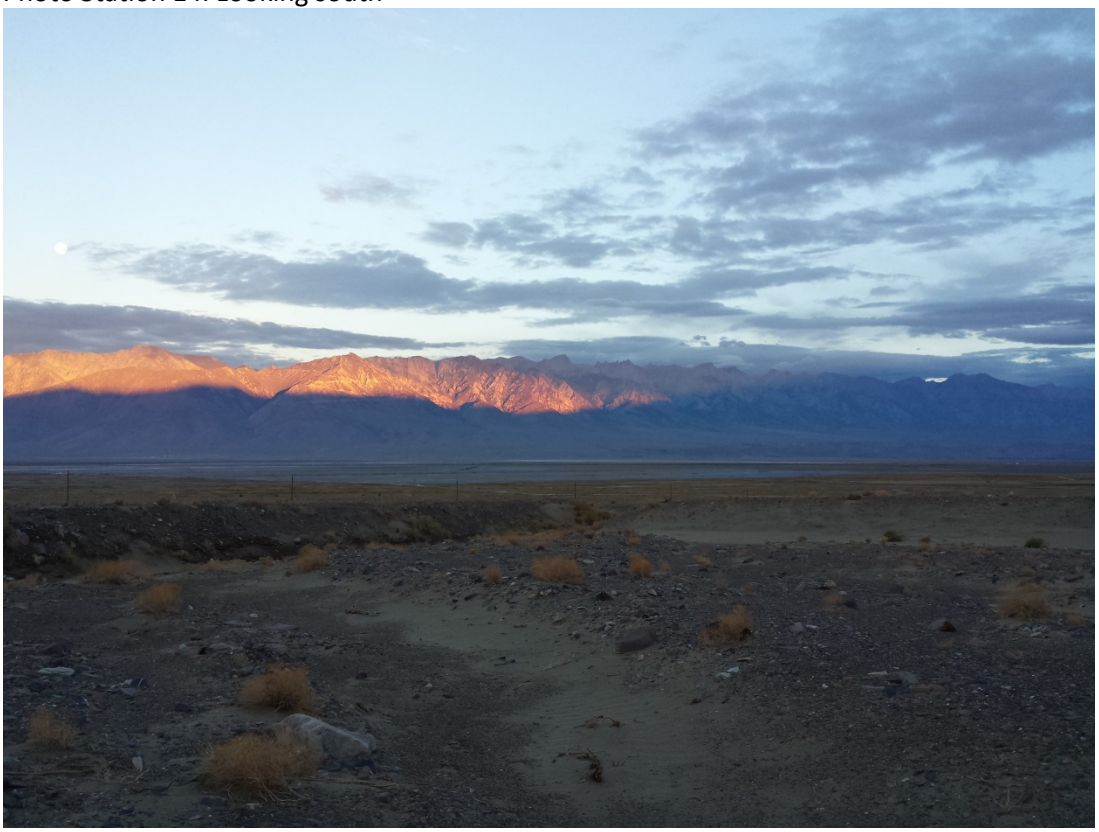

Photo Station 14. Looking southwest

Photo Station 15. Looking west

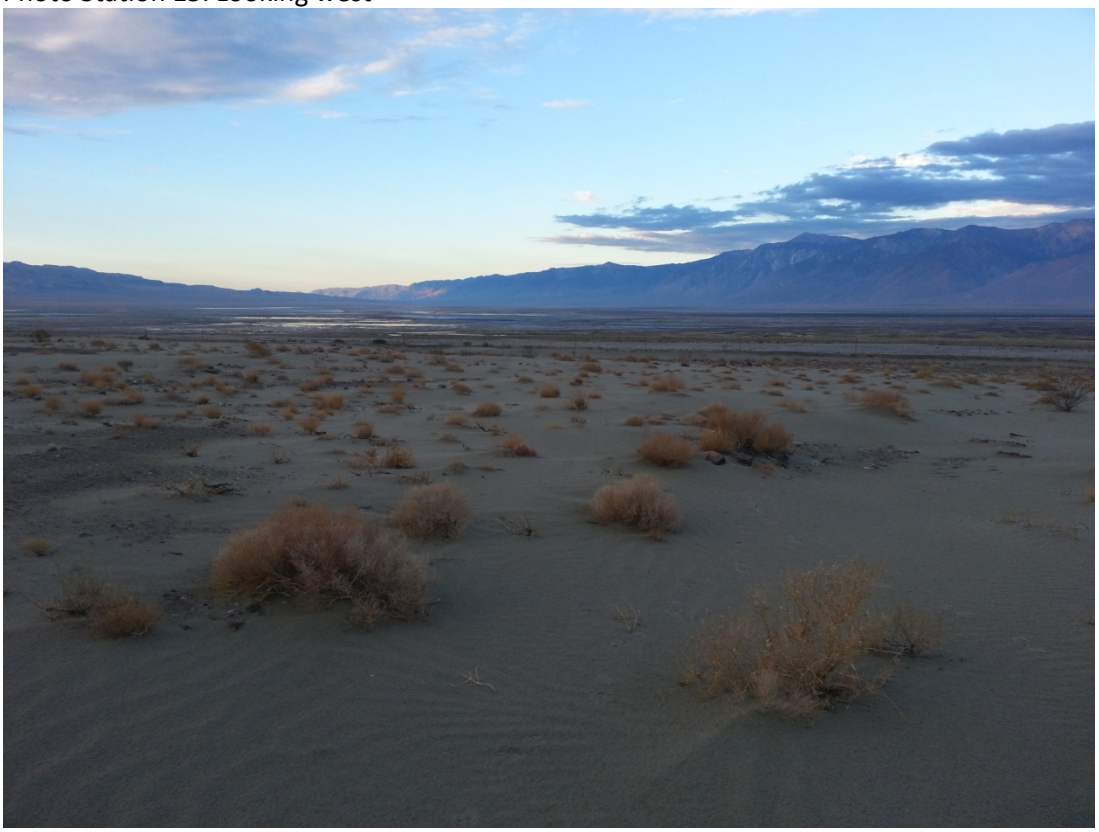

Photo Station 15. Looking south

Photo Station 15. Looking east

Photo Station 15. Looking north

Photo Station 16. Looking south

Photo Station 16. Looking northwest

Photo Station 16. Looking west

Photo Station 17. Looking northwest

Photo Station 17. Looking southeast

Photo Station 18. Looking north

Photo Station 19. Looking north

Photo Station 20. Looking north

APPENDIX C
FLORAL AND FAUNAL COMPENDIUM

APPENDIX C
FLORAL AND FAUNAL COMPENDIUM

PLANTS

Apiaceae – Carrot Family

Lomatium mohavense
Mojave desert parsley

Asclepiadaceae – Milkweed Family

Asclepias erosa
desert milkweed

Asteraceae – Composite Family

Psathyrotes ramosissima
turtleback
Ambrosia dumosa
white-burr sage
Ambrosia salsola
cheesebush

Brassicaceae – Mustard Family

Cleome sparsifolia
fewleaf spiderflower

Cactaceae – Cactus Family

Echinocactus polycephalus var. *polycephalus*
cottontop cactus
Opuntia basilaris var. *basilaris*
beavertail cactus

Capparaceae – Caper Family

Cleomella obtusifolia
Mohave stinkweed

Chenopodiaceae – Goosefoot Family

Atriplex confertifolia
shadscale
Atriplex hymenelytra
desert holly
Atriplex parryi
Parryi saltbush

Atriplex phyllostegia
leafcover saltweed
Salsola tragus
Russian thistle
Sarcobatus vermiculatus
greasewood
Suaeda nigra
bush seepweed

Cuscutaceae – Dodder Family

Cuscuta californica
California dodder

Euphorbiaceae – Spurge Family

Chamaesyce vallis-mortae
Indian spurge

Onagraceae – Primrose Family

Camissonia claviformis
brown-eyed primrose
Camissonia sp.
primrose

Poaceae – Grass Family

Distichlis spicata
saltgrass
Bromus Sp.
brome sp.

Zygophyllaceae – Caltrop Family

Larrea tridentata
creosote bush

WILDLIFE

TERRESTRIAL INVERTEBRATES

Insects

Cicindela spp.
tiger beetles
Eleodes spp.
darkling beetle
Monomorium minimum
black ant
Pogonomyrmex rugosus
red harvester ants
Tabanus punctifer
horsefly
Trigonoscuta owensii
dune weevil
Trimerotropis pallidipennis
pallid-winged grasshopper

Spiders

Latrodectus hesperus
black widow
Thomisidae family
crab spider

TERRESTRIAL VERTEBRATES

Reptiles

Iguanidae – Iguanid Lizards

Dipsosaurus dorsalis
desert iguana

Crotaphytidae – Collared and Leopard Lizards

Gambelia wislizenii
long-nosed leopard lizard

Phrynosomatidae – Zebra-Tailed, Spiny, Tree, and Horned Lizards

Callisaurus draconoides
zebra-tailed lizard
Phrynosoma platyrhinos
desert horned lizard
Sceloporus magister
desert spiny lizard

Uta stansburiana
common side-blotched lizard

Teiidae – Whiptail Lizards

Aspidoscelis tigris
western whiptail

Anguidae – Alligator Lizards and Relatives

Elgaria multicarinata multicarinata
alligator lizard

Colubridae – Colubrid Snakes

Masticophis flagellum
coachwhip
Pituophis catenifer
gopher snake

Viperidae – Vipers

Crotalus cerastes
sidewinder

Birds

Odontophoridae – Quails

Callipepla californica
California quail

Cathartidae – New World Vultures

Cathartes aura
turkey vulture

Accipitridae – Hawks

Accipiter cooperii
Cooper's hawk
Buteo jamaicensis
red-tailed hawk

Falconidae – Falcons

Falco sparverius
American kestrel
Falco mexicanus
prairie falcon

Columbidae – Pigeons and Doves

Zenaida macroura
mourning dove

Cuculidae – Cuckoos and Roadrunners

Geococcyx californianus
greater roadrunner

Tytonidae – Barn Owls

Tyto alba
barn owl

Strigidae – True Owls

Bubo virginianus
great horned owl

Caprimulgidae – Goatsuckers

Chordeiles acutipennis
lesser nighthawk

Trochilidae – Hummingbirds

Archilochus alexandri
black-chinned hummingbird
Calypte anna
Anna's hummingbird

Tyrannidae – Tyrant Flycatchers

Sayornis saya
Say's phoebe
Tyrannus verticalis
western kingbird

Laniidae – Shrikes

Lanius ludovicianus
loggerhead shrike

Corvidae – Jays and Crows

Corvus corax
common raven

Alaudidae – Larks

Eremophila alpestris
horned lark

Hirundinidae – Swallows

Tachycineta bicolor
tree swallow
Stelgidopteryx serripennis
northern rough-winged swallow
Hirundo pyrrhonota
cliff swallow
Hirundo rustica
barn swallow

Aegithalidae – Bushtits

Psaltriparus minimus
bushtit

Troglodytidae – Wrens

Salpinctes obsoletus
rock wren
Thryomanes bewickii
Bewick's wren
Troglodytes aedon
house wren

Regulidae – Kinglets

Regulus calendula
ruby-crowned kinglet

Sylviidae – Gnatcatchers

Polioptila caerulea
blue-gray gnatcatcher

Mimidae – Thrashers

Mimus polyglottos
northern mockingbird
Toxostoma lecontei
Le Conte's thrasher

Motacillidae – Pipits

Anthus rubescens
American pipit

Parulidae – Wood Warblers

Dendroica coronata
yellow-rumped warbler

Emberizidae – Buntings and Sparrows

Chondestes grammacus
lark sparrow
Amphispiza belli
sage sparrow
Passerculus sandwichensis
savannah sparrow
Zonotrichia leucophrys
white-crowned sparrow
Junco hyemalis
dark-eyed junco

Icteridae – Blackbirds and Orioles

Sturnella neglecta
western meadowlark

Fringillidae – Finches

Carpodacus mexicanus
house finch
Carduelis psaltria
lesser goldfinch

Mammals

Soricidae – Shrews

Notiosorex crawfordi
desert shrew

Vespertilionidae – Vesper Bats

Euderma maculatum
spotted bat
Myotis yumanensis
Yuma myotis
Myotis californicus
California myotis

Molossidae – Free-Tailed Bats

Tadarida brasiliensis
Mexican free-tailed bat

Leporidae – Hares & Rabbits

Sylvilagus audubonii
desert cottontail
Lepus californicus
black-tailed jackrabbit

Sciuridae – Squirrels

Ammospermophilus leucurus
white-tailed antelope squirrel
Spermophilus beecheyi
California ground squirrel

Geomyidae – Pocket Gophers

Thomomys bottae
Botta's pocket gopher

Heteromyidae – Pocket Mice and Kangaroo Rats

Chaetodipus californicus
California pocket mouse
Dipodomys deserti
desert kangaroo rat

Muridae – Mice, Rats, and Voles

Neotoma lepida
desert woodrat
Peromyscus maniculatus
deer mouse

Canidae – Wolves and Foxes

Canis latrans
coyote
Urocyon cinereoargenteus
grey fox
Vulpes macrotis
desert kit fox

Procyonidae – Raccoons and Ringtails

Bassariscus astutus
ringtail
Procyon lotor
raccoon

Mustelidae – Weasels, Skunks, and Otters

Taxidea taxus
American badger

Felidae – Cats

Felis rufus
bobcat

APPENDIX E
CULTURAL RESOURCES TECHNICAL REPORT

KEELER DUNES DUST CONTROL PROJECT
CULTURAL RESOURCES TECHNICAL REPORT

Submitted to:

Bureau of Land Management
Bishop Field Office
351 Pacu Lane, Suite 100
Bishop, CA 93514

Prepared for:

Great Basin Unified Air Pollution Control District
157 Short Street, Suite 6
Bishop, CA 93514-3537

Prepared by:

Sapphos Environmental, Inc.
430 North Halstead Street
Pasadena, California 91107

March 21, 2014

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SECTION ES
EXECUTIVE SUMMARY

I. TITLE OF PROJECT: Keeler Dunes Dust Control Project

II. AGENCY: Bureau of Land Management (BLM)

III. PERMITS: BLM Cultural Resource Use Permit No. CA-10-37 (Authorization Request No. CA-170-11-22)

IV. LOCATION: The proposed project / proposed action study area is located immediately northwest of Keeler, Inyo County, California. The proposed project / proposed action study area includes Sections 30, 31, and 32, Township 16 South, Range 37 East; and Sections 24, 25, and 36, Township 16 South, Range 38 East, Mount Diablo Baseline and Meridian, California.

V. DATES OF FIELD RECORDATION: September 25–26, 2012, and February 20, 2014

VI. SUMMARY OF SURVEY ACTIVITES:

i. **Total Acreage of the Area of Potential Effect:** 323.2 acres

ii. **Total Acreage of Proposed Project Study Area:** 870 acres

iii. **Acreage of Land Surveyed at the BLM Class II and/or Class III Levels:** 0

iv. **Number of Newly Recorded Cultural Properties**: 22
1. Number of Newly Recorded Cultural Properties on BLM Lands: 20
2. Number of Newly Recorded Cultural Properties on Other Lands: 2

v. **Total Number of Cultural Properties Located within the Area of Potential Effect:** 4 (P-14-7840/CA-INY-6502, P-14-7851/CA-INY-6513H, BLM Site 1, KD Site 1, and KD Site 2)

vi. **National Register Eligibility of Cultural Properties within the Area of Potential Effect:**
1. Number of Register-Eligible Cultural Properties: 2
2. Number of Ineligible Cultural Properties: 20
3. Number of Cultural Properties that Can Be Avoided: 0
4. Number of Cultural Properties that Would Be Affected: 4

SECTION 1.0
INTRODUCTION

This Cultural Resources Technical Report was prepared to characterize the proposed Keeler Dunes Dust Control Project (proposed project / proposed action) area with respect to cultural resources, related plans of development, and regulatory statutes and guidelines. The proposed project / proposed action would consist of land modifications on the Keeler Dunes as a method to implement dust control measures (DCMs) designed to reduce fugitive dust emissions consistent with the requirements of the National Ambient Air Quality Standards (NAAQS). The proposed project / proposed action study area of approximately 870 acres is located within the northeastern portion of the Owens Valley in Inyo County, California, on lands administered by the U.S. Department of Interior Bureau of Land Management (BLM) Bishop Field Office and the City of Los Angeles Department of Water and Power (LADWP). Of the 870 acres, the area of potential effect (APE), or those portions of the proposed project / proposed action area that are likely to be physically affected by ground disturbance associated with the proposed project / proposed action, is approximately 323.2 acres.

The proposed action is considered an undertaking under Section 106 of the National Historic Preservation Act (NHPA) of 1966 (36 Code of Federal Regulations [CFR] 800.16[y]). Acting in its capacity as the lead agency under the NHPA, the BLM would need to take into account the effects of this proposed undertaking on properties listed in or eligible for listing in the National Register of Historic Places (NRHP). The BLM requires sufficient information with regard to the location and nature of potentially significant cultural resources to be able to make a determination of effects of the undertaking on those resources under NHPA and to make a determination regarding the appropriate level of environmental compliance documentation pursuant to the National Environmental Policy Act (NEPA).

The cultural investigation of the proposed project / proposed action area was requested by the Great Basin Unified Air Pollution Control District (District). The investigation was performed by Sapphos Environmental, Inc., under the supervision of Dr. Tiffany Clark, Archaeological Resources Specialist, in consultation with the BLM Bishop Field Office (Mr. Greg Haverstock, Archaeologist).

1.1 GOAL OF THE PROPOSED PROJECT / PROPOSED ACTION

The Great Basin Unified Air Pollution Control District (District) regulates fugitive dust (PM_{10}) emissions in the Owens Valley Planning Area (OVPA) consistent with the requirements of the National Ambient Air Quality Standards (NAAQS). The dried Owens Lake Bed has been the largest single source of PM_{10} emissions in the United States for many years, with peak annual PM_{10} emissions of more than 80,000 tons and 24-hour concentrations as high as 130 times the federal air quality standard. The air pollution at Owens Lake is caused by the City of Los Angeles's diversion of water from the Owens River and other streams that once flowed into Owens Lake. These waters have historically been diverted from the Owens Valley to the City of Los Angeles via the Los Angeles Aqueduct. By the 1920s, all that remained of the lake was a 26-square-mile hyper-saline brine pool, and by 1930, Owens Lake was virtually dry.[1]

[1] Great Basin Unified Air Pollution Control District. January 2008. *2008 Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan—Final Subsequent Environmental Report*. Prepared by: Sapphos Environmental, Inc., Pasadena, CA. Bishop, CA.

Exposed dry lake bed sediments have been dispersed into the air by prevailing winds over approximately the past 100 years. The resulting severe dust storms occur primarily from October through June, with the highest frequency of dust events occurring March through May and also in December. The northeastern portion of the Owens Lake bed, an area termed the North Sand Sheet (NSS), was one of the largest dust source areas. The NSS soil composition is primarily made up of sediment from the Owens River, with a smaller portion from the Inyo Mountains east of the lake. Over time, wind and water have reworked the Keeler Dunes sand deposits, which currently extend over an approximately 1.36-square-mile area. The Keeler Dunes appear to be spreading to the east and southeast toward the community of Keeler and the foothills of the Inyo Mountains.

Although dust sources on the bed of Owens Lake have been largely controlled, the material from Keeler Dunes becomes mobile during high-wind events, making Keeler Dunes one of the last main dust sources contributing to PM_{10} levels above state and federal standards in the community of Keeler. As a result of data collected from sand-motion monitoring since April 2000, the District has identified the Keeler Dunes as one of the areas that need to be controlled to attain the NAAQS for PM_{10} within the OVPA.

The proposed project / proposed action, in combination with other ongoing dust control projects that have been and are being implemented on the lake bed by the LADWP, is designed to improve air quality through the reduction of PM_{10} emissions throughout the OVPA but particularly in the community of Keeler. DCMs are necessary at the Keeler Dunes to bring the community of Keeler and greater Owens Lake area into compliance with the NAAQS for PM_{10} by 2017.

1.2 PURPOSE OF THE CULTURAL RESOURCES TECHNICAL REPORT

This Cultural Resources Technical Report was prepared to characterize the cultural resources that would potentially be affected by construction, operation, and maintenance of the proposed project / proposed action. As such, the document presents data and information to be used by the BLM in making a determination of effects to cultural resources resulting from the proposed undertaking and will provide the substantial evidence required with respect to cultural resources for environmental documentation under NHPA and NEPA.

1.3 INTENDED AUDIENCE

This Cultural Resources Technical Report summarizes the results of cultural resources investigations for consideration by the BLM, District, cooperating agencies, and Native American tribes. The information contained in this report has been an integral part of the project planning effort, which has attempted to avoid and minimize adverse effects to cultural resources to the maximum extent practicable while attaining the objectives of the proposed project / proposed action. The report details the findings of archaeological and paleontological records searches undertaken at the Eastern Information Center (EIC) at the University of California, Riverside; the BLM Bishop Field Office; the Native American Heritage Commission (NAHC); the Natural History Museum of Los Angeles County; and the San Bernardino County Museum. In addition, data are presented on two historic period archaeological sites that were recorded during the current work effort by Sapphos Environmental, Inc. in the proposed project / proposed action area. Finally, the report documents and summarizes the coordination and consultation that has been undertaken by the BLM with Native American representatives.

The location data for the archaeological resources will not be circulated for public review. To protect the sites from unauthorized excavation, looting, and/or vandalism, the locations of known archaeological resources will be kept confidential beyond what is necessary. Information concerning the nature and location of archaeological resources is protected under the Archaeological Resources Protection Act (16 U.S.C. 470 hh) and other statutes. Records in the information centers are exempt from the California Public Records Act (Government Code Section 6250 *et seq.*). Government Code Section 6254.10 states,

> Nothing in this chapter requires disclosure of records that relate to archaeological site information and reports maintained by, or in the possession of, the Department of Parks and Recreation, the State Historical Resources Commission, the State Lands Commission, the Native American Heritage Commission, another state agency, or a local agency, including the records that the agency obtains through a consultation process between a California Native American tribe and a state or local agency.

Government Code Section 6254(r) explicitly authorizes public agencies to withhold information from the public relating to "Native American graves, cemeteries, and sacred places maintained by the Native American Heritage Commission." Due to the sensitive nature of cultural resources described herein, this report is confidential and meant for the exclusive use of the BLM and other trustee and responsible agencies related to planning, installation, operation, maintenance, and management of the proposed project / proposed action.

1.4 SCOPE OF THE PROPOSED PROJECT / PROPOSED ACTION

The analysis of cultural resources consists of a summary of the regulatory framework of Section 106 of the NHPA Act of 1966, as amended (16 U.S.C. 40 *et seq.*), that guides the decision-making process with respect to historic properties, a description of the methods employed to support the characterization and evaluation of cultural resources within the proposed project / proposed action area, the results for baseline conditions for cultural resources, the potential for the proposed project / proposed action to affect cultural resources, and, if appropriate, opportunities to avoid and minimize the potential affects of the proposed project / proposed action.

1.5 SOURCES OF RELEVANT INFORMATION

Information used in the preparation of this Cultural Resources Technical Report primarily derives from a Class I literature review, including published and gray literature, Class III survey, informal consultation with cooperating agencies, and spatial analysis based on geographic information system data. In addition, information is also presented from two historic period sites that were recorded within the proposed project / proposed action area by Sapphos Environmental, Inc. Sources of relevant information are cited in footnotes and compiled in Section 6, *References*.

1.6 WORKING DEFINITIONS

A number of technical terms are used in the characterization of baseline conditions and assessment of the potential for the proposed project / proposed action to affect cultural resources.

Archaeological site is defined by the NRHP as the place or places where the remnants of a past culture survive in a physical context that allows for the interpretation of these remains. Archaeological remains usually take the form of artifacts (e.g., fragments of tools, vestiges of utilitarian or non-utilitarian objects), features (e.g., remnants of walls, cooking hearths, or midden

deposits), and ecological evidence (e.g., pollen remaining from plants that were in the area when the activities occurred).[2] Prehistoric archaeological sites represent the material remains of Native American groups and their activities. These sites are generally thought to date to the period before European contact but, in some cases, may contain evidence of trade contact with Europeans. Historic archaeological sites reflect the activities of nonnative populations during the historic period.

Area of potential effect (APE) measures 323.2 acres and consists of the portions of the proposed project / proposed action area that have been designated for DCMs, three of the four staging areas, and temporary access routes. These areas have the potential to be subjected to direct effects, such as ground disturbance resulting from the planting and establishment of native vegetation, construction of temporary access routes, and a temporary water delivery system. The APE includes a 100-foot buffer area surrounding the areas that are subject to direct ground disturbance that will account for indirect effects such as dust, foot traffic, and so forth.

Class I inventory is defined as a professional review of available cultural resource data and literature for a given area. This data may come from published and unpublished documents, BLM cultural resource inventory records, institutional site files, state and national registers, interviews, and other information sources.[3]

Class III survey is defined as an intensive, pedestrian survey of an entire target area to identify and record all historic properties.[4]

Cultural resources study area includes areas evaluated for the presence of previously recorded prehistoric and historic period cultural resources through record searches, agency consultation, and archival research. The cultural resources study area measures approximately 6,433 acres and consists of the entirety of the 870-acre proposed project / proposed action study area plus a 1-mile buffer.

Historic period is defined as the period that begins with the arrival of the first nonnative population and thus varies by area. Most Southern California archaeologists use AD 1782 as the date to mark the beginning of the historic period, following the beginning of the Spanish colonization of inland California.

Isolate is defined as an isolated artifact or small group of artifacts that appear to reflect a single event, loci, or activity. It may lack identifiable context but has the potential to add important information about a region, culture, or person. Isolates do not require avoidance or mitigation under NHPA because they lack contextual integrity and, therefore, are unlikely to meet the criteria for inclusion in the NRHP.

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[2] U.S. Department of the Interior, National Park Service. 2000. *National Register Bulletin: Guidelines for Evaluating and Registering Archeological Properties*. Available at: http://www.cr.nps.gov/nr/publications/bulletins/arch/

[3] U.S. Department of the Interior, Bureau of Land Management. 2004. *MS-8110 Identifying and Evaluating Cultural Resources*. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.23101.File.dat/8110.pdf

[4] U.S. Department of the Interior, Bureau of Land Management. 2004. *MS-8110 Identifying and Evaluating Cultural Resources*. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.23101.File.dat/8110.pdf

Native American sacred site is defined as an area that has been, and often continues to be, of religious significance to Native American peoples, such as an area where religious ceremonies are practiced or an area that is central to their origins as a people.

Proposed project / proposed action area is the study area defined by the District for the possible implementation of DCMs. The proposed project / proposed action area measures approximately 870 acres and is located on BLM- and LADWP-administered lands in Inyo County, California. Not all portions of the project / proposed action area will be subjected to DCMs.

SECTION 2.0
PROJECT DESCRIPTION

The description of the proposed project / proposed action includes its precise location and boundaries; the elements that constitute the proposed undertaking; and a brief characterization of the existing conditions at the proposed project / proposed action area.

2.1 LOCATION

The proposed project / proposed action area is located immediately north-northwest of the community of Keeler, California, and east of the 110-square-mile (70,000-acre) Owens Lake Bed, in the Owens Valley, Inyo County, California (Figure 2.1-1, *Regional Vicinity Map*). It is situated approximately 10 miles southeast of the town of Lone Pine and approximately 65 miles southeast of the City of Bishop. There are two communities in the immediate vicinity of the proposed project / proposed action area located in the unincorporated area of Inyo County. These include: the community of Keeler, southeast and adjacent to the proposed project / proposed action area, and the community of Swansea to the north. In the general vicinity of Owens Lake are the towns of Lone Pine to the northwest and Olancha and Cartago to the southwest. One designated Native American reservation, the Lone Pine Paiute-Shoshone Indian Reservation, is located near the town of Lone Pine, northwest of the proposed project / proposed action area (Figure 2.1-1). The proposed project / proposed action is located within the OVPA (Figure 2.1-2, *Proposed Project in Relation to Owens Valley Planning Area*). The OVPA is situated in the southern end of the Owens Valley, and implementation of various dust control measures on the former bed of Owens Lake has been ongoing since the year 2000.

The proposed project / proposed action area is approximately 870 acres (1.36 square miles) (Figure 2.1-3, *Project Location Map*). The proposed project / proposed action area extends approximately 2.5 miles to the northwest from the community of Keeler and is bisected by California State Route 136 (SR 136); the alignment for the Old State Highway runs along the western boundary of the proposed project / proposed action area. The proposed project / proposed action is located on lands administered primarily by the BLM Bishop Field Office and the LADWP. Other stakeholders include Inyo County, Lahontan Regional Water Quality Control Board, Lone Pine-Paiute Shoshone Tribe, Big Pine Band of Owens Valley, Bishop Paiute Tribe, Fort Independence Indian Community of Paiute Indians, Timbisha Shoshone Tribe, California State Lands Commission, Office of Historic Preservation, Native American Lands Commission, Caltrans District 9, Southern Pacific Railroad, Keeler Community Services District, and Keeler residents.

The proposed project / proposed action area is situated on the western portion of the Keeler alluvial fan between the Inyo Mountains to the east-northeast and the dried bed of Owens Lake to the west-southwest. The proposed project / proposed action is within the U.S. Geological Survey (USGS) 7.5-minute series topographic quadrangles Owens Lake[1] and Dolomite[2] (Figure 2.1-4, *Topographic Map of Proposed Project Area with USGS 7.5-Minute Quadrangle Index*). Specifically, the proposed project / proposed action is located in Sections 30, 31, and 32, Township 16 South, Range 37 East; and Sections 24, 25, and 36, Township 16 South, Range 38 East, Mount Diablo Baseline and Meridian, California. The topographic relief of the proposed project / proposed action study area is 285 feet, with the elevation ranging from 3,600 feet above

[1] U.S. Geological Survey. 1987. *7.5-Minute Series, Owens Lake, California, Topographic Quadrangle*. Denver, CO

[2] U.S. Geological Survey. 1987. *7.5-Minute Series, Dolomite, California, Topographic Quadrangle*. Denver, CO.

mean sea level (MSL) near the historic shore of Owens Lake to 3,885 feet above MSL on the upper portion of the alluvial fan.

2.2 EXISTING CONDITIONS

The current environs of the Keeler Dunes area consist of sand sheets with several active sand dune areas. Recent research completed by the Desert Research Institute on behalf of the District indicates that while portions of these dunes may have been formed during periods of lake regression in the early Holocene, the greatest depositional period has been in the past 100 years since the desiccation of the lake following diversions by LADWP beginning in 1913.[3] The proposed project / proposed action area is intersected by SR 136, which runs along the eastern edge of Owens Lake. A water diversion structure, which was built by Caltrans to divert runoff from the area upslope of the highway, is located east of the paved roadway (see Figure 2.1-4).

The Keeler Dunes area is characterized by a Desert Scrub plant community. Portions of the area west of State Route 136 contain active sand sheets and dunes, which are largely devoid of vegetation. Sparse vegetal cover, almost exclusively consisting of Parry's saltbush (*Atriplex parryii*), is found interspersed among the active dune areas. Denser plant communities composed of saltbush, greasewood (*Sarcobatus vermiculatus*), burrobush (*Ambrosia dumosa*), and cheesebush (*Hyumenoclea salsola*) are located upslope of the dunes complex to the east of State Route 136.

2.3 ELEMENTS

The proposed project / proposed action and project alternatives consists of up to 214 acres of DCMs, in addition to temporary staging areas and temporary access routes, within the approximately 870-acre study area. The proposed project / proposed action would include the construction of various DCMs designed to achieve dust control efficiencies of 95 percent over 177 acres and 85 percent over 17 acres (Figure 2.3-1, *Location of Infrastructure Elements Common to All Action Alternatives*). Elements of the proposed project / proposed action include installation of temporary wind breaks (straw bales), planting and establishment of native vegetation, and the construction of temporary access routes and staging areas to support implementation activities (Table 2.3-1, *Dust Control Measure Elements*). The proposed project / proposed action has been designed to minimize the adverse effects of the undertaking on significant cultural resources.

TABLE 2.3-1
DUST CONTROL MEASURE ELEMENTS

Element	Minimum Control Efficiency (%)	Number of Acres	No. Required per Acre	Total No. Required
Native Vegetation (ATPO)	95	177	1,983	350,991
Native Vegetation (ATPO)	85	17	1,092	18,564
Total ATPO				369,555
Straw Bales*	95	177	661	116,997
Straw Bales*	85	17	364	6,188
Total Bales				123,185

Key: ATPO = *Atriplex polycarpa*
Note: * The dimensions of the straw bales are 0.6 x 0.4 x 1.17 meters.

[3] Great Basin Unified Air Pollution Control District. 2012. "Origin and Development of the Keeler Dunes." Available at http://gbuapcd.org/keelerdunes/originanddevelopment/.

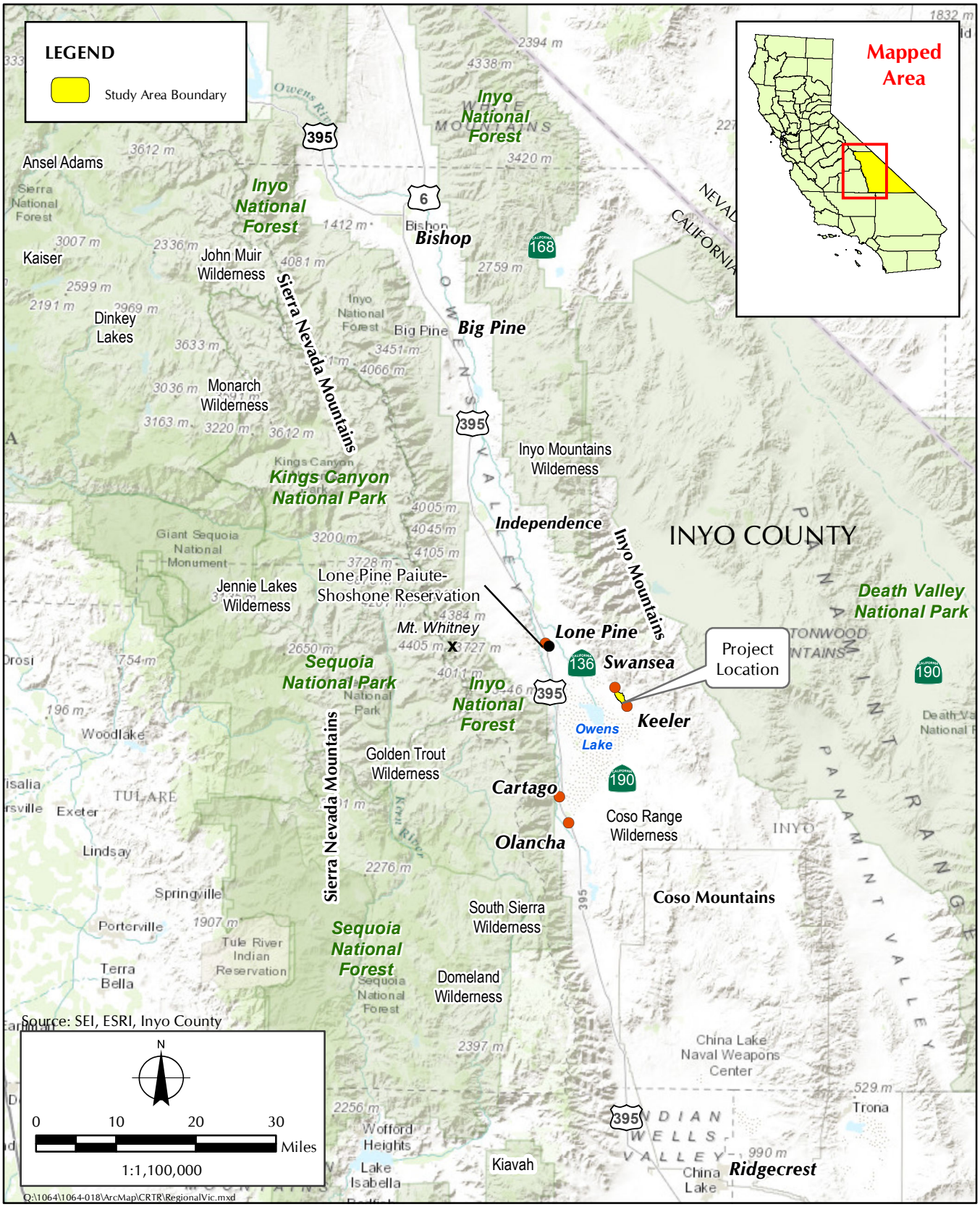

FIGURE 2.1-1

Regional Vicinity Map

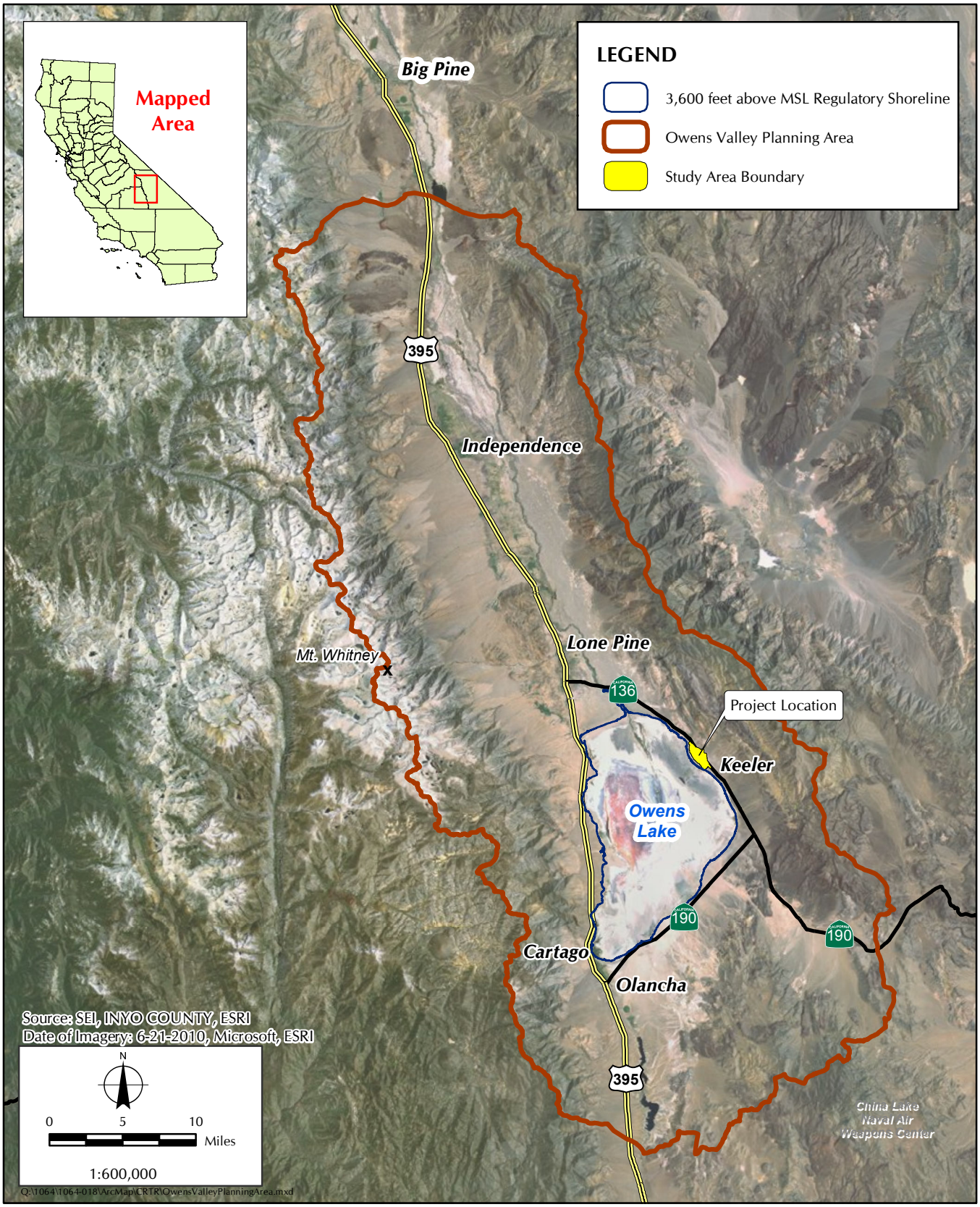

FIGURE 2.1-2

Proposed Project in Relation to Owens Valley Planning Area

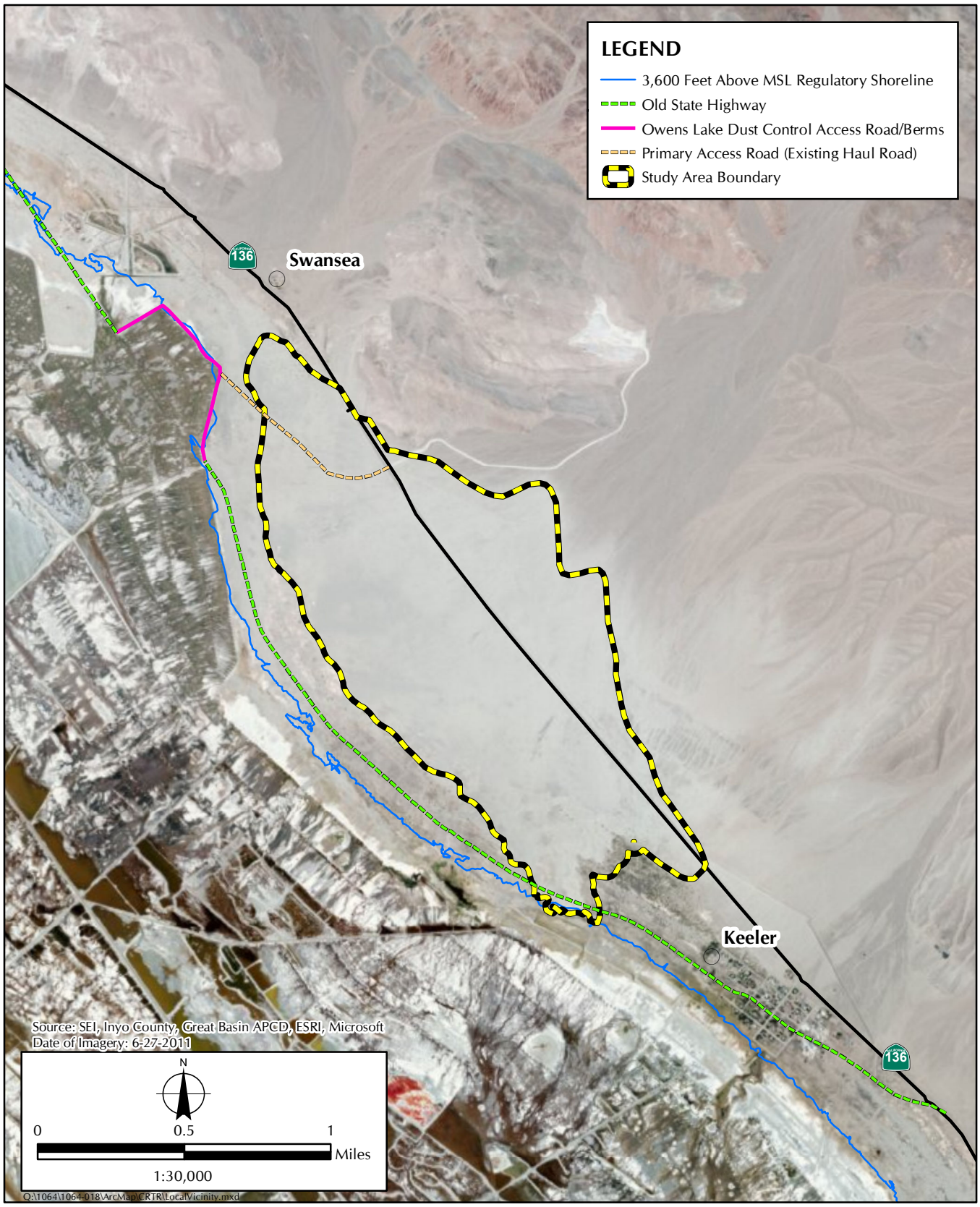

FIGURE 2.1-3

Project Location Map

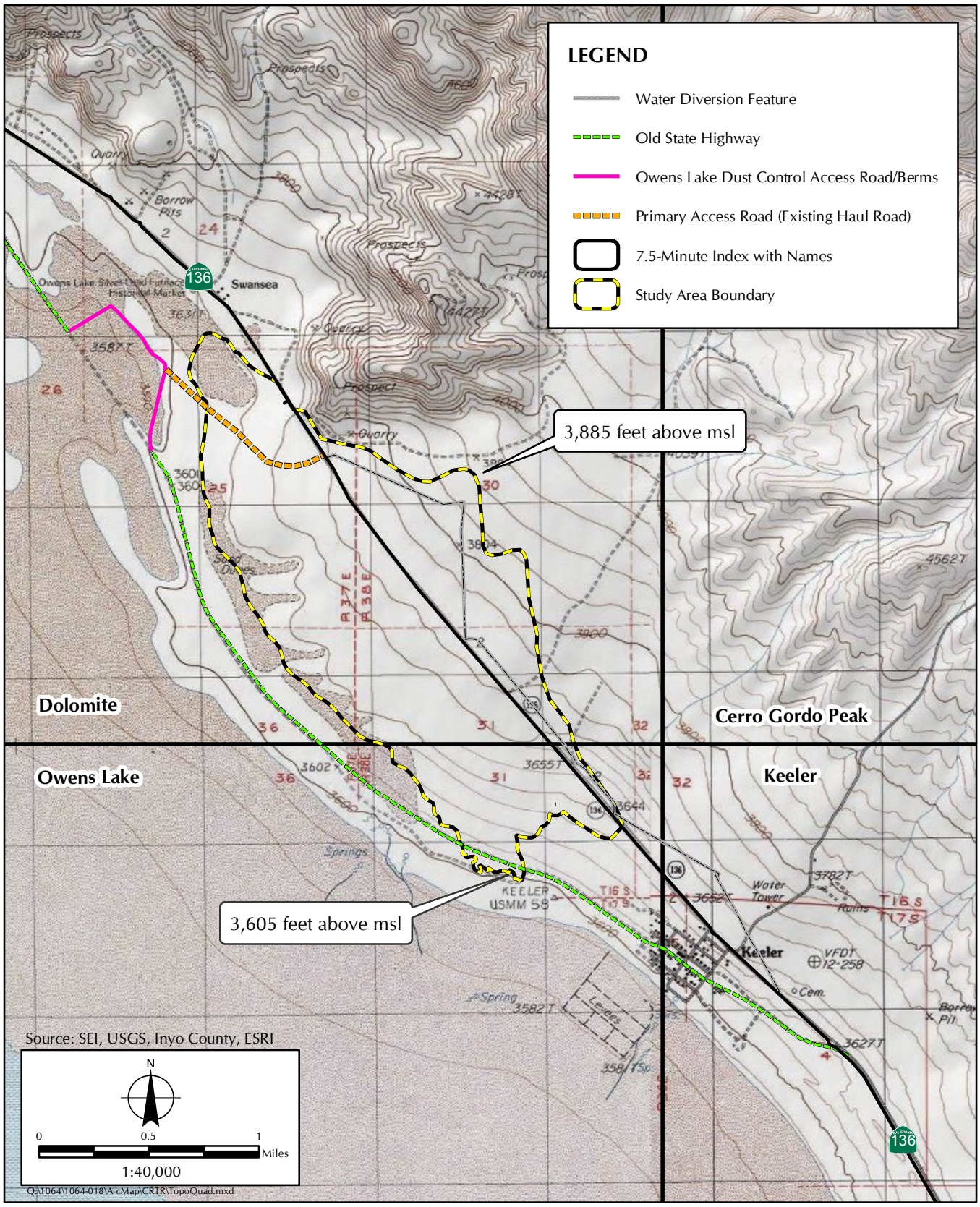

FIGURE 2.1-4

Topographic Map with USGS
7.5-Minute Quadrangle Index

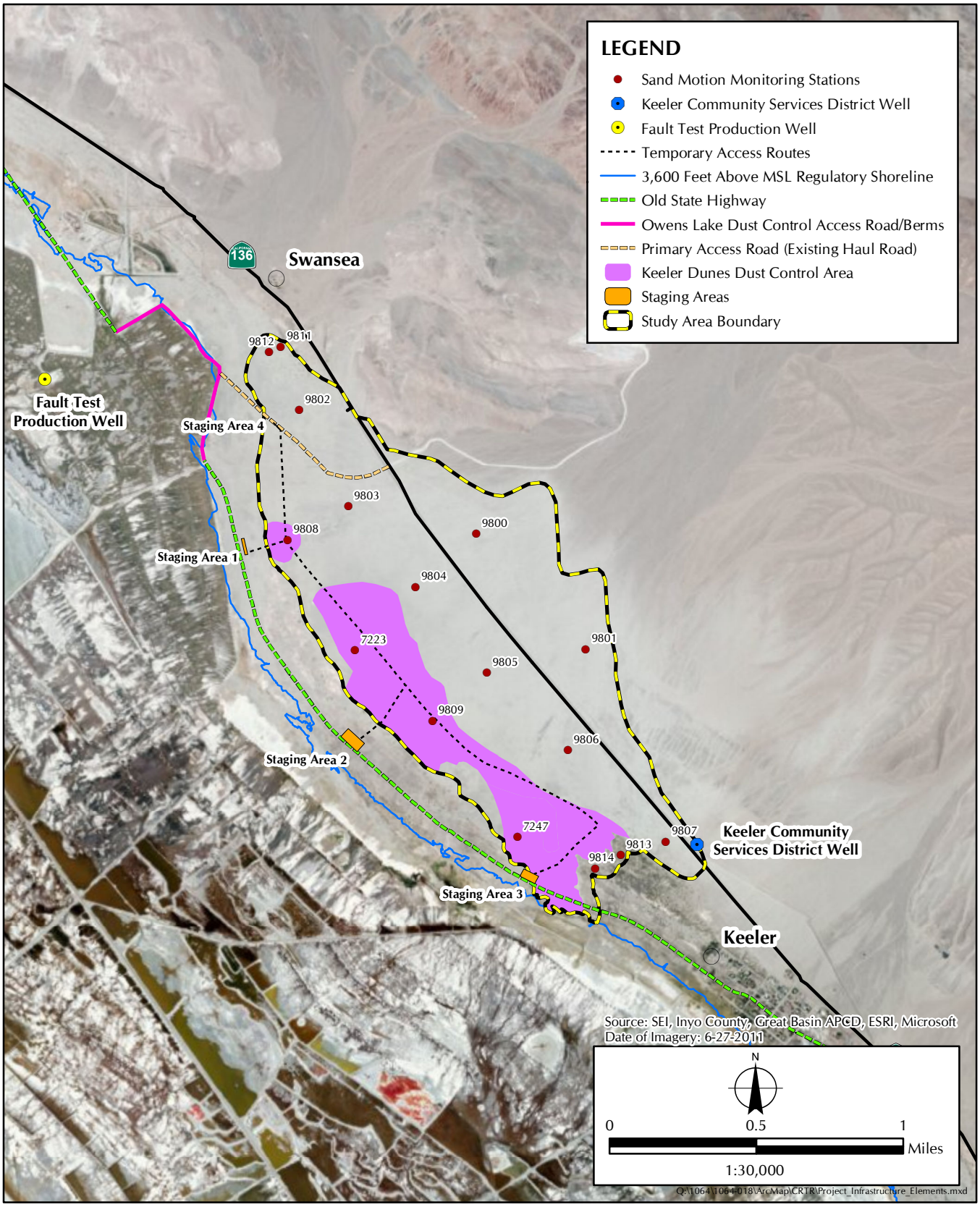

FIGURE 2.3-1

Location of Infrastructure Elements
Common to All Action Alternatives

2.3.1 Planting and Establishment of Native Vegetation

This DCM involves the establishment of a mix of native vegetation within the dust emitting areas. The goal of this work is to create a natural vegetated dune environment, similar to the existing Swansea Dunes (located to the northeast) and other stable shoreline dunes in the region (e.g., Mono Lake) that would act to prevent high emissions of dust by breaking up the wind and lowering the wind speed at the surface. Plants will be installed in a manner that mimics comparable natural environments, to the maximum extent possible given the topography and depth of the sand sheet. To achieve the estimated 85 percent and 95 percent dust control efficiencies, the plants will be spaced between 2 and 4 meters from one another. A variety of native vegetation may be planted in the dunes, including: saltbrush (*Atriplex* sp.), greasewood (*Sarcobatus vermiculatus*), Mojave stinkweed (*Cleomella obtusifolia*), fewleaf cleome (*Cleome sparsifolia*), turtleback (*Psathyrotes ramosissima*), and inkweed (*Suaeda moquinii*).

A minimal level of ground disturbance is expected to be associated with the planting of native vegetation. This work will involve the hand excavation of small holes (less than 1 foot in depth), in which individual seedlings will be placed. Seeds of native plants will also be dispersed by hand throughout these areas. All-terrain vehicles (ATVs) will be used to transport the planting materials from the staging areas to the designated dust control areas. As discussed below, a temporary route will be constructed that parallels SR 136 in order to access the dust control areas. No off-road vehicular use is expected to occur within the dust control areas.

2.3.2 Wind Breaks

This temporary DCM will be used to stabilize emissive sand sheet and dune areas in the active dune areas and provide a sheltered environment for plants during establishment. Wind breaks will consist of biodegradable vegetation (straw bales) installed in an irregular pattern across the emissive areas. Table 2.3-1 lists the estimated total numbers of straw bales needed to attain minimum 85 percent and 95 percent control efficiencies. The straw bales used within the proposed project / proposed action will measure 0.6 $\times$ 0.4 $\times$ 1.17 meters in size and will be certified weed-free to minimize the threat from invasive weeds. Biodegradable barriers are anticipated to decompose over a period of several years and would provide organic material to the existing soil. Limited maintenance of biodegradable wind breaks (replacement of broken bales) is anticipated.

No ground disturbance is expected to be associated with the positioning of the biodegradable barriers. ATVs will transport the straw bales from the staging area to the designated dust control areas using a temporary access route (see below). The placement of the straw bales will occur by hand with no vehicular use expected to occur within the dust control areas.

2.3.3 Other Elements

Other elements associated with the proposed project / proposed action include temporary staging areas; an access route; and a water supply, conveyance, and distribution system (for elements and APE, see Figure 2.3.3-1, *Area of Potential Effects for Cultural Resources*).

Staging Areas

One main staging area (Staging Area 1) will be established within the northwestern edge of the proposed project / proposed action area on land administered by the BLM (Figure 2.3.3-1). Located

immediately east of the Old State Highway, the facility will measure 50 feet by 300 feet in area and will be used by the contractor(s) for the storage of equipment, fuel, ATVs, wind barrier materials, native plants, and other supplies.

Two smaller staging areas will be constructed farther south along the Old State Highway (Figure 2.3.3-1). These staging areas, referred to as Staging Area 2 and Staging Area 3, will be located on land managed by LADWP and BLM, respectively. Staging area 2 will measure 200 feet by 400 feet in area while Staging Area 3 will measure 150 feet by 300 feet. The areas will be used for the temporary storage of equipment and materials needed for the implementation of DCMs in the central and southern portions of the proposed project / proposed action area.

The construction of the staging areas is expected to be limited to the removal and flattening of vegetation and, as such, should involve a minimal level of ground disturbance.

Staging Area 4 will be established adjacent to the gravel haul road constructed by the LADWP for dust mitigation on the Owens Lake, adjacent to the turn-off onto Highway 136 (Figure 2.3.3-1). This staging area will be placed on previously disturbed land within the graveled limits of the existing road; thus no vegetative removal is necessary. The area will measure approximately 10 feet by 200 feet and will be used exclusively for temporary straw bale storage.

Access Route

A temporary access route will be built and used during the construction, operation, and maintenance of the DCMs (Figure 2.3.3-1). The route will be approximately 20 feet wide and 13,478 feet long (2.5 miles) and will run along the northern extent of the APE. It can be accessed from any of the three staging areas located along the Old State Highway.

The temporary access route will be constructed without the use of supplemental materials such as asphalt or gravel; ground disturbance associated with the construction of the access route is expected to include the removal and flattening of vegetation with some minor grading. Following the completion of planting and watering activities, the temporary access route will be restored with straw bales and native plants.

Water Supply, Conveyance, and Distribution

The proposed project / proposed action and alternatives assume that the water for plant irrigation may be supplied from the District's 12-inch production well, located at the Fault Test Site, located about 0.7 mile northwest of the proposed project / proposed action boundary. The Fault Test well is an artesian (flowing) well and is capable of producing 250 gallons per minute (gpm).[4] An initial application of water at each straw bale installed in the dust control areas is expected to require approximately 985,480 gallons, which would be applied over a 2- to 4-month period. The Fault Test production well can supply 120,000 gallons over an 8-hour period, almost 8 times more than would be needed per day of watering. Another available water source includes purchased water from the Keeler Community Services District (KCSD) Well located within the southeastern portion of the proposed project / proposed action study area.[5]

[4] Holder, G., Great Basin Unified Air Pollution Control District, Bishop, CA. 9 October 2012. Telephone conversation with D. Grotzinger, Sapphos Environmental, Inc., Pasadena, CA.

[5] Holder, G., Great Basin Unified Air Pollution Control District, Bishop, CA. 20 September 2013. Email to Eric Charlton, Sapphos Environmental, Inc., Pasadena, CA.

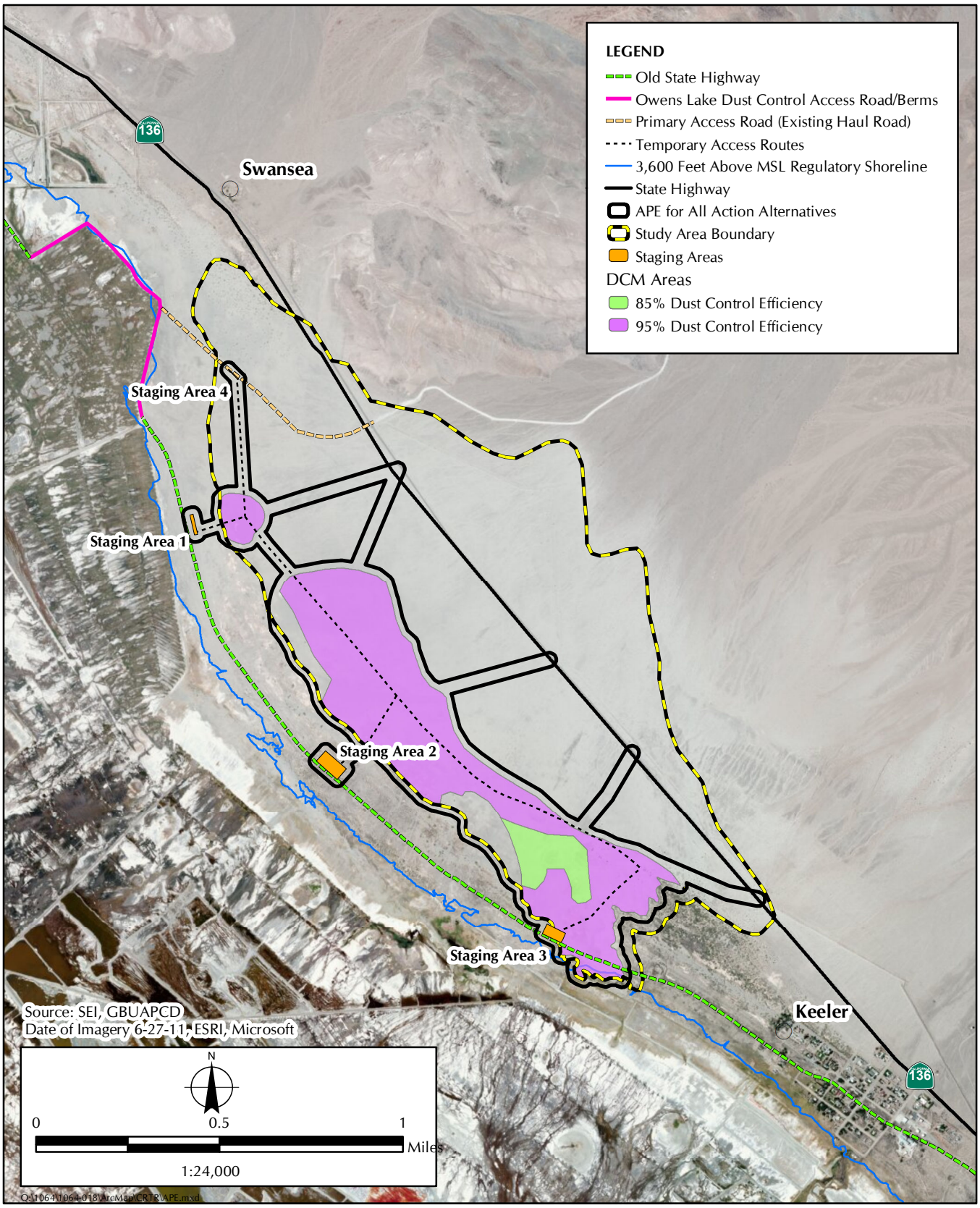

FIGURE 2.3.3-1

Area of Potential Effects for Cultural Resources

The proposed project / proposed action consists of installation and monitoring of a DCM, consisting of straw bales and native vegetation, on 194 acres within a total study area of approximately 870 acres of active and mobile sand deposits. Construction would require four staging areas and a temporary access route from each staging area to the proposed project / proposed action site.

There are also six proposed project / proposed action alternatives including a no project / no action alternative. The difference between the proposed project / proposed action and proposed project / proposed action alternatives include differences in the amount of area controlled as well as the source of water and method of irrigation for the native vegetation. The proposed project / proposed action involves DCMs applied to 194 acres using irrigation water transported by water trucks from the Fault Test (FT) well to staging areas and transferred to all-terrain vehicle (ATV) trailer tanks. Alternatives 1 and 2 are the same as the proposed project / proposed action with an increase in DCMs applied to 214 and 197 acres, respectively. Alternative 3 involves DCMs applied to 194 acres using a combination of irrigation water delivers by temporary aboveground polyvinyl chloride (PVC) pipelines and manual watering in selected areas. Alternative 3 also involves the placement of on-site 20,000-gallon water tanks within the staging areas along the Old State Highway. Alternative 4 involves dust control measures applied to 194 acres using water transported by water trucks to roadside staging areas off of State Route 136 for direct connection to a combination of irrigation water delivered by temporary aboveground PVC pipelines and manual watering in selected areas. Alternative 5 involves DCMs applied to 194 acres using water supplied via the existing Keeler Community Services District well/pipeline and delivered using a combination of irrigation water delivered by temporary aboveground PVC pipelines and manual watering in selected areas. Under Alternative 6, no DCMs would be implemented at the Keeler Dunes.

2.3.4 Pre-construction Surveys

Cultural resources protection is complicated by the shifting sand deposits that result in temporal variations in coverage and exposure of cultural resources. As part of the project design and development process, extensive coordination was undertaken by the District with BLM to develop a conceptual site plan that places project elements in a manner that avoids cultural resources. However, the potential exists, due to the shifting nature of the sand deposits, for additional cultural resources to be exposed prior to the initiation of project installation. Therefore, an additional survey will be undertaken by the District, in consultation with the BLM and Native American monitors. The results of the survey will be used as the basis for the development of the final site plan to be submitted with the right-of-way (ROW) application, demonstrating avoidance of potentially significant cultural resources, including any required corresponding refinements associated with the proposed construction scenario. Special consideration will be afforded to portions of CA-INY-6502 and KD Site1 falling within the APE. This work will involve the identification and recording of identified artifacts and features, including those previously identified within the site boundary of CA-INY-6502 and KD Site1 and any newly identified cultural deposits within the APE. A plot of the proposed project / proposed action elements, including their relation to surface artifacts and features, will be provided with the ROW application. The supplemental monitoring of the areas falling within the impact area will be undertaken by a qualified archaeologist to ensure that no cultural deposits are adversely affected by the transport and placement of the vegetation and straw bales and the delivery of water via small tanks and hoses mounted on ATVs or temporary irrigation lines. The final site plan will be adjusted to avoid the two

cultural resources identified in the initial surveys and any additional cultural resources identified as a result of the supplemental surveys.

The supplemental survey for cultural resources will involve the identification and recordation of artifacts and features using handheld global positioning system (GPS) units. A spatial analysis in geographic information systems (GIS) will then be undertaken to determine the specific placement of vegetation, straw bales, foot paths, and routes of travel for ATVs or temporary irrigation lines in relationship to sensitive cultural resources to ensure the final site plan avoids these resources. The contractor shall submit a final proposed construction scenario to the lead agency for approval that depicts the location of these project elements and their relation to surface artifacts and features. An on-site archaeological monitor and Native American monitor will be required to be present during the implementation of the DCMs within culturally sensitive areas.

To ensure no paleontological resources are will be adversely affected by construction activities, should ground disturbing activities be conducted within Staging Areas 1 and 2 and along the access roads leading to Staging Areas 2 and 3, an on-site paleontological monitor should also be present in as these areas that have the potential to contain significant paleontological resources.

2.3.5 Construction Scenario

Installation of the proposed project / proposed action would require approximately 11 months to complete. Work efforts would be divided into the following tasks: (1) construction of the temporary access route and staging areas; (2) bale placement, seedling planting, and watering; and (3) proposed project / proposed action oversight and monitoring, with supplemental watering and planting as required. Following the completion of the proposed project / proposed action, the areas of disturbance, including the staging areas and temporary access route, would be restored to their original condition.

2.4 AREA OF POTENTIAL EFFECT

The 323.2-acre APE addressed in this Cultural Resources Technical Report consists of areas of direct effect associated with the construction, operation, and maintenance of the proposed project / proposed action and all proposed alternatives plus a 100-foot buffer around the areas of direct ground disturbance that will account for indirect effects such as dust, foot traffic, and so forth (Figure 2.3.3-1).

SECTION 3.0
REGULATORY FRAMEWORK

This section identifies the federal statutes, ordinances, or policies that govern the conservation and protection of cultural resources that must be considered during the decision-making process for projects that have the potential to affect cultural resources. Land use decisions made by the BLM are governed by several statutes and regulations, most importantly the Federal Land Policy and Management Act of 1976 (FLPMA; 43 U.S.C. 1701 et seq.), regulations in 43 CFR 1600 et seq., NEPA, and regulations established by the Council on Environmental Quality (40 CFR 1500–1508).[1] The BLM has developed manuals and handbooks, most recently the Land Use Planning Handbook, BLM Handbook H-1601-1, that provide guidance for land use plans and decisions.[2]

3.1 FEDERAL

3.1.1 National Historic Preservation Act of 1966[3]

Enacted in 1966 and amended most recently in 2006, the NHPA declared a national policy of historic preservation and instituted a multifaceted program, administered by the Secretary of the Interior, to encourage the achievement of preservation goals at the federal, state, and local levels. The NHPA authorized the expansion and maintenance of the NRHP, established the position of State Historic Preservation Officer (SHPO) and provided for the designation of State Review Boards, set up a mechanism to certify local governments to carry out the purposes of the NHRA, assisted Native American tribes to preserve their cultural heritage, and created the Advisory Council on Historic Preservation (ACHP). Its implementing regulations, 36 CFR 800, are described below as Section 106.

Section 106

Section 106 of the NHPA requires that federal agencies with direct or indirect jurisdiction over federally funded, assisted, or licensed undertakings "take into account the effects of their undertakings on historic properties" (i.e., any property that is included in, or eligible for inclusion in, the NRHP; see below).[4] The ACHP may choose to participate in the Section 106 process if the undertaking would have substantial impacts on important historic properties, presents important questions of policy or interpretation, has the potential for presenting procedural problems, or presents issues of concern to Native American tribes.[5] The Section 106 process involves establishing if the proposed action constitutes an undertaking; identification of historic properties within an APE; determination if the undertaking will cause an adverse effect on historic resources; and resolution of those adverse effects through consultation, avoidance, proposed action redesign, and the execution of a Memorandum of Agreement or Programmatic Agreement.

[1] USDI Bureau of Land Management. 11 March 2005. *Land Use Planning Handbook BLM Handbook H-1601-1*. Introduction, p. 1. Available at: http://www.blm.gov/nhp/200/wo210/landuse_hb.pdf

[2] USDI Bureau of Land Management. 11 March 2005. *Land Use Planning Handbook BLM Handbook H-1601-1*. Available at: http://www.blm.gov/nhp/200/wo210/landuse_hb.pdf

[3] *United States Code*, 16 USC 470.

[4] 36 CFR Part 800.1(a)

[5] Appendix A to 36 CFR Part 800

In addition to the ACHP, the California Office of Historic Preservation (SHPO), federally recognized Native American Tribes, and applicants for federal permits/leases/funds participate in the process with the federal agency. Other interested members of the public—including individuals, organizations, and state-recognized Native American Tribes—are provided with opportunities to participate in the process. It should be noted that the Section 106 process has been streamlined for undertakings under the statutory or regulatory authority of the California BLM. Section 106 compliance for the proposed action follows the process outlined in the *State Protocol Agreement among the California State Director of the Bureau of Land Management and the California State Historic Preservation Officer and the Nevada State Historic Preservation Officer*,[6] which was executed in 2007 and revised in 2012, BLM is authorized to act on the SHPO's behalf on undertakings that culminate in "no historic properties affected" (36 CFR 800.4(d)(1)) and "no adverse effect" findings (36 CFR 800.5(b)).

National Register of Historic Places

The NRHP was established by the NHPA of 1966 as:

> an authoritative guide to be used by federal, state, and local governments, private groups, and citizens to identify the Nation's cultural resources and to indicate what properties (sites, districts, objects, buildings, and structures) should be considered for protection from destruction or impairment.[7]

The NRHP recognizes properties that are significant at the national, state, and local levels. The register was established and is maintained by the Secretary of the Interior. To be eligible for listing in the NRHP, a resource must be significant in American history, architecture, archaeology, engineering, or culture. Districts, sites, buildings, structures, and objects of potential significance must also possess integrity of location, design, setting, materials, workmanship, feeling, and association. Anyone can recommend a historic property for listing to the National Register, but it is the federal agency responsible for an undertaking that makes the determination of eligibility. A property is eligible for the NRHP if it meets one or more of the following criteria and possesses integrity of location, design, setting, materials, workmanship, feeling, and association:[8]

Criterion A:	It is associated with events that have made a significant contribution to the broad patterns of our history.
Criterion B:	It is associated with the lives of persons who are significant in our past.
Criterion C:	It embodies the distinctive characteristics of a type, period, or method of construction; represents the work of a master; possesses high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction.
Criterion D:	It has yielded, or may be likely to yield, information important in prehistory or history.

[6] USDI Bureau of Land Management. 2012 *State Protocol Agreement among the California State Director of the Bureau of Land Management and the California State Historic Preservation Officer and the Nevada State Historic Preservation Officer Regarding the Manner in which the Bureau of Land Management will meet its Responsibilities under the National Historic Preservation Act and the National Programmatic Agreement among the BLM, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers*. Agreement Document on file, California State Office, Bureau of Land Management, Sacramento, California.

[7] *Code of Federal Regulations*, 36 CFR 60.2.

[8] *Code of Federal Regulations*, 36 CFR 60.4.

Cemeteries, birthplaces, or graves of historic figures; properties owned by religious institutions or used for religious purposes; structures that have been moved from their original locations; reconstructed historic buildings; and properties that are primarily commemorative in nature are not considered eligible for the NRHP unless they satisfy certain conditions. In general, a resource must be at least 50 years old to be considered for the NRHP, unless it satisfies a standard of exceptional importance.[9]

3.1.2 National Environmental Policy Act

The NEPA requires federal agencies to consider and report the potential environmental impacts of proposed federal actions. Actions likely to have major effects on the environment require the sponsoring agency to develop an Environmental Impact Statement that considers the environmental consequences of alternative proposed action designs; actions likely to have minor effects require Environmental Assessments. "Environment" is defined broadly, and includes cultural resources, social values, and various aspects of the natural environment. Compliance with Section 106 of the NHPA is interlinked with NEPA compliance with respect to historic properties (i.e., historic structures, archaeological sites, traditional cultural properties). The BLM's regulations regarding NEPA are set forth in the National Environmental Policy Act BLM Handbook H-1790-1.[10] Treatment of cultural resources by the BLM is detailed in its Manual Series 8100, et seq.[11]

3.1.3 Native American Graves Protection and Repatriation Act of 1990

The Native American Graves Protection and Repatriation Act of 1990 sets provisions for the intentional removal and inadvertent discovery of human remains and other cultural items from federal and tribal lands. It clarifies the ownership of human remains and sets forth a process for repatriation of human remains and associated funerary objects and sacred religious objects to the Native American groups claiming to be lineal descendants or culturally affiliated with the remains or objects. It requires any federally funded institution housing Native American remains or artifacts to compile an inventory of all cultural items within the museum or with its agency and to provide a summary to any Native American Tribe claiming affiliation.

3.1.4 American Indian Religious Freedom Act

The American Indian Religious Freedom Act (AIRFA) of 1978 was enacted to protect and preserve the traditional religious rights and cultural practices of Native Americans. These rights include, but are not limited to, access of sacred sites, freedom to worship through ceremonial and traditional rights and use, and possession of objects considered sacred. The AIFRA requires that federal agencies evaluate their actions and policies to determine if changes are needed to ensure that Native American religious rights and practices are not disrupted by agency practices. Such evaluations are made in consultation with native traditional religious leaders.

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[9] U.S. Department of the Interior, National Park Service. 2002. *How to Apply the National Register Criteria for Evaluation*. National Register Bulletin 15. Washington, DC.

[10] Bureau of Land Management. 25 October 1988. *National Environmental Policy Act BLM Handbook H-1790-1*. Available at: http://www.blm.gov/nhp/efoia/wo/handbook/h1790-1.pdf

[11] Bureau of Land Management. 3 December 2004. *Manual Series 8100*. Available at: www.blm.gov

3.1.5 Executive Order 13007 (Indian Sacred Sites)

In managing federal lands, agencies shall, to the extent practicable, permitted by law, and not inconsistent with agency functions, accommodate Indian religious practitioners' access to and ceremonial use of Indian sacred sites. Agencies are to avoid adversely affecting the physical integrity of these sites, maintaining the confidentiality of such sites, and informing tribes of any proposed actions that could restrict access to, ceremonial use of, or adversely affect the physical integrity of, sacred sites.

3.1.6 Federal Land Policy and Management Act of 1976

Legislation establishes public land policy and guidelines for the administration, management, protection, development, and enhancement of public lands. Regulations under FLPMA (43 USC 1701 et seq.) established the procedures that the BLM follows in managing public lands. These lands are to be managed in a manner that protects the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archaeological values that, where appropriate, will preserve and protect certain public lands in their natural conditions, provide food and habitat for fish and wildlife and domestic animals, and provide for outdoor recreation and human occupancy and use by encouraging collaboration and public participation throughout the planning process.

3.2 STATE

3.2.1 California Environmental Quality Act

Pursuant to the California Environmental Quality Act (CEQA), a historical resource is a resource listed in, or eligible for listing in, the California Register of Historical Resources (CRHR; Public Resources Code [PRC], Sections 21083.2 and 21084.1).[12,13] In addition, resources included in a local register of historical resources or identified as significant in a local survey conducted in accordance with state guidelines are also considered historical resources under CEQA unless a preponderance of facts demonstrates otherwise. According to CEQA, the fact that a resource is not listed in or determined eligible for listing in the CRHR or is not included in a local register or survey shall not preclude a Lead Agency, as defined by CEQA, from determining that the resource may be a historical resource as defined in California PRC Section 5024.1.

CEQA applies to archaeological resources when (1) the archaeological resource satisfies the definition of a historical resource or (2) the archaeological resource satisfies the definition of a unique archaeological resource. A unique archaeological resource is an archaeological artifact, object, or site that has a high probability of meeting any of the following criteria (PRC Section 21083.2[g])[14]:

(1) The archaeological resource contains information needed to answer important scientific research questions and there is a demonstrable public interest in that information.

[12] *California Public Resources Code*, Division 13, Section 21083.2.

[13] *California Public Resources Code*, Division 13, Section 21084.1.

[14] *California Public Resources Code*, Division 13, Section 21083.2.

(2) The archaeological resource has a special and particular quality such as being the oldest of its type or the best available example of its type.

(3) The archaeological resource is directly associated with a scientifically recognized important prehistoric or historic event or person.

3.2.2 California Register of Historical Resources

Created in 1992 and implemented in 1998, the CRHR is an authoritative guide in California to be used by state and local agencies, private groups, and citizens to identify the state's historical resources and to indicate what properties are to be protected, to the extent prudent and feasible, from substantial adverse change (PRC Section 5024.1[a]).[15] Certain properties, including those listed in or formally determined eligible for listing in the NRHP and California Historical Landmarks (CHLs) numbered 770 and higher, are automatically included in the CRHR. Other properties recognized under the California Points of Historical Interest program, identified as significant in historical resources surveys, or designated by local landmarks programs may be nominated for inclusion in the CRHR. A resource, either an individual property or a contributor to a historic district, may be listed in the CRHR if the State Historical Resources Commission determines that it meets one or more of the following criteria, which are modeled on NRHP criteria (PRC Section 5024.1[c]):[16]

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

Criterion 2: It is associated with the lives of persons important in our past.

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

Criterion 4: It has yielded, or may be likely to yield, information important in history or prehistory.

Resources nominated to the CRHR must retain enough of their historic character or appearance to be recognizable as historical resources and to convey the reasons for their significance.[17] It is possible that a resource whose integrity does not satisfy NRHP criteria may still be eligible for listing in the CRHR. A resource that has lost its historic character or appearance may still have sufficient integrity for the CRHR if, under Criterion 4, it maintains the potential to yield significant scientific or historical information or specific data.[18] Resources that have achieved significance within the past 50 years may be also eligible for inclusion in the CRHR provided that enough time

[15] *California Public Resources Code*, Section 5024.1.

[16] *California Public Resources Code*, Section 5024.1.

[17] Office of Historic Preservation. 14 March 2006. "Technical Assistance Bulletin 6: California Register and National Register, A Comparison (for Purposes of Determining Eligibility for the California Register)." Available at: http://www.ohp.parks.ca.gov

[18] Office of Historic Preservation. 4 September 2002. "Technical Assistance Series #3, California Register of Historical Resources: Questions and Answers." Available at: http://www.ohp.parks.ca.gov

has lapsed to obtain a scholarly perspective on the events or individuals associated with the resource.[19]

3.2.3 Other State Statutes and Regulations

Native American Heritage Commission

Section 5097.91 of the PRC established the NAHC, whose duties include the inventory of places of religious or social significance to Native Americans and the identification of known graves and cemeteries of Native Americans on private lands. Section 5097.98 of the PRC specifies a protocol to be followed when the NAHC receives notification of a discovery of Native American human remains from a county coroner.

Government Code Sections 6254(r) and 6254.10

These sections of the California Public Records Act were enacted to protect archaeological sites from unauthorized excavation, looting, or vandalism. Section 6254(r) explicitly authorizes public agencies to withhold information from the public relating to "Native American graves, cemeteries, and sacred places maintained by the Native American Heritage Commission." Section 6254.10 specifically exempts from disclosure requests for "records that relate to archaeological site information and reports maintained by, or in the possession of, the Department of Parks and Recreation, the State Historical Resources Commission, the State Lands Commission, the Native American Heritage Commission, another state agency, or a local agency, including the records that the agency obtains through a consultation process between a Native American tribe and a state or local agency."

Health and Safety Code, Sections 7050 and 7052

Health and Safety Code, Section 7050.5 declares that in the event of the discovery of human remains outside of a dedicated cemetery, all ground disturbance must cease and the county coroner must be notified. Section 7052 establishes a felony penalty for mutilating, disinterring, or otherwise disturbing human remains, except by relatives.

Penal Code, Section 622.5

Penal Code, Section 622.5 provides misdemeanor penalties for injuring or destroying objects of historic or archaeological interest located on public or private lands but specifically excludes the landowner.

Public Resources Code, Section 5097.5

Public Resources Code, Section 5097.5 defines a misdemeanor as the unauthorized disturbance or removal of archaeological, historic, or paleontological resources located on public lands.

[19] Office of Historic Preservation. 14 March 2006. "Technical Assistance Bulletin 6: California Register and National Register, A Comparison (for Purposes of Determining Eligibility for the California Register)." Available at: http://www.ohp.parks.ca.gov

3.3 LOCAL

3.3.1 County of Inyo General Plan

The Land Use, Conservation, and Open Space Elements of the Inyo County General Plan set forth the following goal in relation to cultural resources: "Preserve and promote the historic and prehistoric cultural heritage of the County."[20] They include the following policies related to the preservation and promotion of Inyo County's cultural heritage that have relevance to the proposed action:

> *Policy CUL-1.3, Protection of Cultural Resources:* Preserve and protect key resources that have contributed to the social, political, and economic history and prehistory of the area, unless overriding considerations are warranted.
>
> *Policy CUL-1.4, Regulatory Compliance:* Development and/or demolition shall be reviewed in accordance with the requirements of CEQA and the National Historic Preservation Act.

[20] Inyo County Planning Department. December 2001. *Inyo County General Plan*. Independence, CA.

SECTION 4.0
METHODS

This section of the Cultural Resources Technical Report describes the methods employed in the characterization and evaluation of cultural resources at the proposed project / proposed action area. The study methods follow standards outlined in BLM Manual Sections 8110.21A and 8110.B4 for Class I inventories and Class III surveys, respectively; these work efforts were designed to provide the substantial evidence required to evaluate the potential impacts of the proposed action on historic properties. In accordance with CEQA and NEPA, the analysis of cultural resources in the proposed project / proposed action area encompasses paleontological and archaeological resources, historical buildings and structures, human remains, and Native American sacred sites.

4.1 PALEONTOLOGICAL RESOURCES

4.1.1 Record Search and Literature Review

In order to assess the potential presence of recorded paleontological sites and other unique geologic units within the approximately 870-acre (1.4-square-mile) proposed project / proposed action area and surrounding vicinity, record searches were requested from the Natural History Museum of Los Angeles County[1] and the San Bernardino County Museum.[2] Sapphos Environmental, Inc. also examined the results of previous paleontological investigations[3,4] conducted in the vicinity of Keeler Dunes as part of the 2003 Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan Environmental Impact Report (EIR)[5] and 2008 Subsequent Environmental Impact Report (SEIR),[6] respectively. Data from the records search and literature review were then compared to a detailed geomorphic map of the Keeler Dunes locale in order to evaluate the potential for the geologic units that characterize the proposed project / proposed action area to yield unique paleontological resources.[7]

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[1] McLeod, Samuel, Natural History Museum of Los Angeles County, Los Angeles, CA. 11 October 2011. Letter response to Clarus Backes, Sapphos Environmental, Inc., Pasadena, CA.

[2] Scott, Eric, San Bernardino County Museum, Redlands, CA. 28 February 2012. Letter response to Tiffany Clark, Sapphos Environmental, Inc., Pasadena, CA.

[3] Gust, S. May 2003. *Paleontological Assessment Report and Mitigation Plan for the Owens Valley Project, Inyo County, California*. Prepared for: Sapphos Environmental, Inc., Pasadena, CA. Prepared by: Cogstone Resource Management, Inc., Santa Ana, CA.

[4] Gust, S., and K. Scott. Revised July 2007. *Paleontological Evaluation of 2008 Supplemental Control Requirements for the Owens Valley PM10 Planning Area Demonstration of Attainment State Implementation Plan, Inyo County, California*. Submitted to: Sapphos Environmental, Inc., Pasadena, CA. Prepared by: Cogstone Research Management, Santa Ana, CA.

[5] Great Basin Unified Air Pollution Control District. February 2004. *2003 Owens Valley PM10 Planning Area Demonstration of Attainment State Implementation Plan Integrated Environmental Impact Report*. State Clearinghouse House Number 2002111020. Prepared by: Sapphos Environmental, Inc., Pasadena, CA. Bishop, CA.

[6] Sapphos Environmental, Inc. 2008. *2008 Owens Valley PM10 Planning Area Demonstration of Attainment State Implementation Plan Final Subsequent Environmental Impact Report, Cultural Resources Technical Report*. Prepared for: Great Basin Unified Air Pollution Control District, Bishop, CA. Pasadena, CA.

[7] Bacon, S., and N. Lancaster. 2012. *Geomorphic Map of Keeler Dunes Area*. Prepared for: Great Basin Unified Air Pollution Control District, Bishop, CA. Prepared by: Division of Earth and Ecosystem Sciences, Desert Research Institute, Reno, NV.

The areas within the proposed project / proposed action area were evaluated for paleontological resources using the BLM's Potential Fossil Yield Classification System (PFYC).[8] In the PFYC system, geologic units are classified based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts, with a higher class number indicating a higher sensitivity. This classification is applied to the geologic formation, member, or other distinguishable unit, preferably at the most detailed level that can be mapped. The PFYC system is meant to provide baseline guidance for predicting, assessing, and mitigating paleontological resources. Descriptions of the five classes that compose the PFYC system are provided below:

Class 1—Very Low. Geologic units not likely to contain recognizable fossil remains.

- Units that are igneous or metamorphic, excluding reworked volcanic ash units
- Units that are Precambrian in age or older

Management concern for paleontological resources in Class 1 units is usually negligible or not applicable given that the probability for impacting any fossils is nonexistent or extremely low. As such, assessment or mitigation of paleontological resources is usually unnecessary except in very rare or isolated circumstances.

Class 2—Low. Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant nonvertebrate fossils.

- Vertebrate or significant invertebrate or plant fossils not present or very rare
- Units that are generally younger than 10,000 years before present
- Recent aeolian deposits
- Sediments that exhibit significant physical and chemical changes (i.e., diagenetic alteration)

Management concern for paleontological resources is generally low given that the probability for impacting vertebrate fossils or scientifically significant invertebrate or plant fossils is low. Assessment or mitigation is usually unnecessary except in rare or isolated circumstances. Localities containing important resources may exist, but would be rare and would not influence the classification. These important localities would be managed on a case-by-case basis.

Class 3—Moderate or **Unknown.** Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential.

- Often marine in origin with sporadic known occurrences of vertebrate fossils
- Vertebrate fossils and scientifically significant invertebrate or plant fossils known to occur intermittently; predictability known to be low
- Poorly studied and/or poorly documented. Potential yield cannot be assigned without ground reconnaissance

[8] Bureau of Land Management. 2008–2009. *Guidelines for Determining Paleontological Significance*. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/im_attachments/2008.Par.69083.File.dat/IM2008-009_att1.pdf.

Class 3a—Moderate Potential. Units are known to contain vertebrate fossils or scientifically significant invertebrate fossils, but these occurrences are widely scattered. The potential for a project to be sited on or impact a significant fossil locality is low, but is somewhat higher for common fossils.

Class 3b—Unknown Potential. Units exhibit geologic features and preservational conditions that suggest significant fossils could be present, but little information about the paleontological resources of the unit or the area is known. This may indicate the unit or area is poorly studied, and field surveys may uncover significant finds. The units in this class may eventually be placed in another class when sufficient survey and research is performed. The unknown potential of the units in this class should be carefully considered when developing any mitigation or management actions.

Management concern for paleontological resources is moderate; or cannot be determined from existing data. Surface-disturbing activities may require field assessment to determine appropriate course of action.

This category includes a broad range of paleontological potential. It includes geologic units of unknown potential, as well as units of moderate or infrequent occurrence of significant fossils. Management considerations cover a broad range of options as well, and could include field surveys, monitoring, or avoidance. Surface-disturbing activities will require sufficient assessment to determine whether significant paleontological resources occur in the area of a proposed action, and whether the action could affect the paleontological resources.

Class 4—High. Geologic units that contain a high occurrence of significant fossils. Vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability. Surface disturbing activities may adversely affect paleontological resources in many cases.

Class 4a—Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive, with exposed bedrock areas often larger than 2 acres. Paleontological resources may be susceptible to adverse impacts from surface disturbing actions.

Class 4b—These are areas underlain by geologic units with high potential but that have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation due to moderating circumstances. The bedrock unit has high potential, but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to the bedrock resulting from the activity.

- Extensive soil or vegetative cover; bedrock exposures are limited or not expected to be impacted
- Areas of exposed outcrop are smaller than 2 contiguous acres
- Outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic conditions
- Other characteristics are present that lower the vulnerability of both known and unidentified paleontological resources

Management concern for paleontological resources in Class 4 is moderate to high, depending on the proposed action. A field survey by a qualified paleontologist may be needed to assess local conditions. The probability for impacting significant paleontological resources is moderate to high,

and is dependent on the proposed action. Mitigation considerations must include assessment of the disturbance, such as removal or penetration of protective surface alluvium or soils and potential for future accelerated erosion. If impacts to significant fossils can be anticipated, on-the-ground surveys prior to authorizing the surface disturbing action will usually be necessary. On-site monitoring or spot-checking may be necessary during construction activities.

Class 5—Very High. Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils, and that are at risk of human-caused adverse impacts or natural degradation.

Class 5a—Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than 2 contiguous acres. Paleontological resources are highly susceptible to adverse impacts from surface disturbing actions. Unit is frequently the focus of illegal collecting activities.

Class 5b—These are areas underlain by geologic units with very high potential but that have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation due to moderating circumstances. The bedrock unit has very high potential, but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to the bedrock resulting from the activity.

- Extensive soil or vegetative cover; bedrock exposures are limited or not expected to be impacted
- Areas of exposed outcrop are smaller than 2 contiguous acres
- Outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic conditions
- Other characteristics are present that lower the vulnerability of both known and unidentified paleontological resources

Management concern for paleontological resources in Class 5 areas is high to very high. A field survey by a qualified paleontologist is usually necessary prior to surface disturbing activities or land tenure adjustments. Mitigation will often be necessary before and/or during these actions. The probability for impacting significant fossils is high. Vertebrate fossils or scientifically significant invertebrate fossils are known or can reasonably be expected to occur in the impacted area. On-the-ground surveys prior to authorizing any surface disturbing activities will usually be necessary. On-site monitoring may be necessary during construction activities.

4.1.2 Paleontological Field Survey

As discussed in Section 5.2.2, *Paleontological Resources Characterization*, information obtained from the paleontological records searches indicate that the western extent of the proposed project / proposed action area contains geological units with a high potential of paleontological resources. As a result of this finding, a paleontological field survey was conducted for portions of the three staging areas and access routes within the APE; these portions of the APE will be subjected to minor grading, vegetation flattening, and/or vegetation removal, and therefore have the greatest potential to be impacted during the implementation of the proposed project / proposed action (see Section 2.0, *Project Description*). The field work was completed in accordance with the methodology outlined in the BLM's Instructional Memorandum (IM) 2008-009, Manual H-8720-1,

and IM 2009-011.[9] Fieldwork was undertaken on July 23, 2013, by Wayne A. Thompson, PhD, of SWCA Environmental Consultants (BLM Permit CA-12-00-007P). A supplemental paleontological survey in support of alternative access alignments to the staging areas was undertaken on February 20, 2014, by Michael Williams, PhD, of Sapphos Environmental, Inc. under the direction of Mr. Greg Haverstock (BLM Archaeologist).

4.2 PREHISTORIC AND HISTORIC RESOURCES

4.2.1 Record Search and Literature Review

A literature review was undertaken to determine if previously documented cultural resources are present within a portion of the Keeler Dunes locale that has been identified for the implementation of DCMs. An archaeological records search was conducted in September 2011 at the EIC, University of California, Riverside, to obtain information about previous archaeological work and known cultural resources within the proposed project / proposed action area or within a 1-mile radius. In addition, the California State Historical Resources Inventory, the NRHP, the listing of CHLs, and the California Points of Historical Interest were searched during the EIC visit to ascertain the presence of potential historic resources within the proposed project / proposed action area. Finally, a search of the site files housed at the BLM Bishop Field Office was completed by Mr. Greg Haverstock (BLM Archaeologist), who provided Sapphos Environmental, Inc. with information on the cultural resources in the project / proposed action area that are located on BLM land.

4.2.2 Class III Survey and Site Recordation

A limited Class III (intensive) survey was conducted on three of the four proposed temporary staging areas and access routes located on BLM and LADWP land (Figure 4.2.2-1, *Class III Survey Area*). These portions of the APE were selected for the intensive pedestrian survey as they will be subjected to minor grading, vegetation flattening, and/or vegetation removal, and therefore have the greatest potential to be impacted during the implementation of the proposed project / proposed action (see Section 2.0, *Project Description*). The purpose of the Class III survey was to examine the locations of the three temporary staging areas, access routes, and a 100-foot buffer around those elements to ensure that no potentially significant cultural resources would be affected during construction. Fieldwork authorization was obtained by BLM prior to the initiation of fieldwork (CA Cultural Use Permit Number CA-10-37) or was directly supervised by Mr. Greg Haverstock (BLM Archaeologist).

The Class III survey was conducted in two periods. The first was performed by Mr. Adam White on July 23 and 24, 2013. During this first survey, Mr. White observed sparse scatters of obsidian debitage in the proposed location of the northernmost staging area within the APE and the proposed access route to the middle staging area within the APE, and observed a few isolated bone fragments at the southeastern end of the northwest-southeast access route. To ensure avoidance of these resources, Mr. White surveyed alternatives to the northernmost and central staging areas within the APE and access routes, and surveyed an alternative to the southeastern portion of the northwest-southeast access route (Figure 4.2.2-1).

A second survey was conducted on February 20, 2014, and was performed by Ms. Rachael Nixon and Mr. Karl Holland under the direction of Mr. Greg Haverstock (BLM Archaeologist). Seventeen

[9] SWCA Environmental Consultants. 2013. *Paleontological Survey Report for the Keeler Dunes Project, Owens Lake, Inyo County, California*. Report prepared for Sapphos Environmental, Inc., Pasadena, California.

archaeological isolates and one site were observed within the APE. Mr. Greg Haverstock recorded all resources and a brief summary of findings are provided in Table 4.2.2-1, *Archaeological Resources Recorded by BLM during February 20, 2014, Class III Survey*). The State of California Department of Parks and Recreation (DPR) 523-series forms are on file with the BLM Bishop Field Office.

TABLE 4.2.2-1
ARCHAEOLOGICAL RESOURCES RECORDED BY BLM DURING FEBRUARY 20, 2014, CLASS III SURVEY

Resource ID	Period	Description	Measurements
BLM-SITE-1	Prehistoric	Lithic scatter	3 meter diameter
BLM-ISO-1	Historic	Brown colored, thick walled, mold blown bottle	—
BLM-ISO-2	Historic	2 fragments of broken ceramic electrical insulator	—
BLM-ISO-3	Historic	Metal fragments, log bolt, large bolt	—
BLM-ISO-4	Historic	Sheet metal	4.5x18 inches
BLM-ISO-5	Historic	Steel pipe, 6 fragments,	2 inch diameter
BLM-ISO-6	Historic	2 fragments of broken ceramic electrical insulator	—
BLM-ISO-7	Historic	Steel sheet with bolt holes and opening, riveted	5 inches thick
BLM-ISO-8	Historic	Steel wire, 2 gauges, fragments, 9 segments	—
BLM-ISO-9	Historic	Ceramic electrical insulator fragments	—
BLM-ISO-10	Historic	Telephone pole cross member with insulated post	51″ wooden member, 17″ post, 1/2″ bolt
BLM-ISO-11	Historic	Karo syrup bottle fragment, clear glass (1968–present)	—
BLM-ISO-12	Historic	Gallon and 1/2 gallon wine jugs clear glass	—
BLM-ISO-13	Historic	Solarized brown Clorox bottle neck and rim (1958–present), and glass ketchup bottle, octagonal with solarized clear glass	—
BLM-ISO-14	Historic	Brown Duraglas been bottle(1947)	—
BLM-ISO-15	Historic	Brown Duraglas been bottle(1941)	—
BLM-ISO-16	Historic	Wire sand fence (8 strands)	—
BLM-ISO-17	Prehistoric	Elongated rock cairn	170 x 67 cm

During the 2012 surveys and at the direction of BLM (Mr. Greg Haverstock), Sapphos Environmental, Inc. recorded three archaeological sites in support of the proposed project / proposed action. One was a multicomponent site that was recently discovered by Mr. Haverstock during a visit to the Keeler Dunes area. The two other sites include a section of the Old State Highway and a previously unrecorded section of the Carson & Colorado Railroad line (P-14-7851/CA-INY-6513H), both of which are situated in the southwestern extent of the proposed project / proposed action area. Sapphos Environmental, Inc. formally document the archaeological remains and evaluate the sites for inclusion on the NRHP and CRHR. The site recordation was completed by Dr. Tiffany Clark and Mr. Adam White on September 25 and 26, 2012.

The ground surface in the area of three sites was thoroughly examined by the archaeologists, who used pin flags to mark the locations of identified features and artifacts. Once the extent and nature

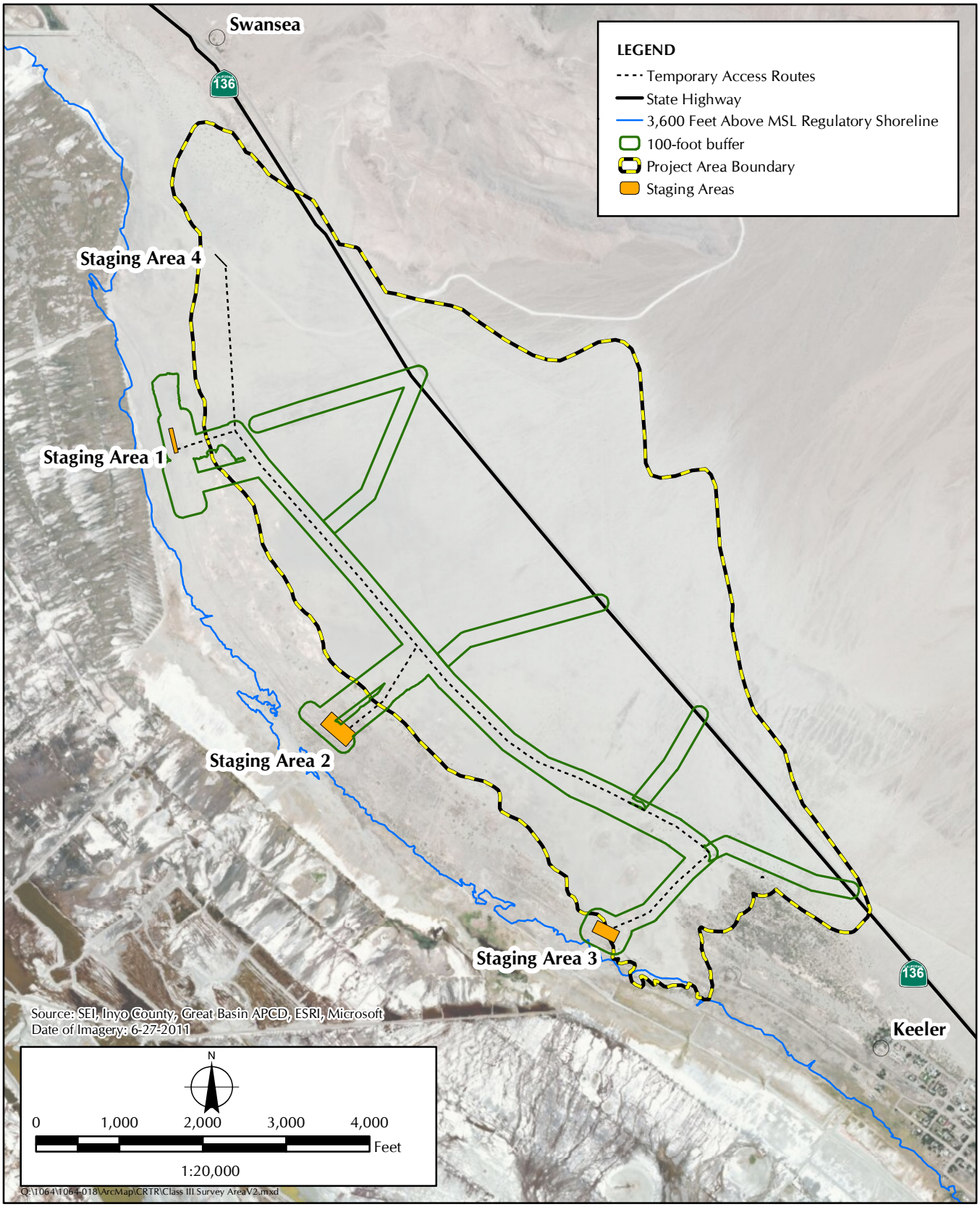

FIGURE 4.3.2-1

Class III Survey Area

of the cultural deposits were defined, the sites were recorded on DPR 523-series site record forms. Field mapping of sites was primarily conducted with global positioning system (GPS) units; field sketch maps and photographs provided necessary supplemental documentation. The locations of the sites were subsequently mapped on the appropriate USGS topographic quadrangle using post-processed GPS data with elevations determined from USGS maps. No artifacts were collected during the site recordation.

4.2.3 Agency Consultation

Sapphos Environmental, Inc. coordinated with the BLM Archaeologist at the onset of the proposed project / proposed action to delineate the appropriate scope of work needed to assess cultural resources and to define the APE. Initial consultation with Mr. Haverstock determined that a Class III (intensive pedestrian) survey of the entire proposed project / proposed action area was not warranted as a number of surveys had been completed in the general vicinity, and cultural resources were well-documented in the Keeler Dunes area.[10] It was later decided that a Class III survey of the portions of the APE that include three of the four staging areas and access routes be examined as these areas are expected to experience minor mechanical ground disturbance (i.e., minor grading, vegetation flattening or removal). Throughout the current phase of project / proposed action planning, coordination with the BLM was maintained in the form of emails, meetings, and phone conversations with Mr. Haverstock, who provided Sapphos Environmental, Inc. with current information regarding site conditions and agency expectations.

4.3 NATIVE AMERICAN SACRED SITES AND HUMAN REMAINS

4.3.1 Native American Coordination

Native American coordination was undertaken to fulfill the District's requirements, pursuant to CEQA, for consideration of Native American cultural resources. Records searches for the proposed project / proposed action included a request for a search of the Sacred Lands File maintained by the NAHC. This request was made of the NAHC early in the planning process in August 2011.[11] The results of the search would be an indication of the presence of known Native American cultural resources in the proposed project / proposed action study area. Written responses to the District's inquiry received by Sapphos Environmental, Inc. on August 31, 2011[12] advised that the Sacred Lands File indicated that no Native American cultural resources have been identified within the cultural resources study area (Appendix A, *Documentation of Native American Consultation*). However, the NAHC did indicate that the Keeler Dunes locale is known as a culturally sensitive area and recommended that additional coordination be undertaken with local Native American groups and individuals on the matter. As a result of this recommendation, Sapphos Environmental, Inc., acting on behalf of the District, sent letters to 10 Native American contacts classified by the NAHC as potential sources of information related to cultural resources in the vicinity of the proposed project / proposed action area. The letters advised the tribes and specific individuals of the proposed project / proposed action and its geographic area and requested information regarding cultural resources within the study area, as well as feedback or concerns related to the proposed

[10] Clark, Tiffany, Sapphos Environmental, Inc., Pasadena, CA. 16 March 2011. Contact Report to Greg Haverstock, BLM Bishop Field Office, Bishop, CA.

[11] Backes, Clarus, Sapphos Environmental, Inc., Pasadena CA. 24 August 2011. Letter to Larry Myers, Native American Heritage Commission, Sacramento, CA.

[12] Singleton, Dave, Native American Heritage Commission, Sacramento, CA. 31 August 2011. Letter response to Clarus Backes, Sapphos Environmental, Inc., Pasadena, CA

project / proposed action. This outreach resulted in responses from Matthew Nelson, a Tribal Historic Preservation Officer and NAGPRA Coordinator of the Bishop Paiute Tribe, who noted that the Keeler Dunes and foothills of the Inyo Mountains east of Owens Lake contained extremely culturally sensitive areas.[13] A second response was received from Kathy Fabunan, a tribal administer for the Lone Pine Paiute-Shoshone Tribe, who forwarded the request for information to the tribe's Cultural Committee for comment.[14] Sapphos Environmental, Inc. Native American Coordination efforts was completed at this stage and transferred to BLM, who is responsible for formal Section 106 consultation with the Tribes. Refer to Section 4.3.2, *Native American Consultation* (below), for details regarding the Section 106 consultation process to date.

Although a review of the available historic maps for the area indicate that no formal cemeteries are located within the proposed project / proposed action study area, documentation on file at the EIC and at the BLM Bishop Field Office indicate Native American burials are present in the proposed project / proposed action study area at archaeological site P-14-7841/CA-INY-6502 (originally recorded as P-14-7841/CA-INY-6502 and P-14-7840/CA-INY-6503).

Limited Phase II testing of the rock cairns at CA-INY-6502 identified one feature that was associated with human remains. The results of the archaeological investigation conducted at CA-INY-6502 suggest that the site was used as a prehistoric burial locale and could be part of a larger mortuary complex that lined the prehistoric shore of Owens Lake. See Section 5 *Results* for more details regarding the investigation efforts and results.

4.3.2 Native American Consultation

The BLM is responsible for formal consultation with interested Native American tribes and individuals pursuant to Section 106, consistent with the requirements of NEPA. The Section 106 consultation process was initiated by the BLM in October 2011, and at that time included BLM, SHPO, and Tribal representatives as consulting parties. In November 2013, new irrigation alternatives were identified by the District and discussed with BLM. As a result of these discussions, the BLM reinitiated the Section 106 consultation process (December 2013) to then include the BLM, SHPO, Tribal representatives, and the District. Alternatives 4 and 5 were developed as a result of the second Section 106 consultation efforts. Alternative 4 was added to eliminate the need for water tanks and provide direct delivery of water to the temporary irrigation system. Alternative 5 was added to eliminate water tanks and water trucks, by providing water delivery directly from the Keeler Community Service District well via pipeline. Alternatives 3, 4, and 5 provide for hand watering areas with cultural sensitivity (less 15 percent). Additionally, the proposed project / proposed action description was revised to include Native American participation in vegetation planting within cultural sensitive areas. As part of the Section 106 consultation process, the BLM sent letters and organized meetings and field visits with tribal representatives to discuss the proposed project / proposed action and alternatives to obtain their comments and concerns about the proposed project / proposed action and alternatives. A summary of the tribal consultation efforts undertaken by the BLM is provided in Table 4.3.2-1, *Summary of Native American Consultation Efforts for the Proposed Project / Proposed Action*).

[13] Nelson, Matthew, Tribal Historic Preservation Officer and NAGPRA Coordinator, Bishop Paiute Tribe, Bishop, CA. 8 December 2011. Email response to Clarus Backes, Sapphos Environmental, Inc., Pasadena, CA.

[14] Fabunan, Kathy, Tribal Administer, Lone Pine Paiute-Shoshone Reservation, Lone Pine, CA. 3 October 2011. Email response to Clarus Backes, Sapphos Environmental, Inc., Pasadena, CA.

TABLE 4.3.2-1
SUMMARY OF NATIVE AMERICAN CONSULTATION EFFORTS FOR THE PROPOSED PROJECT / PROPOSED ACTION

Native American Group	Point of Contact	Date	Method of Consultation	Topic of Consultation
Lone Pine	Chair: Joseph	10/24/11	Cert letter	Keeler Dunes—District proposal for dust control
Independence	Chair: Naylor	10/24/11	Cert letter	Keeler Dunes–District proposal for dust control
Big Pine	Chair: Moose	10/24/11	Cert letter	Keeler Dunes—District proposal for dust control
Timbisha	Chair; Gholson	10/18/11	Phone	Keeler Dunes—District proposal for dust control
Timbisha	Chair; Gholson	10/17/11	Letter	Keeler Dunes—District proposal for dust control
Lone Pine	THPO, CR Committee	11/5/2011	Meeting	Keeler Dunes—District proposal for dust control, DRECP
Lone Pine	Acting Chair, Mary Wuester, Kathy Bancroft, THPO	1/20/2012	Meeting and Field Trip to ODL cairns	DRECP, Keeler Dunes—District proposal for dust control
Big Pine	Bill Helmer, THPO; Danielle Gutteriez, T. Sec. The rest of the council did not attend.	2/21/2012	Meeting	Solar PEIS, DRECP, CASSP, Digital 395, Keeler Dunes Test, Owens Lake Planning, Bodie Vegetation Update
Lone Pine	Acting Chair, Mary Wuester, Kathy Bancroft, THPO	2/5/2014	Meeting	Keeler Dunes–District and BLM to discuss the proposed irrigation alternatives
Big Pine	Bill Helmer, THPO, Danelle Gutierrez, Vice Chair, Sally Manning, Environmental Director, Jacklyn Velazquez,	2/11/2014	Meeting	Keeler Dunes–District and BLM to discuss the proposed irrigation alternatives

Key: District = Great Basin Unified Air Pollution Control District

SECTION 5.0
RESULTS

This section of the Cultural Resources Technical Report details the results of the paleontological records search and survey, the archaeological Class I inventory and limited Class III survey, and the recordation of three archaeological sites within the proposed project / proposed action area. A description of the environmental setting of the Owens Valley is first presented, which includes a summary of paleoenvironmental data from the Owens Lake area. This is followed by the findings of the Class I inventory and limited surveys of paleontological, archaeological, and built environment resources within the cultural resources study area, as well as the results of site recordation efforts within the area of potential effect (APE). An assessment of adverse effects of the proposed project / proposed action on identified paleontological and cultural resources is also undertaken to determine if the implementation of Dust Control Measures (DCMs) will adversely affect significant resources in the Keeler Dunes locale.

5.1 ENVIRONMENTAL SETTING

5.1.1 Physical History of Owens Lake

The Owens Valley, located in the southwestern Great Basin, extends for approximately 200 kilometers north-south and has a variable width between 15 and 40 kilometers. The valley is bounded on the west by the Sierra Nevada, on the east by the Inyo Mountains and White Mountains, and on the south by the Coso Range (Figure 2.1-1).

Owens Lake is located at the southernmost portion of Owens Valley, and is part of a chain of lakes that was active about 1.8 million years ago during the Pleistocene. The lake system extended from Mono Lake (previously a much larger lake known as Lake Russell) and continued south to Lake Manly. Mono Lake was the northernmost lake of the system until its level dropped prior to 35,000 years ago. After this time, the Owens Lake continued to be fed by Owens River, and waters from the lake flowed through the Rose Valley and into China Lake to the south. China Lake overflowed into Searles Lake and Panamint Lake, and continued farther south into Lake Manly.

During the Late Pleistocene, Owens Lake was an open-basin lake reaching high stands between approximately 3,756 feet (1,145 meters) and 3,805 feet (1,160 meters) above mean sea level, and a closed-basin lake during the Holocene. Originally thought of as a stable lake, combined studies of core and stratigraphy indicate a high frequency of water level oscillation, which had not been documented in other pluvial lake basins in the western United States.[1,2] As previously stated, Owens Lake was a natural closed basin before its desiccation, and was fed by Owens River on the north, and by smaller streams from the Sierra Nevada, such as Bishop Creek, Cottonwood Creek, and Ash Creek. Other water sources included ephemeral streams from the Inyo and Coso Mountains to the east and south. Several small springs also occur around the shore and within the lake bed. Closed-basin conditions have prevailed throughout most of the lake's history, which

[1] Bacon, S.N., R.M. Burke, S.K. Pezzopane, and A.S. Jayko. 2005. "Last Glacial Maximum and Holocene Lake Levels of Owens Lake, Eastern California, USA." *Quaternary Science Reviews*, 1–19.

[2] Note: As used by the authors, the term pluvial refers here to a "mean climatic regimen of sufficient duration to be represented in the physical or organic record, and in which the precipitation/evaporation ratio results in greater net moisture available for water bodies and organisms than is available in the same area today or in the preceding regimen. See Bacon, S.N., R.M. Burke, S.K. Pezzopane, and A.S. Jayko. 2005. "Last Glacial Maximum and Holocene Lake Levels of Owens Lake, Eastern California, USA." *Quaternary Science Reviews*, 2.

imply that there is no transport of material, either water or sediment, except through evaporation or wind transport.[3]

Paleoenvironmental analyses indicate that Owens Lake has experienced a number of oscillations between approximately 27,000 calibrated years before present (cal yr BP) to the present.[4] These studies indicate a high stand of the lake at approximately 3,805 feet (1,160 meters) between 24,000 and 23,730 cal yr BP followed by a drop in water levels. A first possible desiccation event and/or very low water levels has been suggested based on a hiatus from sediment cores between approximately 18,920 and 15,590 cal yr BP.[5] A lower high stand of approximately 3,756 feet (1,145 meters) was registered between 15,700 and 15,000 cal yr BP.[6] Very shallow lake levels are also suggested by the presence of sediments that indicate subaerial conditions approximately 12,600 cal yr BP, when the lake registered elevations of approximately 3,608 feet (1,100 meters).[7] A second dry interval was recorded shortly after these low levels at approximately 11,200 cal yr BP. This was followed by a high stand that was not previously reported and that dropped quickly leaving shorelines at approximately 3,674 feet (1,120 meters) between 7860 and 7650 cal yr BP.[8] A third event of near-desiccation and shallow water levels was documented between 6500 and 4400 cal yr BP.[9] Lake oscillations continued throughout the Late Holocene, and between 350 and 230 cal yr BP records indicate that the lake dried into a playa.[10]

During historic times, Owens Lake's highest stand reached approximately 3,600 feet in 1872.[11] Water diversion for irrigation purposes in the late 1800s and early 1900s, in addition to dry climatic conditions, continued to lower the lake level, which rose again after the drought was over. The lake began its complete and final desiccation period after 1913, when the Owens River water was diverted to the Los Angeles Aqueduct by the City of Los Angeles Department of Water and Power (LADWP).[12] By the mid-1920s, Owens Lake had become a dry playa, only to receive water on seven occasions due to unusually high runoff, in 1938, 1967, 1969, 1980, 1982, 1983, and 1986.[13]

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[3] Soil and Water West, Inc. 25 September 2001. *Owens Lakebed Survey (Revised)*. Prepared by: Soil and Water West, Inc., P.O. Box 44666, Rio Rancho, NM. Prepared for: Great Basin Unified Air Pollution Control District, Bishop, CA.

[4] Bacon, S.N., R.M. Burke, S.K. Pezzopane, and A.S. Jayko. 2005. "Last Glacial Maximum and Holocene Lake Levels of Owens Lake, Eastern California, USA." *Quaternary Science Reviews*, 1–19.

[5] Benson, L., Kashgarian, M., Rye, R., Lund, S., Paillet, F., and Smoot, J. 2002. "Holocene Multidecadal and Multicentennial Droughts Affecting Northern California and Nevada." *Quaternary Science Review*, *21*: 659–682.

[6] Orme, A.R, and A.J. Orme. 1993. "Late Pleistocene Oscillations of Lake Owens, Eastern California." *Geological Society of America Abstracts with Programs*, *25*: 129–130.

[7] Benson, L., Kashgarian, M., Rye, R., Lund, S., Paillet, F., and Smoot, J. 2002. "Holocene Multidecadal and Multicentennial Droughts Affecting Northern California and Nevada." *Quaternary Science Review*, *21*: 659–682.

[8] Bacon, S.N., R.M. Burke, S.K. Pezzopane, and A.S. Jayko. 2005. "Last Glacial Maximum and Holocene Lake Levels of Owens Lake, Eastern California, USA." *Quaternary Science Reviews*, 1–19.

[9] Benson, L., Kashgarian, M., Rye, R., Lund, S., Paillet, F., and Smoot, J. 2002. "Holocene Multidecadal and Multicentennial Droughts Affecting Northern California and Nevada." *Quaternary Science Review*, *21*: 659–682.

[10] Li, H-C., Bischoff, J.L., Ku, T.L., Lund, S.P., and Stott, L.D. 2000. "Climate Variability in East Central California during the Past 1000 Years Reflected by High Resolution Geochemical and Isotopic Records from Owens Lake Sediments." *Quaternary Research*, *54*: 189–197.

[11] Smith, G.I., and Bischoff, J.L., Editors. 1993. "Core O.L. 92 from Owens Lake, Southeast California." U.S. Department of the Interior, U.S. Geological Survey, Open File Report 93-683. Menlo Park, CA.

[12] Smith, G.I., and Bischoff, J.L., Editors. 1993. "Core O.L. 92 from Owens Lake, Southeast California." U.S. Department of the Interior, U.S. Geological Survey, Open File Report 93-683. Menlo Park, CA.

[13] Stine, S. 1994. *Late Holocene Fluctuations of Owens Lake, Inyo County, California*. Prepared for: Far Western Anthropological Research Group, Inc., Davis, CA.

In sum, the history of desiccation at Owens Lake began as a consequence of climatic change, accelerated due to irrigation, and ended as a result of water diversion, resulting into the modern Owens Lake playa.[14]

5.1.1.1 Owens Lake Sediments

Several subenvironments have been described within the lake bed based on their morphological characteristics, sediment composition, groundwater, and location on the playa. Today, two main features, the historic shoreline and the brine pool, are evident in topographic maps and aerial photographs. The historic shoreline is considered to be located at 3,600 feet above mean sea level; while the brine pool is considered to be the lowest portion of the lake, located below approximately 3,553 feet.

Owens Lake has always been an alkaline body of water, and water evaporation has caused salt deposits to accumulate on the surface; these salts also migrate through capillarity from the lake's shallow water table.[15] In addition, minerals develop and change into different types, depending on temperature and the presence of rain,[16,17] resulting in a mosaic of textures on the surface of the lake.

The thickness of lake deposits in the deepest portions of the basin range from 3,000 to over 10,000 feet.[18] Currently, portions of the surface of the Owens Lake playa are characterized by a thin layer of windblown sand mixed with clay and an alkali crust, while the layer immediately beneath the surface does not contain any sand. The crust that forms on the surface curves above the clay, forming a hard layer when it dries. The appearance and consistency of the crust varies throughout the year; during summer time, the upper strata of clay dries, forming polygons with open cracks in between that may reach up to 1 meter in depth.[19]

5.1.1.2 Vegetation

Vegetation communities surrounding the Owens Valley are characteristic of those present in the Great Basin and are associated with the different elevations present in the area. Riparian systems are associated with streams that flow from the Sierra Nevada, such as the Owens River delta in the northern portion of the lake, and near springs. Desert Scrub characterizes the area between 4,000 and 6,500 feet. Pinyon Woodland is present between 6,500 and 8,500 feet, and Upper Sage Brush

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[14] Saint-Amand, P., Gaines, C., and Saint-Amand, D. 1987. "Owens Valley, an Ionic Soap Opera Staged on a Natric Playa." In *Geology of the Owens Valley and Inyo Mountains Region, California*. South Coastal Geological Society, Annual Field Trip Guide Book, No. 20-2001, pp. 113–132.

[15] Soil and Water West, Inc. 25 September 2001. *Owens Lakebed Survey (Revised).* Prepared by: Soil and Water West, Inc., P.O. Box 44666, Rio Rancho, NM. Prepared for: Great Basin Unified Air Pollution Control District, Bishop, CA.

[16] Saint-Amand, P., Gaines, C., and Saint-Amand, D. 1987. "Owens Valley, an Ionic Soap Opera Staged on a Natric Playa." In *Geology of the Owens Valley and Inyo Mountains Region, California*. South Coastal Geological Society, Annual Field Trip Guide Book, No. 20-2001, pp. 113–132.

[17] Sharp, R.P., and Glazner, A.F. 1997. "A Story of Desiccation; Once-Blue Owens Lake." In *Geology Underfoot in Death Valley and Owens Valley*, pp. 185–194. Missoula, MT: Mountain Press Publishing Company.

[18] Soil and Water West, Inc. 25 September 2001. *Owens Lakebed Survey (Revised).* Prepared by: Soil and Water West, Inc., P.O. Box 44666, Rio Rancho, NM. Prepared for: Great Basin Unified Air Pollution Control District, Bishop, CA.

[19] Saint-Amand, P., Gaines, C., and Saint-Amand, D. 1987. "Owens Valley, an Ionic Soap Opera Staged on a Natric Playa." In *Geology of the Owens Valley and Inyo Mountains Region, California*. South Coastal Geological Society, Annual Field Trip Guide Book, No. 20-2001, pp. 113–132.

dominates at higher elevations between approximately 8,500 and 9,500 feet.[20,21] Currently, vegetation in the immediate vicinity of the Owens Lake is dominated by Desert Scrub near the shoreline and occasionally on spring mounds located within the lake bed.

During prehistoric times, the variety of resources present within the valley was attractive to native inhabitants, particularly within those areas in the vicinity of the lake characterized by riparian habitats that supported a large variety of fauna, such as mammals, birds (including waterfowl), and reptiles. Fresh water mussels (*Anadonta* sp.) and brine fly larvae (*Ephydra* sp.) were also present in other areas around the lake. Several plant species were also available and were used as food resources or as materials for basket making.[22,23]

5.1.1.3 Owens Lake Level Fluctuations and Prehistoric Cultural Resources

Prior to investigations in the 1990s associated with dust control, Owens Lake was considered to be a perennial lake that had persisted as such throughout the Holocene. It was assumed that any cultural evidence would be found above the historic shoreline, which is considered to be located at approximately 3,600 feet. However, in 1994, Stine suggested that if the lake had experienced changes in its water levels at times of human occupation in the area, the presence of cultural materials below the historic shoreline would be expected. These then would have been covered by water during historic times.[24]

Following Stine's hypothesis, it is clear that fluctuations in the lake level are significant because they influence the distribution of those environments associated with the lake boundaries. Therefore, the availability of plant and animal resources is also determined by these water levels. As a consequence, human populations would also adjust their foraging rounds based on the location of those resources. For example, waterfowl habitats are known to be associated with salt lakes, and it is known that prehistoric hunters took advantage of this resource. In addition, plant resources located on the north portion of the lake, near the delta, would have also provided a food source.[25]

A reconstruction of lake levels during the Holocene indicates that between 2000 and 1000 cal yr BP, water levels at Owens Lake were very low, and the lake probably was completely dry by 600 cal yr BP.[26] After this dry period, the lake recovered, as did other closed-basin lakes such as Mono, Silver, and Pyramid Lakes.

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[20] Bettinger, R.L.1982c. Archaeology East of the Range of Light: Aboriginal Human Ecology of the Inyo-Mono Region, California. *Monographs in California and Great Basin Anthropology, 1*. Davis, CA.

[21] Basgall, M.E., and K.R. McGuire. 1988. *The Archaeology of CA-INY-30: Prehistoric Culture Change in the Southern Owens Valley, California*. Prepared by: Far Western Anthropological Research Group, Inc., Davis, CA. Prepared for: California Department of Transportation, Bishop, CA.

[22] Bettinger, R.L.1982c. Archaeology East of the Range of Light: Aboriginal Human Ecology of the Inyo-Mono Region, California. *Monographs in California and Great Basin Anthropology, 1*. Davis, CA.

[23] Basgall, M.E., and K.R. McGuire. 1988. *The Archaeology of CA-INY-30: Prehistoric Culture Change in the Southern Owens Valley, California*. Prepared by: Far Western Anthropological Research Group, Inc., Davis, CA. Prepared for: California Department of Transportation, Bishop, CA.

[24] Stine, S. 1994. *Late Holocene Fluctuations of Owens Lake, Inyo County, California*. Prepared for: Far Western Anthropological Research Group, Inc., Davis, CA.

[25] Stine, S. 1994. *Late Holocene Fluctuations of Owens Lake, Inyo County, California*. Prepared for: Far Western Anthropological Research Group, Inc., Davis, CA.

[26] Stine, S. 1994. *Late Holocene Fluctuations of Owens Lake, Inyo County, California*. Prepared for: Far Western Anthropological Research Group, Inc., Davis, CA.

Four different beach lines have been identified below the historic-level shoreline at elevations of approximately 3,504 feet, 3,592 feet, 3,586 feet, and 3,584 feet.[27] The idea that these shorelines could have originated during the 19th and 20th centuries is discarded because the quick diversion of the river would not have allowed the formation of marked shorelines.[28] Although the Owens Valley is a tectonically active zone, and several faults have caused the distortion of preexisting beach lines, the presence of old shorelines is still relevant from an archaeological standpoint.[29]

Evidence of archaeological sites that have been covered with water during certain times is supported by the presence of sites located below the historic shore lines. Stine specifically refers to one site (CA-INY-3541) located at approximately 3,586 feet, which appears to have been occupied between 2,000 and 1,000 years ago.[30] The presence of archaeological sites has also been reported below the historic shoreline at Pyramid Lake.[31] At Owens Lake, several sites have also been recorded in association with old spring mounds.[32] Using chronological data from the archaeological assemblage, combined with the information presented by Stine, researchers hypothesized that during low lake levels, occupational intensity around the springs was higher.[33]

5.2 PALEONTOLOGICAL RESOURCES

The National Environmental Policy Act (NEPA) and the Federal Land Policy and Management Act (FLPMA) both require the consideration of paleontological resources for undertakings on federally administered lands. An evaluation of the potential impacts of a proposed project on unique paleontological resources or sites is also necessary for compliance under the California Environmental Quality Act (CEQA). In the following section, the extant paleontological data for the cultural resources study area are summarized and the effects of the proposed project / proposed action on fossil resources are assessed.

5.2.1 Paleontological Setting

The cultural resources study area is located along the northeastern edge of Owens Lake at the base of the Inyo Mountains. These mountains form the southern extent of the larger White-Inyo Range, which extends in a south-southeast direction from Montgomery Pass in southern Nevada to

[27] Stine, S. 1994. *Late Holocene Fluctuations of Owens Lake, Inyo County, California*. Prepared for: Far Western Anthropological Research Group, Inc., Davis, CA.

[28] Stine, S. 1994. *Late Holocene Fluctuations of Owens Lake, Inyo County, California*. Prepared for: Far Western Anthropological Research Group, Inc., Davis, CA.

[29] Bacon, S.N., R.M. Burke, S.K. Pezzopane, and A.S. Jayko. 2005. "Last Glacial Maximum and Holocene Lake Levels of Owens Lake, Eastern California, USA." *Quaternary Science Reviews*, 1–19.

[30] Stine, S. 1994. *Late Holocene Fluctuations of Owens Lake, Inyo County, California*. Prepared for: Far Western Anthropological Research Group, Inc., Davis, CA.

[31] Mehringer, P.J., Jr., and Sheppard, J.C. 1978. *Holocene History of Little Lake, Mojave Desert, California*. Los Angeles, CA: Natural History Museum of Los Angeles County

[32] Wells, H. 2003. *Cultural Resources Survey for 2003 Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan, Final Report*. Submitted by: Ancient Enterprises, Inc., Santa Monica, CA. Prepared by: Sapphos Environmental, Inc., Pasadena, CA. With contribution by Michael R. Walsh and illustrations by Clarus Backes.

[33] Jones and Stokes. 2005. *Final Archaeological Testing and Evaluation of 25 Sites on the Owens Lake Playa, Inyo County, California*. Volumes I and II. Prepared by: Jones and Stokes, Sacramento, CA. Prepared for: CH2MHILL, Santa Ana, CA.

Malpais Mesa east of Owens Lake.[34] The geologic stratigraphy of the White-Inyo Range encompasses a period of approximately 700 million years, with deposits dating from the Precambian to the Holocene.[35] The Inyo Mountains comprise the westernmost range of the Basin and Range structural province with the Owens Valley forming the westernmost basin within the physiographic province.[36]

5.2.2 Paleontological Resources Characterization

The results of the records searches at the Natural History Museum of Los Angeles County[37] and the San Bernardino County Museum[38] and the map review indicate that the surface geology of the study area primarily consists of alluvium, aeolian, and lacustrine units dating to the Quaternary Period. As illustrated in Figure 5.2.2-1, *Geological Map of Keeler Dunes Area Showing the APE*, much of the project / proposed action area is characterized by recent aeolian deposits consisting of active sand sheets and sand dunes interspersed with coarse Quaternary alluvial fan sediments; these deposits originate from the adjacent Inyo Mountains and typically do not contain significant vertebrate fossils.[39] Linear concentrations of artificial fill associated with the Caltrans diversion channel and a paved highway are also found in the area west of State Route 136; these anthropogenic deposits have a low potential of containing paleontological resources. Finally, surficial lacustrine sediments dating to the late Pleistocene and Holocene are located along the western edge of the proposed project / proposed action area (Figure 5.2.2-1). The Quaternary lake sediments probably derive from higher stands of Owens Lake during the Pleistocene and are therefore likely to contain the fossil remains of vertebrates and invertebrates dating to that epoch.[40]

A summary of the data provided by the Natural History Museum of Los Angeles County[41] and the San Bernardino County Museum[42] indicates four localities have been recovered from within 1 mile of the APE. These localities (LACM 7716–7719) have yielded a diverse taxonomic assemblage including bony fish (Teleostei), bird (Aves), jackrabbit (*Lepus*), pocket gopher (*Thomomys*), and even-toed ungulate (Artiodactyla).[43] These specimens were collected during previous surveys

[34] Nelson, Clemens A., Clarence A. Hall, Jr., and W.G. Ernst. 1991. Geologic History of the White-Inyo Range. In *Natural History of the White Inyo-Range Eastern California*, edited by Clarence A. Hall, Jr., pp. 42-74. University of California Press, Berkeley.

[35] Nelson, Clemens A., Clarence A. Hall, Jr., and W.G. Ernst. 1991. Geologic History of the White-Inyo Range. In *Natural History of the White Inyo-Range Eastern California*, edited by Clarence A. Hall, Jr., pp. 42-74. University of California Press, Berkeley.

[36] Hunt, C.B. 1967. *Physiography of the United States*. San Francisco, CA: W.H. Freeman and Company.

[37] McLeod, Samuel, Natural History Museum of Los Angeles County. 11 October 2011. Letter response to Clarus Backes, Sapphos Environmental, Inc., Pasadena, CA.

[38] Scott, Eric, San Bernardino County Museum, Redlands, CA. 28 February 2012. Letter response to Tiffany Clark, Sapphos Environmental, Inc., Pasadena, CA.

[39] McLeod, Samuel, Natural History Museum of Los Angeles County. 11 October 2011. Letter response to Clarus Backes, Sapphos Environmental, Inc., Pasadena, CA.

[40] Scott, Eric, San Bernardino County Museum, Redlands, CA. 28 February 2012. Letter response to Tiffany Clark, Sapphos Environmental, Inc., Pasadena, CA.

[41] McLeod, Samuel, Natural History Museum of Los Angeles County. 11 October 2011. Letter response to Clarus Backes, Sapphos Environmental, Inc., Pasadena, CA.

[42] Scott, Eric, San Bernardino County Museum, Redlands, CA. 28 February 2012. Letter response to Tiffany Clark, Sapphos Environmental, Inc., Pasadena, CA.

[43] McLeod, Samuel, Natural History Museum of Los Angeles County. 11 October 2011. Letter response to Clarus Backes, Sapphos Environmental, Inc., Pasadena, CA.

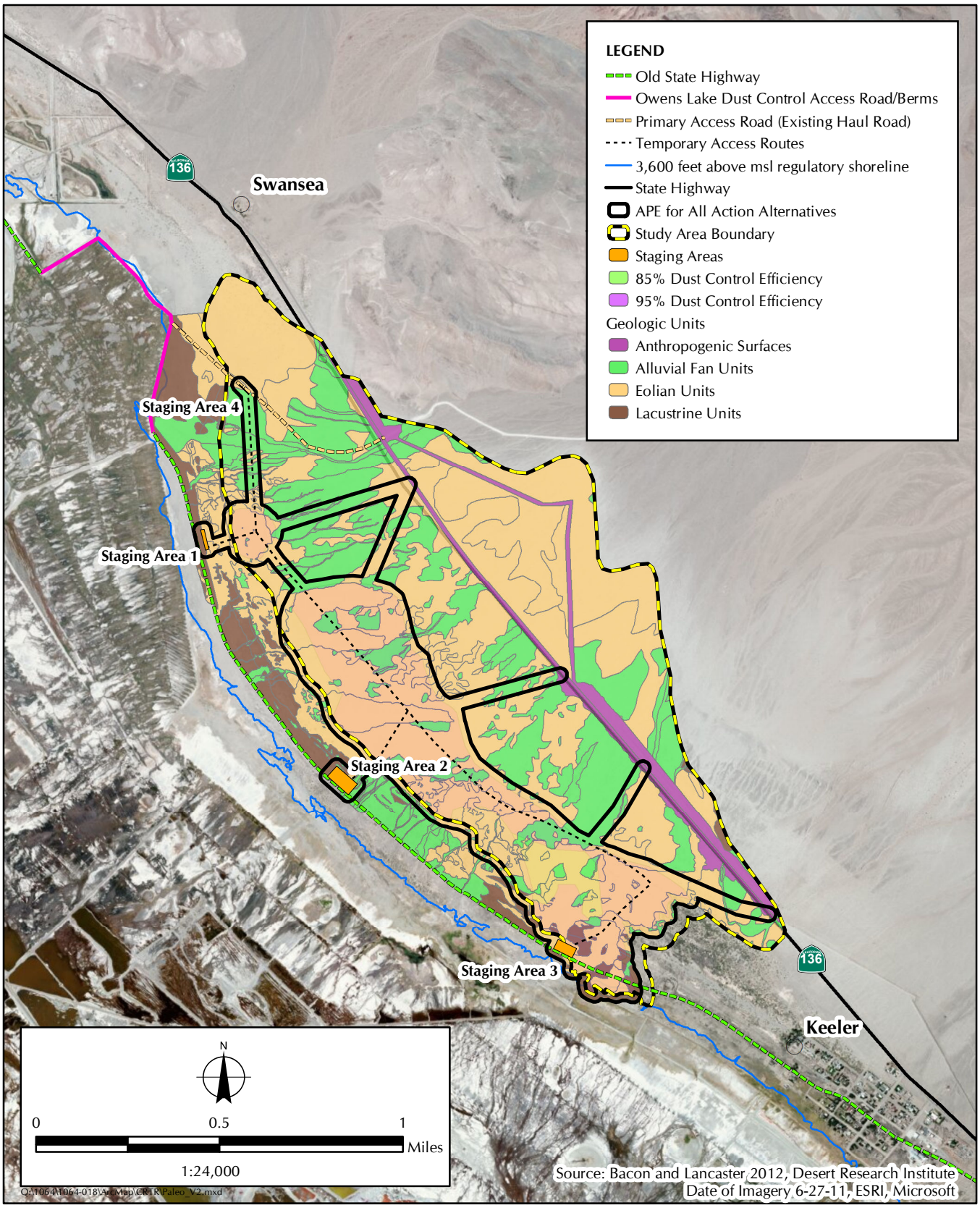

FIGURE 5.2.2-1
Geological Map of Keeler
Dunes Area Showing the APE

immediately outside of the current APE by Cogstone Resource Management Inc.[44] Within 5 miles of the APE, the Natural History Museum of Los Angeles County has recorded one locality (LACM 4691) immediately northwest of the proposed project / proposed action area near the mouth of the Owens River. This locality yielded the remains of a proboscidean, mountain lion (*Felis concolor*), horse (*Equus*), and camel (Camelidae).[45,46] The San Bernardino County Museum has two recorded localities (SBCM 6.6.3–6.6.4) from Quaternary alluvium in the same area as LACM 4691. These localities produced the remains of horse (*Equus*), camel (*Camelops*), and bison (*Bison*).[47] Smith et al.[48] reported the remains of a number of fossil fish including suckers (Catostomidae) and minnows (Cyprinidae) from the silty clays and sands of the lakebed approximately four miles to the south of Keeler near the intersection of highways 136 and 190.

The paleontological survey of three of the four proposed temporary staging areas, associated access routes, and 100-foot buffer determined that no surface fossils were located within the survey area. The survey determined that the proposed northwest-southeast access route is underlain by PFYC Class 2 dune sand and Quaternary alluvium with low paleontological sensitivity. The survey also determined that portions of Staging Area 1 and 2 and portions of temporary access roads leading to Staging Areas 2 and 3 within the APE are underlain by PFYC Class 4 Quaternary lacustrine deposits that are highly sensitive for paleontological resources.[49]

5.2.3 Assessment of Potential Impacts to Paleontological Resources

To evaluate the potential impacts of the proposed project / proposed action on paleontological resources in the Keeler Dunes locale, the APE was mapped in relation to geomorphic units within the proposed project / proposed action area (Figure 5.2.2-1). As previously discussed, the APE includes all of the elements and areas of planned ground disturbance, along with a 100-foot buffer. Figure 5.2.2-1 illustrates that most of the APE is characterized by surficial aeolian sediments consisting of active sand sheets and sand dunes; these sediments are interspersed with smaller surficial deposits of Quaternary alluvium. These geologic units exhibit PFYC Class 2 (low) sensitivity due to their young age (less than 10,000 years BP). Shallow excavations in these areas, which are expected to occur with the planting of vegetation, the placement of temporary wind breaks, and the construction of access routes, have little potential of encountering fossil remains.

Along with aeolian sediments and Quaternary alluvium present within the APE are small incursions of lacustrine deposits. These deposits are located in Staging Area 1 and 2 and portions of temporary

[44] Gust, Sherri. 2003. Paleontological Assessment Report and Mitigation Plan for the Owens Valley Project, Inyo County, California. Report prepared for Sapphos Environmental, Inc., Pasadena, CA. Cogstone Resource Management Inc., Santa Ana, CA.

[45] Jefferson, G.T. 1989. Late Pleistocene and earliest Holocene fossil localities and vertebrate taxa from the western Mojave Desert. In Jefferson, G.T., ed., *The West-central Mojave Desert: Quaternary Studies between Kramer and Afton Canyon*, pp. 27–40. SBCM Association Special Publication, Redlands, CA.

[46] Jefferson, G.T. 1991. *A Catalogue of Late Quaternary Vertebrates from California: Part Two, Mammals*. Technical Reports No. 7. Natural History Museum of Los Angeles County, Los Angeles.

[47] Scott, Eric, San Bernardino County Museum, Redlands, CA. 28 February 2012. Letter response to Tiffany Clark, Sapphos Environmental, Inc., Pasadena, CA.

[48] Smith, G.R., Reynolds, R.E., and Serrano, R. J. 2009. Recent records of fossil fish from eastern Owens Lake, Inyo County, California. In Reynolds, R.E. and Jessey, D.R., eds., Landscape Evolution at an Active Plate Margin. The 2009 Desert Symposium Field Guide and Proceedings. California State University Desert Studies Symposium and LSA Associates Inc. pp. 176–183.

[49] SWCA Environmental Consultants. 2013. *Paleontological Survey Report for the Keeler Dunes Project, Owens Lake, Inyo County, California*. Report prepared for Sapphos Environmental, Inc., Pasadena, California.

access roads leading to Staging Areas 2 and 3 (Figure 5.2.2-1). These lacustrine deposits have a PFYC Class 4 (high) paleontological sensitivity due to the abundance of paleontological resource localities that have been identified in lacustrine deposits in the Keeler Dunes vicinity. Should ground disturbing activities be conducted at a depth greater than one foot within Staging Areas 1 and 2 and along the access roads leading to Staging Areas 2 and 3 an on-site paleontological monitor should also be present. Further, if previously undocumented fossil remains are encountered during proposed project / proposed action implementation, operations should be immediately stopped in the area and the BLM Bishop Field Office manager should be notified immediately. Once the find was assessed and evaluated, modification to the proposed project / proposed action would be made as needed to avoid impacts of these paleontological discoveries prior to the resumption of work.

5.3 CULTURAL RESOURCES

5.3.1 Prehistoric, Ethnographic, and Historic Contexts

5.3.1.1 Prehistoric Context

Archaeological sequences for the Great Basin are grouped into Early, Middle, and Late Holocene time frames, with period definitions varying by region. These chronological divisions correlate with climatic and environmental changes, and are continuously being refined as new data is collected and dating techniques are improved. The main prehistoric sequence used in the Great Basin was developed during the 1970s by Bettinger and Taylor[50] based on a series of radiocarbon dates obtained from Eastern California. Their sequence has been refined as more data is gathered from the region. In particular, investigations at the Lubkin Creek site (CA-INY-30) in the north of Owens Lake, have greatly contributed to the understanding of the archaeology of the region.[51]

The Owens Valley archaeological sequence is applied in the area where the proposed project / proposed action is located, but an equivalent chronology with different time period names is used just south in the Mojave Desert area. Both chronologies are presented in Table 5.3.1.1-1, *Regional Chronology*. Archaeological sites in desert regions of California are often limited to surface assemblages that lack datable organic materials or stratigraphic associations, and therefore archaeologists working in these regions rely largely on variations in projectile point morphology to place sites in time. In many cases, period designations share the name with the "index" projectile point type that is prevalent during that time period. It should be noted that each period ends when a new diagnostic projectile point type first occurs, not when the characteristic point type no longer occurs.[52]

[50] Bettinger, R.L., and Taylor, R.E. 1974. "Suggested Revisions in Archaeological Sequences of the Great Basin in Interior Southern California." *Nevada Archaeological Research Paper*, *5*: 1–26.

[51] Basgall, M.E., and K.R. McGuire. 1988. *The Archaeology of CA-INY-30: Prehistoric Culture Change in the Southern Owens Valley, California*. Prepared by: Far Western Anthropological Research Group, Inc., Davis, CA. Prepared for: California Department of Transportation, Bishop, CA.

[52] Warren, C.N. 2002. "Time, Form, and Variability: Lake Mojave and Pinto Periods in Mojave Desert Prehistory." In W.J. Wallace and F.A. Riddell, eds., *Essays in California Archaeology: A Memorial to Franklin Fenenga*, pp. 137. *Contributions of the University of California Archaeological Research Facility*, *60*.

TABLE 5.3.1.1-1
REGIONAL CHRONOLOGY

Epoch	Owens Valley Region	Mojave Desert Region	Dates
Late Pleistocene	Paleoindian	Paleoindian	Pre 10,000 BP
Early Holocene	Early	Lake Mojave	10,000 ~ 7000 BP
Middle Holocene	Little Lake	Pinto	~7000 BP to ~3500 BP
Late Holocene	Newberry	Gypsum	~3150 BP to ~1350 BP
	Haiwee	Rose Spring	~1350 BP to ~650 BP
	Marana	Late Prehistoric	~650 BP to Historic Contact

Late Pleistocene

Little is known about the human occupation of this region during the Late Pleistocene, other than that fluted projectile points characteristic of the Paleoindian period have been found in several locations scattered throughout the desert. In the western Mojave Desert and southwestern Great Basin these points have generally been found as isolates in undatable surface contexts, and therefore have been associated with the Paleoindian period solely on the basis of their morphological similarity to securely dated Clovis projectile points from the Great Plains and Southwest regions.[53,54]

Early Holocene

Early Period (10,000 to 7000 BP)

A number of archaeological sites have been recorded in the western United States that date to the beginning of the Holocene period about 11,000 years BP; many of these Early Holocene sites are found along the shorelines of Pleistocene dry lakes. The generally accepted date range for the Early Holocene is set as before 6000 BP,[55] with more refined chronologies by Basgall and McGuire[56] between 6600 and 10,000 BP, and Gilreath and others[57] between 9500 and 7000 BP. The Early Holocene is characterized by the presence of large-stemmed and concave points known as Lake Mojave and Silver Lake. These point type designations correspond to the dry lakes where they were first found.[58]

[53] Dillon, B.D. 2002. "California Palaeoindians: Lack of Evidence, or Evidence of a Lack?" In *Essays in California Archaeology: A Memorial to Franklin Fenenga*, ed. W.J. Wallace and F.A. Riddell, pp. 110–128. Berkeley, CA: Contributions of the University of California Archaeological Research Facility No. 60, p. 115.

[54] Sutton, M.Q. 1996. "The Current Status of Archaeological Research in the Mojave Desert." *Journal of California and Great Basin Anthropology*, *18*(2): 221–257.

[55] Bettinger, R.L., and Taylor, R.E. 1974. "Suggested Revisions in Archaeological Sequences of the Great Basin in Interior Southern California." *Nevada Archaeological Research Paper*, *5*: 1–26.

[56] Basgall, M.E., and K.R. McGuire. 1988. *The Archaeology of CA-INY-30: Prehistoric Culture Change in the Southern Owens Valley, California*. Prepared by: Far Western Anthropological Research Group, Inc., Davis, CA. Prepared for: California Department of Transportation, Bishop, CA.

[57] Gilreath, A.J., and Holanda, K.L. 2000. *By the Lake by the Mountains: Archaeological Investigations at CA-INY-4554 and INY-1428*. Prepared by: Far Western Anthropological Research Group, Inc., Davis, CA. Submitted to: California Department of Transportation, District 9, Bishop.

[58] Campbell, E.W.C., Campbell, W.H., Antevs, E., Amsden, C.E., Barbieri, J.A., and Bode, F.D. 1937. "The Archaeology of Pleistocene Lake Mojave." In *Southwest Museum Paper, 9*. Los Angeles, CA: Southwest Museum.

Little is known about the subsistence strategies during this period, although it is assumed that hunting was a primary focus. The presence of projectile points and the relative lack of ground stone tools indicative of plant processing lend credence to this view. Faunal assemblages at several sites of this period have also supported this assumption, with evidence for both small (e.g., lagomorph) and large (e.g., artiodactyl) animal exploitation.[59,60] As with the Paleoindian period, however, the presence of Lake Mojave period sites near extinct Pleistocene and Early Holocene lakes suggest a diverse range of plant and animal resources may have been utilized.

Middle Holocene

Little Lake Period (7000 to 3500/3150 BP)

The onset of the Middle Holocene is marked by a dryer and hotter climate throughout the deserts of the western United States. Under these conditions, the subsistence focus most likely shifted away from lakeshores toward upland resources as these lakes dried up. The Middle Holocene is characterized by the appearance of split-stemmed projectile points, such as the Pinto series and those similar to the Gatecliff series that has been defined for the central Great Basin.[61]

Pinto series projectile points are smaller than Lake Mojave points, and their name derives from the Pinto Basin, where they were first defined.[62] Currently, there is controversy regarding the time frame associated with this period, because of lack of chronometric data and disagreement on the definition and dating of Pinto series points.[63] Evidence of Little Lake and Lake Mojave occupation at the Lubkin Creek site is sparse and seems to indicate that both periods overlap.[64] The data consists of a few diagnostic artifacts and obsidian hydration data. The archaeological assemblage at the site indicates an emphasis on exploitation of animal resources.[65] Milling equipment is scant and is limited to pieces that appear to have had little use.[66] The presence of a variety of lithic materials

[59] Basgall, M.E. 2000. "The Structure of Archaeological Landscapes in the North-Central Mojave Desert." In *Archaeological Passages: A Volume in Honor of Claude Nelson Warren*, eds. J.S. Schneider, R.M. Yohe II, and J.K. Gardner. Hemet, CA: Western Center for Archaeology and Paleontology, Publications in Archaeology.

[60] Basgall, M.E., and M.C. Hall. 1994. "Perspectives on the Early Holocene Archaeological Record of the Mojave Desert." In *Kelso Conference Papers 1987–1992, A Collection of Papers and Abstracts from the First Five Kelso Conferences on the Prehistory of the Mojave Desert*, eds. G. Dicken Everson and Joan S. Schneider. Occasional Papers in Anthropology 4. Bakersfield, CA: California State University, Bakersfield, Museum of Anthropology.

[61] Thomas, D.H. 1981. "How to Classify the Projectile Points from Monitor Valley, Nevada." *Journal of California and Great Basin Anthropology*, *3*(1): 7–43. Banning, CA: Malki Museum, Inc.

[62] Campbell, E.W.C., and Campbell, W.H. 1935. "The Pinto Basin Site." *Southwest Museum Paper*, *9*. Los Angeles, CA: Southwest Museum.

[63] Warren, C.N. 2002. "Time, Form, and Variability: Lake Mojave and Pinto Periods in Mojave Desert Prehistory." In *Essays in California Archaeology: A Memorial to Franklin Fenenga*, ed. by W.J. Wallace and F.A. Riddell, pp. 129–141. *Contributions of the University of California Archaeological Research Facility*, *60*.

[64] Basgall, M.E., and K.R. McGuire. 1988. *The Archaeology of CA-INY-30: Prehistoric Culture Change in the Southern Owens Valley, California*. Prepared by: Far Western Anthropological Research Group, Inc., Davis, CA. Prepared for: California Department of Transportation, Bishop, CA.

[65] Basgall, M.E., and K.R. McGuire. 1988. *The Archaeology of CA-INY-30: Prehistoric Culture Change in the Southern Owens Valley, California*. Prepared by: Far Western Anthropological Research Group, Inc., Davis, CA. Prepared for: California Department of Transportation, Bishop, CA.

[66] Jones and Stokes. 2002a. *Archaeological Investigations at CA-INY-30, 200, 2001*. (J&S 01-006), pp. 8-9. Prepared by: Jones and Stokes, Sacramento, CA. Prepared for: Los Angeles Department of Water and Power.

obtained from distant sources and used for tool manufacturing reflects extensive travels of possibly hundreds of kilometers.[67,68]

Late Holocene

Newberry Period (3150 to 1350 BP)

During this period, climatic variations led to more favorable cooler and moister conditions. Archaeological data indicate that there is an increase in population and social complexity, and more evidence of trade networks is available. Although hunting of a variety of fauna continues to be an important part of the economy, there is an increase in the use of seeds as a food resource. Processing of seeds is evidenced by the presence of milling equipment in archaeological sites that date to this period. Larger settlements than those characteristic of the previous period are present. This period is characterized by Elko and Humboldt series projectile points, which appear to replace the Pinto points of the previous period. Occupancy at the Lubkin Creek site during the Newberry period is evidenced by the presence of Elko and Humboldt Basal-notched projectile points and radiocarbon dates from a structure floor that range from 1860 ± 70 to 1220 ± 70 years BP. Cultural material representing activity throughout the Newberry Period at Lubkin Creek suggests that the site was a "seasonally occupied residential base."[69]

Haiwee Period (1350 to 650 BP)

Climatic conditions were variable during the Haiwee period, with temperate conditions followed by a series of droughts. This period is characterized by the introduction of smaller points, replacing the Elko and other large dart-size points from the previous period. These smaller points are known as Rose Spring[70] and Eastgate, and are often grouped together under the name Rosegate.[71] The presence of these smaller projectile points coincides with the introduction of a remarkable technological advance, the bow and arrow.[72,73] The variable climatic conditions may also be associated with the Numic expansion toward the later portion of the Haiwee period. It is hypothesized that Numic speakers spread from southeastern California throughout the Great

[67] Basgall, M.E. 1989. "Obsidian Acquisition and Use in Prehistoric Central-Eastern California: A Preliminary Assessment." In *Current Directions in California Obsidian Studies*, ed. R.E. Hughes. Contributions of the University of California Archaeological Research Facility, 48. Berkeley, CA: University of California Archaeological Research Facility.

[68] Basgall, M.E., and K.R. McGuire. 1988. *The Archaeology of CA-INY-30: Prehistoric Culture Change in the Southern Owens Valley, California*. Prepared by: Far Western Anthropological Research Group, Inc., Davis, CA. Prepared for: California Department of Transportation, Bishop, CA.

[69] Basgall, M.E., and K.R. McGuire. 1988. *The Archaeology of CA-INY-30: Prehistoric Culture Change in the Southern Owens Valley, California*. Prepared by: Far Western Anthropological Research Group, Inc., Davis, CA. Prepared for: California Department of Transportation, Bishop, CA.

[70] Lanning, E.P. 1963. "The Archeology of Rose Spring Site Iny-372." *University of California Publications in American Archaeology and Ethnology*, *49*(3): 237–336.

[71] Thomas, D.H. 1981. "How to Classify the Projectile Points from Monitor Valley, Nevada." *Journal of California and Great Basin Anthropology*, *3*(1): 7–43. Banning, CA: Malki Museum, Inc.

[72] Yohe, R.M., II. 1992. *A Reevaluation of Western Great Basin Cultural Chronology and Evidence for the Timing and Introduction of the Bow and Arrow to Eastern California Based on New Excavations at the Rose Spring Site (CA-INY-372)*. PhD Dissertation, University of California, Riverside.

[73] Yohe, R.M., II. 1998. "The Introduction of the Bow and Arrow and Lithic Resource Use at Rose Spring (CA-INY-372)." *Journal of California and Great Basin Anthropology*, *20*(1).

Basin.[74,75,76] Data from the Rose Spring site (CA-INY-372) in the Rose Valley, just south of Owens Lake, indicate that bow and arrow technology may have appeared around 1500 BP.[77] Archaeological contexts also show the use of bedrock milling features, along with portable milling equipment.

Marana Period (650 to Historic Contact, Circa AD 1770)

This period is characterized by the first appearance of Desert side-notched and Cottonwood series projectile points. In addition, pottery appears for the first time represented by the Owens Valley brown ware.[78] During Marana times, the size of annual foraging ranges decreased, and the inhabitants of the Owens Valley adopted a more sedentary way of life than that known for the rest of the Great Basin. This is evidenced by the appearance of continuously occupied valley-floor villages; these are often associated with satellite villages that served as bases for the procurement of specific resources such as pinyon, ricegrass, or alpine plants.[79]

Data from Lubkin Creek indicate that the most extensive period of occupation at this site occurred during the Marana period. Basgall and McGuire[80] found three discrete midden deposits, structural (habitation floors) remains, and a large amount of Desert series projectile points and Owens Valley brown ware pottery. In addition, over 150 diagnostic late prehistoric beads were recovered. Researchers argued that the archaeological evidence from the Lubkin Creek site does not fit the definition of a village settlement; rather, the data suggest that the site was used intermittently for over 700 years as a temporary habitation locale or during short-term periods for food procurement and processing.[81]

5.3.1.2 Regional Ethnography

The Owens Valley area was primarily inhabited by the Owens Valley Paiute during prehistoric times; by the time of Euro-American contact, Western Shoshone populations were also present in the area. Currently, descendants of both groups still live in the valley, mostly within the reservations. Four reservations are located in the Owens Valley just north of Owens Lake: Lone

[74] Bettinger, R.L., and Baumhoff, M.A. 1982. "Numic Spread: Great Basin Cultures in Competition." In *American Antiquity*, *47*: 485–503.

[75] Madsen, D.B., and Rhode, D. 1994. *Across the West: Human Population Movement and the Expansion of the Numa*. Salt Lake City, UT: University of Utah Press.

[76] Sutton, M.Q. 1996. "The Current Status of Archaeological Research in the Mojave Desert." *Journal of California and Great Basin Anthropology*, *18*(2): 221–257.

[77] Yohe, R.M., II. 1992. *A Reevaluation of Western Great Basin Cultural Chronology and Evidence for the Timing and Introduction of the Bow and Arrow to Eastern California Based on New Excavations at the Rose Spring Site (CA-INY-372)*, pp. 53. PhD Dissertation, University of California, Riverside.

[78] Bettinger, R.L., and Baumhoff, M.A. 1982. "Numic Spread: Great Basin Cultures in Competition." In *American Antiquity*, *47*: 485–503.

[79] Bettinger, Robert L. 1999. From Traveler to Processor: Regional Trajectories of Hunter–Gatherer Sedentism in the Inyo-Mono Region, California. In Billman, B. R., and Feinman, G. M., eds., *Settlement Pattern Studies in the Americas, Fifty Years Since Viru,* Smithsonian Institution Press, Washington, DC, pp. 39–55.

[80] Basgall, M.E., and K.R. McGuire. 1988. *The Archaeology of CA-INY-30: Prehistoric Culture Change in the Southern Owens Valley, California*. Prepared by: Far Western Anthropological Research Group, Inc., Davis, CA. Prepared for: California Department of Transportation, Bishop, CA.

[81] Basgall, M.E., and K.R. McGuire. 1988. *The Archaeology of CA-INY-30: Prehistoric Culture Change in the Southern Owens Valley, California*. Prepared by: Far Western Anthropological Research Group, Inc., Davis, CA. Prepared for: California Department of Transportation, Bishop, CA.

Pine, Big Pine, Fort Independence, and Bishop. One of the earliest references to the Owens Valley Paiute and the Shoshone is that by Kroeber;[82] however, later ethnographic works by Steward[83,84,85] and Driver[86] have become the standard reference for these groups.

Owens Valley Paiute

The Owens Valley Paiute inhabited the area located between the head waters of the Owens River (about 25 miles north of Bishop) to the south portion of Owens Lake. They spoke dialects of Mono, which is one of the divisions of the Western Numic segment of the Numic branch of Uto Aztecan languages.[87,88] Lamb divided the Mono speech forms present on both sides of the Sierras into three dialectical groups: Northwestern Mono, Northeastern Mono, and Southern Mono. The most widespread dialect was the Southern Mono, with a subdialect that was still known by some speakers in Lone Pine, Big Pine, and Fort Independence during the 1980s.[89] However, Liljeblad and Fowler indicate that isolated groups that lived in areas near Euro-American towns had lost any knowledge of their native language by 1985.[90]

Population density of the Owens Valley Paiute is higher and settlement patterns are more sedentary than that of any other group in the Great Basin, with population estimates before contact times ranging between 1,000 and 2,000 people.[91,92,93] The Owens Valley Paiute lived in villages distributed along water courses. The number of villages was higher in the northern Owens Valley than the southern portion due to the presence of major water sources. In the southern Owens Valley, semipermanent settlements were limited to those areas near springs and small streams at the foot of the mountains.[94]

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[82] Kroeber, A.L. 1925. *Handbook of the Indians of California*, p. 556. New York, NY: Dover Publications, Inc.

[83] Steward, J.H. 1934. "Two Paiute Ethnographies." *University of California Publications in American Archaeology and Ethnology*, *33*(5): 423–438.

[84] Steward, J.H. 1937. "Linguistic Distributions and Political Groups of the Great Basin Shoshoneans." *American Anthropologist*, *39*(4): 625–634.

[85] Steward, J.H. 1938. "Basin Plateau Aboriginal Sociopolitical Groups." *Bureau of American Ethnology Bulletin*, *120*. Washington, DC.

[86] Driver, H.E. 1937. "Cultural Element Distributions, VI: Southern Sierra Nevada." *University of California Anthropological Records*, *1*(2): 53–154. Berkeley, CA.

[87] Liljeblad, S., and Fowler, C.S. 1986. "Owens Valley Paiute." In *Handbook of North American Indians*, Volume 11, Great Basin, pp. 412–434. Washington, DC: Smithsonian Institution.

[88] Miller, W.R. 1986. "Numic Languages." In *Handbook of North American Indians*, Volume 11, Great Basin, pp. 98–106. Washington, DC: Smithsonian Institution.

[89] Lamb, S.M. 1958. *Northfork Mono Grammar*. Unpublished PhD Dissertation in Linguistics, University of California Berkeley.

[90] Liljeblad, S., and Fowler, C.S. 1986. "Owens Valley Paiute." In *Handbook of North American Indians*, Volume 11, Great Basin, pp. 412–434. Washington, DC: Smithsonian Institution.

[91] Chalfant, W.A. 1933. *The Story of Inyo*. Bishop, CA: Chalfant Press.

[92] Liljeblad, S., and Fowler, C.S. 1986. "Owens Valley Paiute." In *Handbook of North American Indians*, Volume 11, Great Basin, pp. 412–434. Washington, DC: Smithsonian Institution.

[93] Steward, J.H. 1933. "Ethnography of the Owens Valley Paiute." *University of California Publications in American Archaeology and Ethnology*, *33*(3): 233–350.

[94] Liljeblad, S., and Fowler, C.S. 1986. "Owens Valley Paiute." In *Handbook of North American Indians*, Volume 11, Great Basin, pp. 412–434. Washington, DC: Smithsonian Institution.

The Owens Valley Paiute traveled throughout the year on a seasonal basis following available food resources. A wide variety of seeds, plants, and roots were part of their diet, as their territory extended through different environmental zones, but the seeds from the pinyon (*Pinus monophylla*) were a primary source of food.[95] These pine nuts would ripen in the fall and families traveled during October and November to pine nut–rich areas in the Inyo and White Mountains for collection and processing. Families would camp near nut caches in years of abundant crops; however, during scarce years, the nuts were carried to the villages in the valley floor.[96] Acorns are a more reliable crop and were preferred over the pine nuts; however, these were not readily available in the area. These were mostly obtained through trade and occasionally collected from the oaks that grew on the eastern slopes of the Sierra Nevada.[97]

Archaeological investigations and ethnographic studies have indicated that the Owens Valley Paiute practiced irrigation of wild plants, specifically hydrophytic species. Thus, irrigation during spring and summer months increased water flow to the areas that were naturally flooded.[98] Although early works such as those by Chalftant[99] and Steward[100] have suggested that this practice was acquired post-Contact, Bettinger[101] and Lawton and others[102] have indicated that this was implemented in prehistoric times. Irrigation occurred by diverting streams to plots where the tubers of the groundnut (*Brodiaea capitata*) and spikerush (*Heleocharis* sp.) occurred naturally.

The diet of the Owens Valley Paiute Shoshone was complemented by hunting and fishing. Deer (*Odocoileus*) and bighorn sheep (*Ovis canadensis*), as well as rabbits, were hunted individually or during group hunts in the Sierras and White and Inyo Mountains.[103] Rabbit hunting was predominant; these were taken with bow and arrow or through rabbit drives.[104] Liljeblad and Fowler[105] indicate that fishing was not a widespread practice; the Owens River contained small fish only, and the lake was nearly devoid of it due to the high alkaline conditions. However, chronicles from Captain J.W. Davidson indicate that at least during the 1800s, large quantities of small fish

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[95] Steward, J.H. 1933. "Ethnography of the Owens Valley Paiute." *University of California Publications in American Archaeology and Ethnology*, *33*(3): 233–350.

[96] Bettinger, R.L. 1975. "The Surface Archaeology of Owens Valley, Eastern California: Prehistoric Man-Land Relationships in the Great Basin", pp. 61-62. PhD dissertation, University of California, Riverside, Department of Anthropology.

[97] Liljeblad, S., and Fowler, C.S. 1986. "Owens Valley Paiute." In *Handbook of North American Indians*, Volume 11, Great Basin, pp. 416. Washington, DC: Smithsonian Institution.

[98] Bettinger, R.L. 1975. "The Surface Archaeology of Owens Valley, Eastern California: Prehistoric Man-Land Relationships in the Great Basin", pp. 61. PhD dissertation, University of California, Riverside, Department of Anthropology.

[99] Chalfant, W.A. 1933. *The Story of Inyo*. Bishop, CA: Chalfant Press.

[100] Steward, J.H. 1938. "Basin Plateau Aboriginal Sociopolitical Groups." *Bureau of American Ethnology Bulletin*, *120*. Washington, DC.

[101] Bettinger, R.L. 1975. "The Surface Archaeology of Owens Valley, Eastern California: Prehistoric Man-Land Relationships in the Great Basin", pp. 61. PhD dissertation, University of California, Riverside, Department of

[102] Lawton, H.W., Wilke, P.J., DeDecker, M., and Mason, W.M. 1976 "Agriculture Among the Paiute of Owens Valley." *The Journal of California Anthropology*, *3*: 13–50.

[103] Steward, J.H. 1933. "Ethnography of the Owens Valley Paiute." *University of California Publications in American Archaeology and Ethnology*, *33*(3): 233–350.

[104] Liljeblad, S., and Fowler, C.S. 1986. "Owens Valley Paiute." In *Handbook of North American Indians*, Volume 11, Great Basin, pp. 418. Washington, DC: Smithsonian Institution.

[105] Liljeblad, S., and Fowler, C.S. 1986. "Owens Valley Paiute." In *Handbook of North American Indians*, Volume 11, Great Basin, pp. 418. Washington, DC: Smithsonian Institution.

were caught using sieve-like baskets and then dried in the sun.[106] In addition, Steward[107] indicates that two types of fish, the Owens sucker (*Catostomus fumeiventris*) and the Owens tui chub (*Gila bicolor snyderi*), were in some instances an important part of the Paiute's diet. Steward[108] and Wilke and Lawton[109] also mention the consumption of a small brine fly (*Ephydra hians*), which is common in the Mono and Owens Lakes. Both the larvae and pupa were prepared differently, and were only an important source of food in Mono and Owens Lakes.

The Owens Valley Paiute practiced exogamy within the different villages, and marriage between any relatives was forbidden. Children were associated with their mother's village but could not marry within their father's village. Each village was composed of extended families that were considered to be all relatives.[110]

Western Shoshone

The Western Shoshone occupied a large territory that included the area immediately south and east of Owens Lake, extending north and northeast through Nevada and Utah,[111] sharing the territory near Owens Lake with the Owens Valley Paiute.[112] They spoke different varieties of Central Numic, which is a component of the Numic branch of the Uto-Aztecan family. Central Numic is composed of three different languages: Panamint, Shoshone, and Comanche.[113]

Estimates of Western Shoshone population are scant, and the best documented information comes from early writers (mostly early settlers and government officials) during the 1930s. Steward[114] presents a population density of one person per 16.6 square miles adjacent to the northeast portion of Owens Lake, but does not provide any figures for the area immediately south of the lake. Shoshone population density was lower than that of the Owens Valley Paiute, and their degree of mobility was higher. According to Steward,[115] the valleys where most of the Shoshone populations resided were not abundant in resources, thus limiting the ability for large groups to remain in one place for longer periods of time. In addition, a high reliance on pine nuts, the yield of which varied from year to year, generated a less sedentary way of life among the Shoshone. Other plants

[106] Wilke, P.J., and Lawton, H.W., Editors. 1976. *The Expedition of Capt. J. W. Davidson from Fort Tejon to the Owens Valley in 1859*, pp. 29. Socorro, NM: Ballena Press.

[107] Steward, J.H. 1933. "Ethnography of the Owens Valley Paiute." *University of California Publications in American Archaeology and Ethnology*, *33*(3): 233–350.

[108] Steward, J.H. 1933. "Ethnography of the Owens Valley Paiute." *University of California Publications in American Archaeology and Ethnology*, *33*(3): 233–350.

[109] Wilke, P.J., and Lawton, H.W., Editors. 1976. *The Expedition of Capt. J. W. Davidson from Fort Tejon to the Owens Valley in 1859*, pp. 30. Socorro, NM: Ballena Press.

[110] Steward, J.H. 1933. "Ethnography of the Owens Valley Paiute." *University of California Publications in American Archaeology and Ethnology*, *33*(3): 233–350.

[111] Steward, J.H. 1938. "Basin Plateau Aboriginal Sociopolitical Groups." *Bureau of American Ethnology Bulletin*, *120*. Washington, DC.

[112] Liljeblad, S., and Fowler, C.S. 1986. "Owens Valley Paiute." In *Handbook of North American Indians*, Volume 11, Great Basin, pp. 413, Figure 1. Washington, DC: Smithsonian Institution.

[113] Thomas, D.H., Pendleton, L., and Cappannari, S. 1986. "Western Shoshone." In *Handbook of North American Indians*, Volume 11, Great Basin, pp. 262. Washington, DC: Smithsonian Institution.

[114] Steward, J.H. 1938. "Basin Plateau Aboriginal Sociopolitical Groups." *Bureau of American Ethnology Bulletin*, *120*, pp. 47. Washington, DC.

[115] Steward, J.H. 1937. "Linguistic Distributions and Political Groups of the Great Basin Shoshoneans." *American Anthropologist*, *39*(4): 625–634.

consumed by the Shoshone include a type of sunflower, which was available in an area near Keeler,[116] and acorns from the Sierras. From spring to fall, the Shoshone traveled in small groups collecting food, following the availability of resources. During the winter months, groups of families stayed in warmer places near food caches, mostly pine nuts, and accessible water.[117] According to Irwin,[118] the Shoshone also practiced a form of incipient agriculture similar to the Owens Valley Paiute, consisting of the irrigation of wild plants.

Hunting activities were also part of the Shoshonean way of life. Bighorn sheep hunts were mostly carried out during the summer.[119] During winter months, hunting activities were focused on migrating species. Steward[120] described subsistence activities for the Shoshone at the Koso Hot Spring Village, located about 20 miles south of Owens Lake. He indicates that rabbit hunts were a common practice, and communal hunting of pronghorn antelope (*Antilocarpa americana*) took place in areas where these animals were available, such as the Indian Wells Valley (south of Little Lake), and in some areas just south of Owens Lake.

Shoshone families were politically independent and remained isolated throughout most of the year.[121] However, marriage took place between families that had contact with one another, such as during plant collection trips or communal hunting. Marriage was more a contract between families than between individuals. The preferred arrangement for marriage among the Shoshone consisted of several marriages between the children of two families.[122]

5.3.1.3 Historic Context

Early Euro-American Exploration

Native American groups were subject to dramatic social and cultural changes after the Spanish began colonizing coastal California in 1769. Of primary importance in affecting these changes were the establishment of the Spanish mission system throughout California and the introduction of new diseases, which spread rapidly and decimated the native population. Although the initial occupation of California occurred relatively quickly along the coastlines, the interior portion of California, such as the Owens Valley, did not feel the effects until much later.[123]

The first Euro-Americans to visit the Owens Valley were probably mountain men and prospectors. Peter Skene Ogden, a Canadian fur trapper, traveled into Owens Valley and south along the

[116] Irwin, C.N. 1980. *The Shoshone Indians of Inyo County, California. The Kerr Manuscript*. Independence, CA: Ballena Press.

[117] Steward, J.H. 1972. *Theory of Culture Change, the Methodology of Multilinear Evolution*, pp. 114, 115. Chicago, IL: University of Illinois Press

[118] Irwin, C.N. 1980. *The Shoshone Indians of Inyo County, California. The Kerr Manuscript*, pp. xi. Independence, CA: Ballena Press.

[119] Thomas, D.H. 1983. "The Archaeology of Monitor Valley I: Epistemology." *Anthropological Papers of the American Museum of Natural History*, *59*(1).

[120] Steward, J.H. 1938. "Basin Plateau Aboriginal Sociopolitical Groups." *Bureau of American Ethnology Bulletin*, *120*, pp. 81-82. Washington, DC.

[121] Steward, J.H. 1938. "Basin Plateau Aboriginal Sociopolitical Groups." *Bureau of American Ethnology Bulletin*, *120*, pp. 56. Washington, DC.

[122] Steward, J.H. 1972. *Theory of Culture Change, the Methodology of Multilinear Evolution*, pp. 118-119. Chicago, IL: University of Illinois Press.

[123] Wehrey, J. 2006. *Voices from this Brown Land*, pp. 2. New York, NY: Palgrave Macmillan.

eastern edge of the Sierra Nevada Mountains while exploring for the Hudson's Bay Company in 1829.[124] Joseph Reddeford Walker, also a fur trapper, traveled to the Owens Valley in 1834. Walker was a fur trapper who traversed the valley several times. In 1843, Walker led the J.B. Childs (Chiles) party to California by way of the Humboldt Sink, Walker Lake, Owens Valley, and Walker Pass. Walker followed the same passage in 1845 on John Fremont's third expedition through California. It was during this expedition that Fremont named the Owens Valley after his traveling companion, Dick Owens, even though it is believed that neither one of them had actually set foot in the valley.[125] One of the earliest surveys of the Owens Valley was conducted in 1855–1856 by Henry Washington and A.W. von Schmidt, who were sent by the U.S. Bureau of Land Management and the State of California Surveyors Office.[126] The exploration of the Owens Valley by Euro-Americans is directly linked with the lives of the Native Americans, the Owens Valley Paiute, who lived in the area at the time of the first expeditions. The first explorers left scant records concerning these expeditions and the native populations of the Owens Valley. Nonetheless, Schmidt made the first description of the irrigation methods used by the Owens Valley Paiute,[127] and Captain J.W. Davidson during his expedition from Fort Tejon to the Owens Valley in 1859 also described the lives of the Paiute. As a result of his expeditions, Captain Davidson suggested that the government should protect the Native Americans and that a portion of land should be set aside for a reservation, which from his point of view could be self-sustaining.[128] This was the first of many attempts to create reservations in the area.

Development of Towns and Industries

Substantial settlement of the Owens Lake region by Euro-Americans began in 1861, when Barton and Alney McGee introduced a small herd of cattle and built a log cabin in the area that would later become the town of Lone Pine.[129] Beginning in the 1870s, the mining and soda extraction industries caused a number of towns to spring up around Owens Lake: Swansea and Keeler on the east shore of the lake were centers for silver smelting and mineral extraction, while Olancha and Cartago on the western shore were important transportation centers for freight and raw materials moving in and out of the region. A summary of the history of these five towns is presented below; their locations are shown on Figure 2.1-1.

Lone Pine

In 1860, a loosely organized prospecting camp known as the "Hill Party" was located in the area that would later become the town of Lone Pine, where independent prospectors searched for gold and silver.[130] In 1861, Barton and Alney McGee raised cattle and built a log cabin in the area.[131] In

[124] Dictionary of Canadian Biography. 2013. Peter Skene Ogden. Accessed online on September 4, 2013 at: http://www.biographi.ca/en/bio.php?id_nbr=4109

[125] Wilke, P.J., and Lawton, H.W., Editors. 1976. *The Expedition of Capt. J. W. Davidson from Fort Tejon to the Owens Valley in 1859*, pp. 9. Socorro, NM: Ballena Press.

[126] Wilke, P.J., and Lawton, H.W., Editors. 1976. *The Expedition of Capt. J. W. Davidson from Fort Tejon to the Owens Valley in 1859*, pp. 9. Socorro, NM: Ballena Press.

[127] Lawton, H.W., Wilke, P.J., DeDecker, M., and Mason, W.M. 1976 "Agriculture Among the Paiute of Owens Valley." *The Journal of California Anthropology*, *3*: 13–50.\

[128] Lawton, H.W., Wilke, P.J., DeDecker, M., and Mason, W.M. 1976 "Agriculture Among the Paiute of Owens Valley." *The Journal of California Anthropology*, *3*: 13–50.

[129] Jones and Stokes. 2007. *Cultural Resources Inventory of Two Parcels in the Moat and Row Testing Area, Owens Lake Dust Mitigation Program, Inyo County, California*, pp. 12. Prepared for: City of Los Angeles Department of Water and Power.

[130] DeDecker, M. 1966. *Mines of Eastern Sierra*, pp. 41. Glendale, CA: La Siesta Press.

the 1870s, Lone Pine was the commercial center providing goods and services to the mines located throughout the Owens Valley. On March 26, 1872, an earthquake took place on the eastern side of Sierra Nevada. Twenty-three deaths were reported, and 52 of the 59 adobe houses in the town were destroyed. The earthquake forced the mountain range upward, relative to the valley, approximately 13 feet, while producing a lateral slide to the northwest by about 16 feet. The surface ruptured along a fault line that was noticeable for a distance of approximately 100 miles, and the quake could be felt as far away as San Diego.[132] At Owens Lake, the shoreline at Swansea receded 150 feet, requiring an extension for the newly constructed steamboat wharf.[133]

Swansea

Swansea is located 9 miles southeast of Lone Pine along State Route 136. Swansea, named for the town in Wales, held the smelter of the Owens Lake Company and was the final destination of the silver ore mined from Cerro Gordo. The smelter operated from 1869 through 1874 and at its peak produced 150 bars of silver ore per day weighing 83 pounds each. The Owens Lake Company owned the steamer Bessie Brady, and in 1872 the company constructed a 300-foot wharf for the steamer located at Swansea.[134] In 1874, the Owens Lake Company went bankrupt and the steamer Bessie Brady was sold and moved to Keeler. That same year a rain storm buried Swansea under several feet of mud and debris, and today all that remains of Swansea are the ruins of the brick smelter.[135]

Keeler

Keeler is located 15 miles southeast of Lone Pine along State Route 136. In 1873, as part of the Cerro Gordo Freight Company's consolidation, a new wharf was constructed for the steamer Bessie Brady on the northeast shore of Owens Lake, in an area that would later be known as the community of Keeler. In 1879, Captain Julius M. Keeler, acting on the behalf of David N. Hawley and other east coast financiers, formed the Owens Lake Mining and Milling Company. The group purchased the Union Consolidated Mine and made plans to construct a ten-stamp mill at the community of Keeler, locally known as Hawley. On March 1, 1880, with the groundbreaking of the new mill, the site was renamed Keeler.[136] In July of 1883, the Carson & Colorado Railroad line was completed at Keeler.[137]

By 1920, Keeler was the wealthiest community in Inyo County. Keeler had schools, hotels, and a Chinatown district, and was the main depot for the Carson & Colorado Railroad.[138] The community contained three chemical processing plants and produced 47,000 tons of soda ash bicarbonate

[131] Jones and Stokes. 2007. *Cultural Resources Inventory of Two Parcels in the Moat and Row Testing Area, Owens Lake Dust Mitigation Program, Inyo County, California*, pp. 12. Prepared for: City of Los Angeles Department of Water and Power.

[132] Fiero, B. 1986. *Geology of the Great Basin*, p. 189. Reno, NV: University of Nevada Press.

[133] DeDecker, M. 1966. *Mines of Eastern Sierra*, pp. 61. Glendale, CA: La Siesta Press.

[134] Chalfant, W.A. 1933. *The Story of Inyo*, pp. 290. Bishop, CA: Chalfant Press.

[135] Nadeau, R. 1958. *Ghost Towns and Mining Camps of California*, pp. 188. Los Angeles, CA: The Ward Ritchie Press.

[136] Ligenenfelter, R. 1962. 'The Desert Steamers." *Journal of the West*, *1*(2).

[137] Due, J. 1951. "The Carson and Colorado Railroad." *Economic Geography*, *27*(3): 251–267.

[138] Krautter, F. 1959. *The Story of Keeler*. Independence, CA: Owens Inyo Company.

each year, which constituted more than half of all the soda products consumed in the United States annually.[139]

Olancha

Olancha is located where the current U.S. Highway 395 intersects State Route 190. Beginning in the late 1860s, the town, which included a stagecoach depot, was a principal logistical and transportation center between the Cerro Gordo silver mines and Los Angeles. After the mining operations at Cerro Gordo ceased, Olancha turned into an agricultural center, and with the arrival of Southern Pacific Railroad in 1910, it became a hub for the distribution of materials used for the construction of the Los Angeles Aqueduct.[140] In 1862, M.H. Farley built the first mill in the Owens Valley along Olancha Creek, approximately 0.5 mile south of the location that would later become the town.[141] The following year, Farley built a stamp mill, a blacksmith shop, and a sawmill, all which were burned down by local Native Americans in 1867.

Cartago

Cartago is located on U.S. Highway 395, approximately 18 miles south of the town of Lone Pine. Located on the south side of Owens Lake, the town was originally known as Daneri's Landing, where the steamers *Bessie Brady* and *Mollie Stevens* were moored. The Cerro Gordo Freight Company was headquartered at Cartago, which was the starting point for mule trains transporting silver bullion south to Los Angeles.[142] The volume of bullion extracted from the mines so exceeded the capacity of the mule trains that in 1872 temporary housing was built at Cartago from the estimated 18,000 bars of silver awaiting shipment to Los Angeles. With the decline of silver production, and the arrival of the Southern Pacific Railroad, Cartago became a transportation center for the chemicals and soda products being processed at Owens Lake.[143] The California Alkali Company plant was established in Cartago in 1917, but was closed down soon after the end of World War I, and was purchased by the Inyo Chemical Company in 1923. The Inyo Chemical Company processed soda products and chemicals, and operated an ice plant at Cartago.[144]

Industrial Developments in the Owens Valley

Silver mining was one of the earliest industries established in the Owens Valley. By the turn of the century, however, precious metal mining had given way to the large-scale commercial production and extraction of mineral resources from Owens Lake. A description of the various mining activities and facilities that operated historically in the Owens Valley is provided below.

[139] Kahrl, W. 1982. *Water and Power*, pp. 224. Berkeley, CA: University of California Press.

[140] Wright, D. 2005. "California Ghost Towns." Available at http://www.ghosttowns.com/states/ca/olancha.html

[141] Roberts, G., and Roberts, J. 2004. *Discover Historic California*, pp. 535. Baldwin Park, CA: Gem Guides Book Company.

[142] DeDecker, M. 1966. *Mines of Eastern Sierra*, pp. 61. Glendale, CA: La Siesta Press.

[143] Jones and Stokes. 2007. *Cultural Resources Inventory of Two Parcels in the Moat and Row Testing Area, Owens Lake Dust Mitigation Program, Inyo County, California*, pp. 13. Prepared for: City of Los Angeles Department of Water and Power.

[144] Pipkin, G. 1974. *Cartago, My Cartago*, pp. 2-3. Unpublished manuscript on file at the Eastern California Museum, Independence, CA.

Cerro Gordo Mines

In 1865, a Mexican American named Pablo Flores discovered the largest silver strike in California at Cerro Gordo (Fat Hill). The Cerro Gordo mines were located on the western slope of Buena Vista Peak in the southern Inyo Mountains.[145] The Cerro Gordo mines produced over 15 million dollars' worth of silver ore.

In 1866, Mortimer W. Belshaw, a mining engineer, and his partner Adbner B. Elder came from San Francisco and started the Union Mining Company by staking claims at Cerro Gordo and buying the Union Mine.[146] Mr. Belshaw realized that the wealth of Cerro Gordo was not found by mining silver alone, but was made by owning the silver ore processing facilities, controlling transportation, and supplying water to the mines. Mr. Belshaw built a smelting furnace to process lead-ore from the Union Mine, and constructed a toll road on the only passable road (the Yellow Grade) to and from Cerro Gordo to Owens Lake. He also piped water in from the nearest natural spring, which he controlled, to Cerro Gordo. Through these efforts, Mr. Belshaw largely controlled the Cerro Gordo mines.[147] By 1871, the town of Cerro Gordo was well established.

In 1870, Belshaw bought out Elder and formed a new partnership with Victor Beaudry, who had purchased a half interest in the Union Mine. Together Belshaw and Beaudry built a new smelting furnace, and by 1874 the smelting operation was producing 18 tons of bullion per day. The firewood required for increased smelting production at Cerro Gordo and at Owens Lake had stripped the surrounding forest lands bare on the Inyo Mountains by the mid-1870s.[148]

As shortages of natural resources increased, accompanied by the logistical problems caused by the remote location of the Cerro Gordo mines, competitive pressures accelerated among the various mining companies. Belshaw of the Union Consolidated Company increased the toll charges on the Yellow Grade, the only road from Cerro Gordo to Swansea, cutting the Owens Lake Silver-Lead Company's ore processing capacity in half. The Owens Lake Silver-Lead Company fought back in the courts and eventually won, but the production loss, court delays, and legal fees forced the company into bankruptcy in the spring of 1874. Belshaw and the Union Consolidated Company were also victims of court fights and legal fees in their attempt to protect their mining claims against outside interests. These actions forced the Union Consolidated Company to cease operations in 1878.[149]

Cottonwood Charcoal Kilns

In the 1870s, smelting operations led to deforestation in the Inyo Mountains, and local mining companies required new sources of fuel if the silver smelting furnaces were to continue to operate. The Cottonwood Charcoal Kilns, located north of Cartago, were beehive kilns that turned wood into charcoal. The charcoal was transported across the lake at Cartago by the steamers Bessie Brady and Mollie Stevens, and then used as fuel for the silver smelting furnaces that supported the Cerro Gordo mines.

[145] DeDecker, M. 1966. *Mines of Eastern Sierra*, pp. 57. Glendale, CA: La Siesta Press.

[146] Nadeau, R. 1958. *Ghost Towns and Mining Camps of California*, pp. 88. Los Angeles, CA: The Ward Ritchie Press.

[147] Nadeau, R. 1958. *Ghost Towns and Mining Camps of* California, pp. 188. Los Angeles, CA: The Ward Ritchie Press.

[148] DeDecker, M. 1966. *Mines of Eastern Sierra*, pp. 62. Glendale, CA: La Siesta Press.

[149] DeDecker, M. 1966. *Mines of Eastern Sierra*, pp. 65. Glendale, CA: La Siesta Press.

Soda Products Manufacturing

Processing and manufacturing of soda minerals and compounds for industrial and commercial use in paint, glass, and detergent began at Owens Lake in the 1880s. In the 1950s, most of the world's production of borax was derived from Owens Lake, Searles Lake, and the Kramer borate mines.[150] The production of soda compounds, especially borax, has been influenced by world events: the First and Second World Wars brought about a rapid increase in domestic and world demand for soda minerals, corresponding in large price increases. This surge in demand for natural soda compounds forced plant owners to increase their capacities to meet both domestic and world demand.[151]

Inyo Development Company. The Inyo Development Company began production in 1885 in an area located approximately 1 mile northwest of the community of Keeler.[152] In 1899, the company expanded its operations to include soda ash production through a natural evaporation process.[153] The company's targeted markets were the glass, soap, and borax industries, for which the company maintained a sales agent in San Francisco. Assets included vacant lots and buildings, 3,000 acres of land, production vats, furnaces, pipelines, and manufacturing equipment, and payroll records indicate that the company employed between 20 to 150 workers.[154] At their height, the facilities produced 20 tons of soda ash per day, but by 1920, the company had dissolved and the plant was sold to the California Alkali Company.[155]

The Chemical Production Company. The Chemical Production Company began production in 1918, under the presidency of Lafayette M. Hughes. The plant was located approximately 9 miles south of Lone Pine, on the western shore of Owens Lake, and north of the California Alkali Company's plant. The company produced soda ash and was able to achieve a daily production rate of 20 tons per day. However, the company's process for manufacturing soda ash was a commercial failure and the plant closed within 2 months after starting operations.[156]

Natural Soda Products Company. In 1908, R.C. Paddock, Noah Wrinkle, and several other prominent investors formed the Natural Soda Products Company (NSPC).[157] The NSPC plant was located on the eastern shore of Owens Lake, approximately 2 miles south of the community of

[150] Calef, W. 1951. The Salines of Southeastern California. *Economic Geography*, *27*(1): 43–64.

[151] Jones and Stokes. 2007. *Cultural Resources Inventory of Two Parcels in the Moat and Row Testing Area, Owens Lake Dust Mitigation Program, Inyo County, California*, pp. 16. Prepared for: City of Los Angeles Department of Water and Power.

[152] Jones and Stokes. 2007. *Cultural Resources Inventory of Two Parcels in the Moat and Row Testing Area, Owens Lake Dust Mitigation Program, Inyo County, California*, Figure 8. Prepared for: City of Los Angeles Department of Water and Power.

[153] University of Nevada, Reno. n.d. *A Guide to the Records of the Inyo Development Company*. Collection No. NC73. Special Collections Section, University of Nevada, Reno. Available at: http://www.library.unr.edu/specoll/mss/NC73.html

[154] University of Nevada, Reno. n.d. *A Guide to the Records of the Inyo Development Company*. Collection No. NC73. Special Collections Section, University of Nevada, Reno. Available at: http://www.library.unr.edu/specoll/mss/NC73.html

[155] Hamilton, F. 1920. *Seventeenth Annual Report of the State Mineralogist*. Volume XVII. California State Mining Bureau, Sacramento, CA.

[156] Hamilton, F. 1920. *Seventeenth Annual Report of the State Mineralogist*. Volume XVII. California State Mining Bureau, Sacramento, CA.

[157] *Owens Valley Herald Newspaper*. 25 December 1908. "New Soda Company Will Begin Manufacture of Many Products."

Keeler.[158] In 1912, the company was re-organized under the leadership of Bishop bankers Wilfred and Mark Watterson.[159] The NSPC facilities occupied both sides of the road which is now California State Highway 136; on the east side of the road was a processing mill, a mess hall, and barracks, and on the west side was the NSPC company town containing three dirt streets that housed the NSPC Hall and housings for the workers.[160] By 1920, the plant was producing bicarbonate of soda and soda ash with a daily output of around 120 tons per day, or roughly 10,000 tons of dense soda ash per year.[161] The processing technique developed by Herbert and Noah Wrinkle involved pumping lake water into large solar tanks, which yielded a concentrated solution. The plant employed a total of 100 workers.[162] Operations continued until January of 1953 when the corporation was dissolved.[163]

California Alkali Company. The California Alkali Company began continuous operations in September of 1917. The company's plant was located in Cartago near the Southern Pacific Railroad depot on the western shore of Owens Lake. The company, which employed 100 men, was owned by Mortimer Fleishhacker, president, and John F. Bush, vice president and general manager. Soda ash was produced by pouring lake water into clay vats and using solar evaporation to create concentrated brine. The plant's daily capacity was approximately100 tons of dense soda ash.[164]

A prohibition against the importation of German potash and soda ash was removed at the end of World War I. Small producers like the California Alkali Company could no longer compete against cheaper German-produced soda ash, and the plant was forced to close.[165] In 1924, the plant and its facilities were sold to the Inyo Chemical Company.[166]

The Inyo Chemical Company remodeled the plant and increased the production of soda ash and sodium bicarbonate. The company ceased using evaporation ponds and instead built wells into the playa and constructed a pipeline to pump brine back to the plant at Cartago.[167]

Pacific Alkali Company. The Pacific Alkali Company plant, located on the western shore of Owens Lake approximately 9 miles south of Lone Pine, began operations in 1930. Harvey S. Mudd was

[158] Jones and Stokes. 2007. *Cultural Resources Inventory of Two Parcels in the Moat and Row Testing Area, Owens Lake Dust Mitigation Program, Inyo County, California*, Figure 8. Prepared for: City of Los Angeles Department of Water and Power.

[159] Kahrl, W. 1982. *Water and Power*, pp. 273-274. Berkeley, CA: University of California Press.

[160] O'Connell Family. 1995. *Desert Days: Living in the California Desert, 1914–1929*, pp. 32. North Hills, CA: Rock Ink.

[161] Hamilton, F. 1920. *Seventeenth Annual Report of the State Mineralogist*. Volume XVII. California State Mining Bureau, Sacramento, CA.

[162] Hamilton, F. 1920. *Seventeenth Annual Report of the State Mineralogist*. Volume XVII. California State Mining Bureau, Sacramento, CA.

[163] Natural Soda Products Company. 10 February 1953. *Certificate of Dissolution of Natural Soda Products Company*, pp. 3. Certificate filed in the Office of the Secretary of State of the State of California.

[164] Hamilton, F. 1920. *Seventeenth Annual Report of the State Mineralogist*. Volume XVII. California State Mining Bureau, Sacramento, CA.

[165] Pipkin, G. 1974. *Cartago, My Cartago*, pp. 2-3. Unpublished manuscript on file at the Eastern California Museum, Independence, CA.

[166] Jones and Stokes. 2007. *Cultural Resources Inventory of Two Parcels in the Moat and Row Testing Area, Owens Lake Dust Mitigation Program, Inyo County, California*, pp. 18. Prepared for: City of Los Angeles Department of Water and Power.

[167] Jones and Stokes. 2002b. *California Register of Historical Resources Evaluation of a Historic Pipeline at Cartago, California*. Prepared by: Jones and Stokes, Sacramento, CA. Prepared by: Jones and Stokes, Sacramento, CA. Prepared for: Los Angeles Department of Water and Power.

the company's president, George E. White was general manager, and George Dub was the plant's superintendent. The process used to produce soda ash consisted of pumping Owens Lake water through 2.5 miles of 14-inch pipe into evaporation ponds that ranged in size from 15 to 50 acres. The plant produced roughly 1,000 tons of soda and 2,000 tons of borax per year, and was powered by electricity provided by the Los Angeles Bureau of Power and Light. The plant employed roughly 50 men.[168] According to a manuscript by the Pittsburgh Plate Glass Company, the Columbia-Southern Chemical Corporation acquired the plant from the Pacific Alkali Company in 1944 and remodeled it in 1958.[169] The plant became part of the Pittsburgh Plate Glass Company and continued operations until the late 1970s.

Permanente Metals Corporation. After World War II, the demand for some mineral commodities fell, but the demand for soda ash increased. In 1947, the Permanente Metals Corporation, which later became Kaiser Aluminum and Chemical Corporation, finished the construction of a soda ash plant at Owens Lake. The plant was located about 7 miles south of Bartlett (between Bartlett and Cartago). The plant did not operate much in 1949, and was seldom used in 1950 when it finally closed.[170,171]

Saline Valley Salt Deposit

The salt deposits were located in the Saline Valley east of the Inyo Mountains, approximately 13 miles northeast of Swansea and 50 miles by dirt road from Keeler. The property was originally operated by the Saline Salt Company, formed in 1911 by White Smith, and continued to operate under that name until 1913. From 1915 to 1919, the deposit was operated by the Owens Valley Salt Company. From 1926 through 1930, the property was operated by Sierra Salt Corporation with G.W. Russell president, and A.S. Henderson the company's secretary.[172]

The salt was transported from the Saline Valley to the mill by an aerial tramway. The tramway was completed in 1913, and in 1929, the tramway was refurbished by the Sierra Salt Corporation and extended 13 miles to the Tramway Station.[173]

The Tramway Station was located northwest of Keeler adjacent to the Carson & Colorado Railroad siding, later operated by the Southern Pacific Railroad. The station included employee housing and a mill, which contained driers, vibrating screens, packing equipment and automated weight scales.[174] Due to high operating costs, the tramway ceased operations in 1933.[175]

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[168] Bradey, W. 1938 *Thirty-fourth Annual Report of the State Mineralogist*. Volume XXXIV. California State Mining Bureau, Sacramento, CA.

[169] Jones and Stokes. 1997. *Cultural Resources Inventory and Evaluation of Historic Resources on the Eastern Side of Owens Lake for the Great Basin Unified Air Pollution Control District*. Prepared by: Jones and Stokes, Sacramento, CA, pp. 19. Prepared for: Great Basin Unified Air Pollution Control District.

[170] Mineral Information Services. 1959. "Soda Ash Industry of Owens Lake (1887-1959)." In *State of California Division of Mines*, Vol 12, No. 10.

[171] Dub, G.D. 1947. "Owens Lake, California-Source of Sodium Minerals." In *American Institute of Mining and Metallurgical Engineers*. Industrial Mineral Division (Non Metallics). Vol 173. New York, NY: Institute at the Office of the Secretary.

[172] Bradey, W. 1938 *Thirty-fourth Annual Report of the State Mineralogist*. Volume XXXIV. California State Mining Bureau, Sacramento, CA.

[173] Bradey, W. 1938 *Thirty-fourth Annual Report of the State Mineralogist*. Volume XXXIV. California State Mining Bureau, Sacramento, CA.

[174] Bradey, W. 1938 *Thirty-fourth Annual Report of the State Mineralogist*. Volume XXXIV. California State Mining Bureau, Sacramento, CA.

Sierra Talc Company

Formed in 1918 as the Inyo Talc Company, the company was renamed the Sierra Talc Company in 1919. The company built a mill in Keeler, which still stands today. The mill produced two types of high-grade talc, including talc for the newly emerging home electric appliance market. During World War II, the company was the country's largest producer of high-grade steatite talc for electric insulators. The company was the last industrial customer to use the narrow gauge railroad operated by the Southern Pacific Railroad. The company ceased operations in 1980 due to the lack of raw materials and to the logistical problems caused by the closure of the rail line at Keeler by the Southern Pacific Railroad.[176]

Transportation

Several distinct transportation industries, including trams, mule teams, boats, and railroads, played important roles in the industrial and economic histories of the Owens Lake region. The first three modes of transportation were needed to efficiently move raw materials and silver bullion to and from the Cerro Gordo mines. The fourth mode, the railroad, was not use intensively until the construction of the Los Angeles Aqueduct in the early 20th century.

Tramway

The Leschen Aerial tramway and its support facilities are located along California State Highway 136, 7 miles east of Lone Pine. The tramway was constructed in 1913 to bring salt from the Saline Valley over the Inyo Mountains to the eastern shore of Owens Lake, and later zinc ore from Cerro Gordo to Keeler. The electric-powered tram had an hourly capacity of 16 tons, and was 29,560 feet long from tower to tower. After 1920, the tram was used to bring limestone for the Natural Soda Product and Clark Chemical Plant at Bartlett. Later the tram was disassembled and sold to a Nevada firm, but was never used again.[177]

Mule Teams

In 1873, Mr. Belshaw, Mr. Beaudry, and Mr. Nadeau formed the Cerro Gordo Freight Company, with Nadeau receiving a 3-year contract from Belshaw and Beaudry to run the freight operations. The new company purchased 80 wagons, each of which was said to hold as much cargo as a narrow gauge railroad box car. Nadeau set up a chain of way-stations for the mule teams between Cartago and Los Angeles, and the round trip took approximately 3 weeks. The Cerro Gordo Freight Company dissolved in 1881.[178]

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[175] Jones and Stokes. 1997. *Cultural Resources Inventory and Evaluation of Historic Resources on the Eastern Side of Owens Lake for the Great Basin Unified Air Pollution Control District*. Prepared by: Jones and Stokes, Sacramento, CA, pp. 19. Prepared for: Great Basin Unified Air Pollution Control District.

[176] Jones and Stokes. 1997. *Cultural Resources Inventory and Evaluation of Historic Resources on the Eastern Side of Owens Lake for the Great Basin Unified Air Pollution Control District*. Prepared by: Jones and Stokes, Sacramento, CA, pp. 20. Prepared for: Great Basin Unified Air Pollution Control District.

[177] DeDecker, M. 1966. *Mines of Eastern Sierra*, pp. 65. Glendale, CA: La Siesta Press.

[178] Chalfant, W.A. 1933. *The Story of Inyo*, pp. 312. Bishop, CA: Chalfant Press.

Steamboats

James Brady, the superintendent of the Owens Lake Silver-Lead Company at Swansea and a competitor of the Consolidated Union mine's Mr. Belshaw, came up with the idea of using a steamer to ferry silver bullion from Swansea to the town of Cartago. On June 27, 1872, the steamer *Bessie Brady* (named after Brady's daughter) made her maiden voyage carrying 700 bars of silver to Daneri's landing, later renamed Cartago. The new steamer took 3 days off the shipment time for bullion from Swansea to Cartago. The steamer was a financial success for many years, even though James Brady sold his interest in the Owens Lake Silver-Lead Company long before the steamer was able to generate large profits for the company. In 1873, *Bessie Brady* was sold to the Cerro Gordo Freight Company and moved to the newly constructed wharf at Keeler.[179]

In 1873, Colonel Sherman Stevens constructed a flume at Cottonwood Canyon, west of Owens Lake. By 1876, it was incorporated into the Inyo Lumber & Coal Company and flume was extended onto the Owens Lake shoreline. The company built its own steamer, named the *Mollie Stevens* after Colonel Stevens's daughter, in 1877. Smaller than the *Bessie Brady*, the *Mollie Stevens* made her maiden voyage in June of that year carrying 30,000 feet of lumber for the Union Consolidated Company.[180] However, with the decline of mining activities at Cerro Gordo the following year, the *Molly Stevens* was moored at Ferguson's Landing and her engine was removed and sent to the *Bessie Brady*.[181] In 1882, while she was being refurbished and refitted with the *Molly Stevens*' engine, a fire broke out and engulfed the *Bessie Brady*. The steamer was a total loss.[182]

The Carson & Colorado Railroad

The Carson & Colorado Railroad was originally constructed to connect the Virginia & Truckee Railroad Company (V&T) with the Central Pacific Railroad at Reno, Nevada. The owners of the V&T wanted to expand the line south to take advantage of the mining boom along the eastern Sierras from the Candelaria Mountains to Owens Lake. In 1880, financed by D.O. Mills, William Ralston, and William Sharon from San Francisco, the line was extended from Mound House near Carson City, Nevada to Keeler.[183] To save money, the financiers had a narrow gauge rail line constructed on the eastern side of the Sierras where the terrain was relatively flat. This line was completed to Keeler in 1883, and was known as the "Slim Princess" by the residents of the valley.[184]

The Carson & Colorado Railroad Company's owners had hoped to complete the line to Mojave, but this was never realized. The Carson & Colorado Railroad Company controlled the line until its sale to the Southern Pacific on March 1, 1900. The narrow gauge line ran until 1911, when the Southern Pacific completed its line from Mojave to Owenyo.[185]

[179] DeDecker, M. 1966. *Mines of Eastern Sierra*, pp. 59. Glendale, CA: La Siesta Press.

[180] DeDecker, M. 1966. *Mines of Eastern Sierra*, pp. 61. Glendale, CA: La Siesta Press.

[181] Ligenenfelter, R. 1962. 'The Desert Steamers." *Journal of the West*, *1*(2).

[182] Ligenenfelter, R. 1962. 'The Desert Steamers." *Journal of the West*, *1*(2).

[183] Due, J. 1951. "The Carson and Colorado Railroad." *Economic Geography*, *27*(3): 251–267.

[184] Kahrl, W. 1982. *Water and Power*, pp. 38. Berkeley, CA: University of California Press.

[185] Due, J. 1951. "The Carson and Colorado Railroad." *Economic Geography*, *27*(3): 251–267.

Southern Pacific Railroad

The Southern Pacific Railroad purchased the narrow gauge line from the Carson & Colorado Railroad Company in 1900. The purchase started rumors in Los Angeles that the Southern Pacific would extend its line from Mojave to the Owens Valley, but due to poor economic conditions in the mining industry, the railroad instead extended its line west and connected Mojave with Bakersfield.[186] In 1907, the City of Los Angeles chose the Southern Pacific Railroad to build a line from Mojave to Owenyo, and to transport materials from Mojave to the Owens Valley for the City's planned aqueduct system. The Southern Pacific's bid to build the line was not the lowest, but the railroad was chosen because it controlled the right-of-way on land needed by the City to construct its aqueduct. In return for the contract, Southern Pacific offered the land to the City for 5 dollars an acre. The line shipped over a million tons of freight from Mojave to Owenyo during the construction of the aqueduct.[187] Eventually the freight traffic dropped as agricultural shipments from the Owens Valley were reduced due both to water being siphoned off from the Owens River and to the construction of U.S. Highway 395.

Los Angeles Aqueduct

In 1904 through May 1905, the City of Los Angeles began to acquire land and water rights in Owens Valley. In 1907, the voters of Los Angeles approved a bond measure to build an aqueduct system that would divert water from the Owens River to Los Angeles.[188] The water from the Owens River was needed by the City's growing population, which had reached 100,000 by 1900.[189]

Beginning in 1908, William B. Mulholland, chief engineer and later the superintendent of the Department of Water and Power for the City of Los Angeles, designed and supervised the construction of the Los Angeles Aqueduct. Workers' camps along the construction route brought temporary economic and population increases to the Owens Valley and to the small towns that dotted the route. In 1913, the aqueduct was completed.[190]

In the 1920s, drought and Los Angeles' rapidly growing population made increasing demands on water supplies, forcing the City to begin purchasing entire farms and ranches in the Owens Valley. The City constructed wells to pump the water from the aquifers below the valley's surface directly into the aqueduct system. The results of this action had a negative effect on the valley's economy, both in terms of agriculture and commerce. In the early 1920s, the aqueduct system was the target of periodic public protests and vandalism, including the dynamiting of aqueduct assets.[191] To defuse the protests and stabilize the economy, the City of Los Angeles developed a lease back program to farmers and ranchers. By 1927, the City had leased back approximately 70 percent of their land holdings in the Owens Valley.[192]

[186] Kahrl, W. 1982. *Water and Power*, pp. 37. Berkeley, CA: University of California Press.

[187] Kahrl, W. 1982. *Water and Power*, pp. 152. Berkeley, CA: University of California Press.

[188] Smith, D. 1 December 1974. "70-Year Water Dispute: Fact, Fable Hard to Separate." *Los Angeles Times*.

[189] Hundley, N. 2001. *The Great Thirst: Californians and Water: A History*, pp. 141. Los Angeles, CA: University of California Press.

[190] Kahrl, W. 1982. *Water and Power*, pp. 158-161. Berkeley, CA: University of California Press.

[191] Hundley, N. 2001. *The Great Thirst: Californians and Water: A History*, pp. 165. Los Angeles, CA: University of California Press.

[192] *Los Angeles Times*. 17 June 1928. "Owens Valley Farming Grows."

The diversion of water from the Owens River by the Los Angeles Aqueduct coupled with the high level of evaporation to cause a rapid drop in the water level of Owens Lake. By 1930, the lake was virtually dry, resulting in the exposure of large deposits of solids salts, brines, and other minerals along the playa.

5.3.2 Cultural Resources Characterization

5.3.2.1 Previous Archaeological Research Conducted in the Owens Valley

Archaeological investigations in the Owens Valley began with works aimed at studying the Owens Valley Paiute. One of the earliest works is that by Mallery,[193,194] who made a recording of petroglyphs in the Owens Valley in the late 1800s. During the 1930s, Steward conducted ethnographic studies among this group and reported an archaeological site northwest of Keeler.[195] Throughout the 1940s and 1950s, several studies were carried out in the region. Elizabeth and William H. Campbell worked along the shore lines of dry lakes in Southern California, and recorded two sites near the Owens Lake shoreline.[196] Harry and Francis Riddell recorded several sites on the periphery of the lake, specifically on the east and west shoreline, and near the delta area.[197,198,199]

Some of the work conducted during the 1950s and 1960s greatly contributed to the development of regional chronologies, and thus to the understanding of the area's prehistory. H. Riddell[200] performed excavations at the Cottonwood Creek Site (CA-INY-2), which is located just west of Owens Lake on Cottonwood Creek. CA-INY-2 is the type site for the Cottonwood series projectile points and the Owens Valley brown ware.[201] Cultural materials recovered from this site include protohistoric and historic artifacts, suggesting a Paiute village active during historic times. The Rose Spring site, CA-INY-372, located about 10 miles south of Olancha on the south end of the lake, was excavated by the Riddells, and their work was compiled and published by Lanning.[202] CA-INY-372 is the site type for the Rose Spring series projectile points. Among the contributions of Lanning's works is his attempt to provide evidence of material culture change through time. More

[193] Mallery, G. 1886. "Pictographs of the North American Indians: A Preliminary Paper." In *Fourth Annual Report of the Bureau of Ethnology to the Secretary of the Smithsonian Institution: 1882–1883*, Director J. W. Powell, pp. 30–33. Washington, DC: Government Printing Office.

[194] Mallery, G. 1972. *Picture-Writing of the American Indians: Vol. 1*, pp. 52–71. New York, NY: Dover Publications, Inc.

[195] Steward, J.H. 1933. "Ethnography of the Owens Valley Paiute." *University of California Publications in American Archaeology and Ethnology*, *33*(3): 233–350.

[196] Campbell, E.W.C. 1949. "Two Ancient Archaeological Sites in the Great Basin." *Science*, *109*(2831): 340.

[197] Riddell, F.A. 1958. "The Eastern California Border: Cultural and Temporal Affinities." *Reports of the University of California Archaeological Survey*, *42*: 41–48.

[198] Riddell, H.S., Jr. 1951. "The Archaeology of a Paiute Village Site in Owens Valley." *Reports of the University of California Archaeological Survey*, *12*(15): 14–28.

[199] Riddell, H.S., Jr., and Riddell, F.A. 1956. "The Current Status of Archaeological Investigations in Owens Valley, California." *Reports of the University of California Archaeological Survey*, *33*(38): 28–33.

[200] Riddell, H.S., Jr. 1951. "The Archaeology of a Paiute Village Site in Owens Valley." *Reports of the University of California Archaeological Survey*, *12*(15): 14–28.

[201] Riddell, H.S., Jr. 1951. "The Archaeology of a Paiute Village Site in Owens Valley." *Reports of the University of California Archaeological Survey*, *12*(15): 14–28.

[202] Lanning, E.P. 1963. "The Archeology of Rose Spring Site Iny-372." *University of California Publications in American Archaeology and Ethnology*, *49*(3): 237–336.

recent investigations at CA-INY-372 by Yohe[203,204,205] have contributed to a refinement of the regional chronology and a better understanding of the introduction of bow and arrow technology in eastern California. Excavations at the Stahl site (CA-INY-182) between 1948 and 1951 by Mark Harrington were published in 1957.[206] CA-INY-182 is located near Little Lake, about 13 miles south of the Rose Spring site. Investigations at this site have greatly contributed to the interpretations of Mojave Desert archaeology.

During the 1970s, Bettinger's work in the Owens Valley began and has resulted in various publications.[207,208,209,210] Combined with information from different studies, Bettinger has addressed important issues about regional adaptations.

Investigations in the Owens Valley area since the 1970s until present times have largely been the result of contract work generated by various projects that are required to comply with current state and federal laws and regulations. The cultural resources technical reports generated throughout the years include archaeological surveys, as well as testing and data recovery of prehistoric and historic archaeological resources, located adjacent to or within the Owens Lake bed. The outcomes of these reports have been addressed in a large number of environmental documents. These have been summarized in the 2003 and 2008 Environmental Impact Reports (EIRs) prepared in support of the Owens Lake PM_{10} Planning Area Demonstration of Attainment State Implementation Plan (SIP).[211,212] In recent years, much of the work has been in support of the implementation of DCMs in the lake.[213,214,215]

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[203] Yohe, R.M., II. 1992. *A Reevaluation of Western Great Basin Cultural Chronology and Evidence for the Timing and Introduction of the Bow and Arrow to Eastern California Based on New Excavations at the Rose Spring Site (CA-INY-372)*. PhD Dissertation, University of California, Riverside.

[204] Yohe, R.M., II. 1992. *A Reevaluation of Western Great Basin Cultural Chronology and Evidence for the Timing and Introduction of the Bow and Arrow to Eastern California Based on New Excavations at the Rose Spring Site (CA-INY-372)*. PhD Dissertation, University of California, Riverside.

[205] Yohe, R.M. 2000. "'Rosegate' Revisited: Rose Spring Point Temporal Range in the Southwestern Great Basin." In *Archaeological Passages: A Volume in Honor of Claude Nelson Warren*, ed. by J.S. Schneider, R.M. Yohe, II, and J.K. Fardnet, pp. 213–224. Western Center for California Archaeology and Paleontology Publications in Archaeology No. 1, Hemet, CA.

[206] Harrington, M.R. 1957. "A Pinto Site at Little Lake, California." *Southwest Museum Papers, 17*. Los Angeles, CA.

[207] Bettinger, R.L. 1975. "The Surface Archaeology of Owens Valley, Eastern California: Prehistoric Man-Land Relationships in the Great Basin." PhD diss., University of California, Riverside, Department of Anthropology.

[208] Bettinger, R.L. 1977. "Aboriginal Human Ecology in Owens Valley, Eastern California: Prehistoric Change in the Great Basin." *American Antiquity*, *43*: 3–17.

[209] Bettinger, R.L. 1982a. "Aboriginal Exchange and Territoriality in Owens Valley, California." In *Context for Prehistoric Exchange*, ed. J.E. Ericson and T.K. Earle, pp.103–127. New York: Academic Press

[210] Bettinger, R.L. 1982b. "Aboriginal Sociopolitical Organization in the in Owens Valley: Beyond the Family Band." In *The Development of Political Organization in Native North America*, ed. E. Tooker and M.H. Fried, pp 45–58. *Proceedings of the American Ethnological Society*. Washington, DC

[211] Great Basin Unified Air Pollution Control District (District). 2003. *2003 Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan Environmental Impact Report*. Prepared for: Great Basin Unified Air Pollution Control District. Prepared by: Sapphos Environmental, Inc.

[212] Great Basin Unified Air Pollution Control District (District). 2008. *2008 Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan Environmental Impact Report*. Prepared for: Great Basin Unified Air Pollution Control District. Prepared by: Sapphos Environmental, Inc.

[213] Sapphos Environmental, Inc., 2008. 2008 *Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan, Final Cultural Resources Technical Report*. Prepared for: Great Basin Unified Air Pollution Control District. Prepared by: Sapphos Environmental, Inc.

5.3.2.2 Previous Archaeological Research in the Cultural Resource Study Area

The Class I existing information inventory indicates that 11 archaeological surveys have been previously conducted for cultural resources within the cultural resources study area. Brief descriptions of the surveys are provided below (Table 5.3.2.2-1, *Previously Surveyed Areas in Class I Cultural Resources Study Area*; locations are shown in Figure B-1, *Previously Surveyed Areas in Class I Cultural Resources Study Area*, in Appendix B, Confidential Archaeological Information: Maps.

TABLE 5.3.2.2-1
PREVIOUSLY SURVEYED AREAS IN CLASS I CULTURAL RESOURCES STUDY AREA

Report No.	Year	Report Title	Author
IN-00063	1978	California Desert Program – Archaeological Sample Unit Records for Owens Valley Planning Unit	BLM
IN-00293	2003	Cultural Resource Survey for 2003 Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan, Vols. I and II	Wells, Helen, Ancient Enterprises, Inc., Santa Monica, CA, for Sapphos Environmental, Inc., Pasadena, CA
IN-00563	1997	Cultural Resources Inventory and Evaluation of the Historic Resources on the Eastern Side of Owens Lake for the Great Basin Unified Air Pollution Control District	Jones and Stokes Associates
IN-00592	2002	Inventory and Evaluation of 18 Sites on the Eastern Margin of the Owens Lake Playa, Inyo County, California	Jones and Stokes Associates
IN-00639	2004	Cultural Resources Inventory Report	McCormick, Erica D., BLM, Bishop, CA
IN-00641	2002	Archaeological Survey Report for a Monument on State Route 136, Inyo County, California	Jones and Stokes Associates
IN-00642	2005	Cultural Resources Inventory of a Proposed Temporary Road at Swansea, Inyo County, California	Burton, Jeffry F., Trans-Sierran Archaeological Research
IN-00658	2003	Research Design for Limited Phase II Testing at the Keeler Dunes Sites, Owens Valley, California	Halford, F. Kirk, BLM, Bishop, CA
IN-00735	2005	Results of Limited Phase II Testing at the Keeler Dunes Sites, Owens Valley, California	Halford, F. Kirk, and Kim Carpenter, Far Western Anthropological Research Group, Inc.
IN-00834	2008	Cultural Resources Inventory Report	Haverstock, Greg, BLM, Bishop, CA
IN-00928	2010	Cultural Resources Inventory of Caltrans District 9 Rural Conventional Highways in Inyo, Eastern Kern, Mono, and Northern San Bernardino Counties	Seil, Libby, Bryan Larson, Joseph Freeman, Jill Braden, Lindsay Hartman, Laura Leach-Palm, Paul Brandy, and Jay King, Far Western Anthropological Research Group, Inc.

[214] Jones and Stokes. 2008. *Archaeological Testing and Evaluation of Sites in Phase 7 of the Owens Lake Dust Mitigation Program, Inyo County, California*. Prepared for Los Angeles Department of Water and Power, Los Angeles, California. (EIC Report No. IN-00857).

[215] Garcia and Associates. 2011. *Cultural Resources Survey Report for the Owens Lake Dust Control Program, Phase 7a Project, Owens Lake, California*. Report prepared for MWH, and Los Angeles Department of Water and Power, Los Angeles, California.

IN-00063. This project involved a Class II survey of Bureau of Land Management (BLM) land within the Owens Valley for the California Desert Program. As part of this work effort, a reconnaissance survey was completed in 1978 by BLM archaeologists in Section 13, Township 16 South, Range 37 East. One archaeological site, a prehistoric lithic quarry, was recorded during the survey. The cultural resource is located outside of the proposed project's cultural resources study area.

IN-00293. In 2003, an archaeological literature search and survey were conducted in support of the 2003 Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan. The examination included a sample survey of approximately 4,400 acres of the Owens Lake bed. A total of 31 archaeological sites, 3 historic resources, a portion of the Natural Soda Products historic district (previously recorded), and 46 isolates were discovered during this survey. Twenty-three archaeological sites, 2 historic resources, part of the Natural Soda Products historic district, and 33 isolates were found to be within that project's APE. Phase II investigations were recommended to reduce the impacts to below the level of significance.

IN-00563. In 1997, Jones and Stokes Associates conducted an archaeological resources inventory, prepared a historic contextual study, and documented and evaluated large-scale historic resources that may be affected by the implementation of dust mitigation measures in the Owens Lake study area, Owens Valley, Inyo County, California. A survey was conducted on 1,900 acres of a 24,960-acre proposed project area. A total of 19 isolated artifacts and 1 prehistoric site were discovered during field reconnaissance. It was recommended that additional research and testing be conducted in the area of the prehistoric site prior to any ground disturbance. It was also recommended that that the historic Natural Soda Products Company be considered eligible for listing on the National Register of Historic Places (NRHP) and California Register of Historical Resources (CRHR) as a historic district.

IN-00592. In 2002, Jones and Stokes Associates located 18 prehistoric archaeological sites during the monitoring of LADWP's construction activities on the North Sand Sheet of Owens Lake. These sites were subsequently tested and evaluated for CRHR eligibility. Results of the testing program indicate that on an individual basis, none of the sites could be considered significant as defined by CEQA. However, it was determined that the collective assemblage of data from the sites could contribute to regional research questions.

IN-00639. In 2004, a Class I records search and Class III intensive pedestrian survey were conducted by Bishop BLM Field Office archaeologists on a 2-acre parcel of land located west of California State Highway 136. This work was prompted by the unauthorized construction of a road through BLM land. The records search indicated that there were no sites recorded within 0.5 mile of the survey area. No cultural resources were encountered during the pedestrian survey.

IN-00641. In 2002, an archaeological survey was conducted on 3.67 acres of land for a proposed monument on California State Highway 136. No cultural resources were identified as a result of this survey. A recommendation was made that in the event that buried cultural resources were encountered during project construction, work should be halted in that area until a qualified archaeologist could determine the significance of the find. It was also recommended that in the event human bone is discovered, the County coroner and Native American Heritage Commission (NAHC) should be contacted immediately.

IN-00642. In 2005, Trans-Sierran Archaeological Research conducted a cultural resources survey of a 91-acre area of BLM land east of Owens Lake. The survey was prompted at the request of

Barnard Construction, Inc., who proposed to build a temporary road to access quarry locales south of the community of Swansea. Two historic period sites, the Carson & Colorado Railroad and the Owens Lake Silver-Lead Company's mill and smelter, were recorded in the project area; two prehistoric lithic scatters were also located during the survey. Three of the four archaeological sites were considered eligible for listing on the NRHP. It was recommended that the project should be designed to avoid these resources. If avoidance were not possible, then mitigation was recommended.

IN-00658. In 2003, a research design was developed by the Bishop BLM Field Office archaeologist and the Far Western Archaeological Research Group, Inc. to evaluate the presence of human remains at two prehistoric sites (CA-INY-6502/P-14-7840 and CA-INY-6503/P-14-7841) on BLM and LADWP land in the southern portion of the Keeler Dunes; these sites are located within the current proposed project's APE. The proposed Phase II test excavations would investigate whether cairn features located at the sites were used to mark prehistoric burials. The research design provided a summary of the past cultural resources work conducted in the Keeler Dunes area and discussed the excavation and laboratory methods that would be used in the proposed study.

IN-00735. In 2003, BLM archaeologists and the Far Western Anthropological Research Group, Inc., conducted Phase II test excavations at two prehistoric sites (CA-INY-6502/P-14-7840 and CA-INY-6503/P-14-7841) on BLM and LADWP land in the southern portion of the Keeler Dunes; these sites are located within the current proposed project's APE. The purpose of this work was to determine if cairn features at the sites were used mark the locations of prehistoric burials. No human remains were identified during the excavation of six cairns at CA-INY-6502/P-14-7840, and a single human burial was found in a cairn feature at CA-INY-6503/P-14-7841. At the request of the Lone Pine Tribal Council, no further Phase II investigations were conducted at the two sites.

IN-00834. In 2008, BLM archaeologists conducted a Class I inventory and Class III surveys of 10 proposed environmental monitoring sites for the District. No cultural resources were located within or near the APE. It was recommended the monitoring sites be accessed in ways that would avoid previously documented archaeological sites in the area. In addition, it was recommended that if previously unidentified cultural resources were discovered during the project, that construction work should halt and the BLM archaeologist should be notified.

IN-00928. Between 2007 and 2009, Far Western Anthropological Research Group, Inc. conducted a cultural resources inventory of rural conventional highways in Inyo, Mono, and eastern Kern counties for the California Department of Transportation (Caltrans). The project included a Class I inventory and Class III surveys of Caltrans right-of-way for 19 state highway routes. A total of 226 cultural resources were found partially or completely within the right-of-way during the survey.

5.3.2.3 Known Prehistoric Archaeological Resources in the Cultural Resources Study Area

A total of 27 prehistoric cultural resources have been recorded in the study area, including 22 archaeological sites and five isolates (Table 5.3.2.3-1, *Previously Recorded Prehistoric Archaeological Sites and Isolates Located in the Cultural Resources Study Area*); the location of these prehistoric sites and isolates are shown in Figure B-2, *Previously Recorded Archaeological Sites and Historic Buildings and Structures in Class I Cultural Resources Study Area*; and Figure B-3, *Previously Recorded Archaeological Isolates in Class I Cultural Resources Study Area*, respectively (Appendix B). The prehistoric sites consist of artifact scatters, cairns, rock rings, quarry complexes, bedrock mortars, and petroglyphs. Prehistoric isolates were exclusively composed of single or small numbers of flaked stone artifacts.

TABLE 5.3.2.3-1
PREVIOUSLY RECORDED PREHISTORIC ARCHAEOLOGICAL SITES AND ISOLATES LOCATED IN THE CULTURAL RESOURCES STUDY AREA

Primary No.	Trinomial	Resource Type	Description	Within APE	Within Project Area	Within 1 Mile
P-14-273	CA-INY-273	Site	Artifact scatter			X
P-14-320	CA-INY-320	Site	Ceramic and lithic scatter			X
P-14-321	CA-INY-321	Site	Artifact scatter			X
P-14-432	CA-INY-432	Site	Petroglyph with bedrock mortar			X
P-14-451	CA-INY-451	Site	Artifact scatter			X
P-14-452	CA-INY-452	Site	Flaked and ground stone scatter			X
P-14-5927		Isolate	4 lithic flakes			X
P-14-7147	CA-INY-6076	Site	Lithic scatter			X
P-14-7148	CA-INY-6077	Site	Lithic scatter			X
P-14-7567	CA-INY-6361	Site	Lithic and ground stone scatter			X
P-14-7568	CA-INY-6362	Site	Basalt quarry complex			X
P-14-7570	CA-INY-6364	Site	Lithic scatter			X
P-14-7571	CA-INY-6365	Site	Lithic scatter and rock ring feature			X
P-14-7572	CA-INY-6366	Site	Lithic and ground stone scatter			X
P-14-7573	CA-INY-6367	Site	Lithic scatter			X
P-14-7603		Isolate	Small lithic scatter			X
P-14-7604		Isolate	Obsidian scraper			X
P-14-7605		Isolate	Obsidian scraper			X
P-14-7606		Isolate	Three pieces of obsidian debitage			X
P-14-7840	**CA-INY-6503**	**Site**	**Rock cairns with associated prehistoric and historic artifact scatters**	**X**	**X**	
P-14-7841	**CA-INY-6502**	**Site**	**Rock cairns with associated prehistoric and historic artifact scatters**	**X**	**X**	
P-14-7842	CA-INY-6504	Site	Lithic and ground stone scatter			X
P-14-7843	CA-INY-6505	Site	Rock cairns with associated prehistoric and historic artifact scatters			X
P-14-8281	CA-INY-6599	Site	Lithic scatter			X
P-14-8419	CA-INY-6659	Site	Lithic scatter			X
P-14-8420	CA-INY-6660	Site	Lithic scatter			X
P-14-10344		Site	Lithic scatter			X

NOTE: P-15-7840/CA-INY-6503 and P-14-7841/CA-INY-6502 are now considered one cultural resource (CA-INY-6502).

Only two prehistoric archaeological sites, P-14-7840/CA-INY-6503 and P-14-7841/CA-INY-6502, are located within the proposed project / proposed action area. The sites are situated near a freshwater spring on lands administered by the BLM and LADWP. Recorded in 2003 as part of a cultural resource survey for the LADWP Keeler Dunes Mining project, the remains consist of concentrations of rock cairns that are surrounded by a diffuse flaked stone scatter; several cairns had associated artifact assemblages that contained flaked and ground stone tools, pottery, shell, and animal bone.[216] A small number of historic artifacts were also noted at the two sites including a bullet, bottle glass fragments, clothing debris, and butchered animal bone; these remains range in date from the late 1800s to modern times.

Following their initial recording, limited Phase II testing was completed on the cairn features at CA-INY-6502 and CA-INY-6503 by BLM and Far Western Anthropological Research Group, Inc. (Far Western).[217] Given the form of the cairns and their associated artifacts, it was originally postulated that the features may mark human burials. To determine if the cairns were used as grave markers, seven rock piles were excavated at the sites (six at CA-INY-6502 and one at CA-INY-6503). Only one cairn at CA-INY-6503 was found to be in direct association with human remains. Archaeological work at the sites was halted in response to the discovery of the human remains and concerns by local Native American groups. Due to their cultural and archaeological value, both sites were determined to be eligible for listing under Criterion D on the NRHP.[218]

Sand movement within the Keeler Dunes area since 2003 has revealed additional archaeological deposits associated with CA-INY-6502 and CA-INY-6503. The exposure of these previously undocumented cultural remains prompted a revisit to the sites in 2009 by BLM archaeologist Mr. Greg Haverstock.[219] An additional 63 cairn features, which were concentrated in several discrete loci, were identified in the dune complex during the revisit. As a result of these findings, the site boundaries of CA-INY-6502 and CA-INY-6503 were expanded and merged into one large site (therein referred to as CA-INY-6502) (Figure B-2). During subsequent visits to the site, Mr. Haverstock noted cremated and articulated human skeletal remains eroding out of the dune complex, suggesting that the site was used as a prehistoric mortuary location. Mr. Haverstock has hypothesized that CA-INY-6502 may be part of a series of such mortuary sites that line the prehistoric shore of Owens Lake, collectively referred to as the Southern Owens Valley Mortuary Complex.[220] This complex also includes the site of P-14-7843/CA-INY-6505, which is located just outside of the proposed project / proposed action area (Figure B-2).

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[216] Halford, F. Kirk and Kim Carpenter. 2005. *Results of Limited Phase II Testing at the Keeler Dunes Sites, Owens Valley, California*. Cultural Resource Project: CA-170-03-11. Report prepared by Far Western Anthropological Research Group, Inc., Davis, CA.

[217] Halford, F. Kirk and Kim Carpenter. 2005. *Results of Limited Phase II Testing at the Keeler Dunes Sites, Owens Valley, California*. Cultural Resource Project: CA-170-03-11. Report prepared by Far Western Anthropological Research Group, Inc., Davis, CA.

[218] Halford, F. Kirk and Kim Carpenter. 2005. *Results of Limited Phase II Testing at the Keeler Dunes Sites, Owens Valley, California*, pp. 1. Cultural Resource Project: CA-170-03-11. Report prepared by Far Western Anthropological Research Group, Inc., Davis, CA.

[219] Primary Site Record for CA-INY-6502 and CA-INY-6503 (Update). Record on file at the Bureau of Land Management, Bishop Field Office, Bishop, California.

[220] Haverstock, Greg. March 17-20, 2010. Stones and Bones: The Southern Owens Valley Mortuary Complex. Paper presented at the Society for California Archaeology, 2010 Annual Meeting. Riverside, CA.

5.3.2.4 Known Historic Archaeological and Built Environment Resources in the Study Area

Previously recorded archaeological and built environment resources dating to the historic period have also been identified within the cultural resources study area (Table 5.3.2.4-1, *Previously Record Historic Resources Located in the Cultural Resources Study Area*; and Figure B-2). Five historic period archaeological sites have been documented in the vicinity of Keeler Dunes, including: two segments of the Carson & Colorado Railroad line (P-14-5194/CA-INY-5058H and P-14-7851/CA-INY-6513H), an Owens Lake Silver-Lead Company mill and smelter facility (P-14-4822/CA-INY-6661H), the Swansea pier (P-14-8385/CA-INY-6658H), and a section of a utility line (P-14-7569/CA-INY-6363H). The southern portion of one of these sites, the Owens Lake Silver-Lead Company mill and smelter facility, is located within the proposed project / proposed action area (see Figure B-2). Two built environment resources are also recorded in the proposed project / proposed action vicinity: a three-story standing building that is part of the Sierra Talc Mill (P-14-4820/CA-INY-4820H) in Keeler and the remains of an Owens Lake Silver-Lead Company furnace (P-14-4822/CA-INY-4822H) in Swansea. Neither of these cultural resources is located in the proposed project / proposed action area.

The five historic period isolates include a section of pipe, broken glass bottles, a metal horseshoe, and a ceramic fragment (Table 5.3.2.4-1 and Figure B-3). Only one historic isolate, a broken glass bottle (P-14-7852), is located within the proposed project / proposed action area.

TABLE 5.3.2.4-1
PREVIOUSLY RECORDED HISTORIC RESOURCES LOCATED IN THE CULTURAL RESOURCES STUDY AREA

Primary No.	Trinomial	Resource Type	Description	Within APE	Within Project Area	Within 1 Mile
P-14-5194	CA-INY-5058H	Site	"End of Line" of the Carson & Colorado Railroad			X
P-14-5926		Isolate	Section of pipeline			X
P-14-7569	CA-INY-6363H	Site	Utility line			X
P-14-7608		Isolate	Glass bottle fragment			X
P-14-7640		Isolate	Metal horseshoe			X
P-14-7641		Isolate	Ceramic fragment			X
P-14-7851	CA-INY-6513H	Site	Carson & Colorado Railroad			X
P-14-7852		Isolate	Broken glass bottle		X	
P-14-8385	CA-INY-6658H	Site	Swansea Pier			X
P-14-4820	CA-INY-4820H	Building	Sierra Talc Mill			X
P-14-4822	CA-INY-4822H	Furnace	Owens Lake Silver-Lead Company furnace			X
P-14-8421	CA-INY-6661H	Site	Owens Lake Silver-Lead Company mill and smelter		X	

5.3.2.5 Newly Recorded Archaeological Resources in the Cultural Resources Study Area

Newly Recorded Archaeological Resources

Four newly recorded archaeological sites and seventeen archaeological isolates were documented in the proposed project / proposed action area. These include a sparse lithic scatter (BLM Site 1), a multicomponent artifact concentration (KD Site 1), a section of Old State Highway (KD Site 2), and a previously undocumented section of the Carson & Colorado Railroad (P-14-7851/CA-INY-6513H). Portions of all four sites are located in the southwestern portion of the proposed project / proposed action area within the defined APE. Descriptions and evaluations of each cultural resource are provided below; the locations of the archaeological sites and isolates are shown in Figure B-4, *Locations of Newly Recorded Archaeological Resources in Project Area* (Appendix B). DPR forms of the three sites are provided in Appendix C, *Confidential Archaeological Information: DPR 523 Forms*.

BLM Site 1. This site is a small prehistoric lithic scatter located within the southern buffer of Staging Area 3. It is composed of a few fragments of flaked stone and two cores and measures approximately 3 meters in diameter. The site was recorded by Mr. Greg Haverstock during field surveys conducted on February 20, 2014 and information regarding the resource is on file at the Bureau of Land Management, Bishop Field Office. Based upon surficial deposits, BLM Site 1 is not recommended eligible for listing in the NRHP or CRHR.

KD Site 1. This multicomponent site is situated along the western edge of the APE within the southwestern corner of the proposed project / proposed action area west of the Old State Highway (Figure B-4). It measures approximately 775 feet by 400 feet and consists of six historic period artifact concentrations, a historic road alignment, and two possible prehistoric cairns (Figure 5.3.2.5-1, *Map of KD Site 1*). The site is situated on a sand sheet which overlies alluvial deposits and is bounded on the north and east by active dune deposits (Image 5.3.2.5-1, *Overview of Artifact Concentration 2 at KD Site 1, Looking Northeast*).

FIGURE REMOVED FOR CONFIDENTIALITY

IMAGE REMOVED FOR CONFIDENTIALITY

Image 5.3.2.5-1. Overview of Artifact Concentration 2 at KD Site 1, Looking Northeast

Artifact Concentration 1 (AC 1). This historic period artifact concentration measures 120 feet by 150 feet and is located immediately south of an abandoned dirt road in the central portion of the KD Site 1. The large and dense artifact concentration is composed of a number of discrete trash deposits that are situated in close proximity to one another. During the field recordation of AC 1, the trash scatter was subdivided into nine loci which roughly approximate the clustering of artifacts within the concentration (Figure 5.3.2.5-2, *Schematic of Artifact Loci Locations within AC 1*). In total, AC 1 is estimated to contain over 7,400 artifacts (Table 5.3.2.5-1, *Estimates of Artifacts by Type at KD Site 1*). Most of these remains ($n = 6{,}600$) consist of small unidentified fragments of highly corroded metal. The lack of preservation of metal artifacts at KD Site 1 can be attributed to the highly alkaline soils that characterize the Owens Lake area. Though many metal artifacts were too poorly preserved to be identified, as discussed in more detail below, a small number of metal food cans and other containers were recorded in AC 1.

Culinary-related artifacts comprise the majority of the identifiable assemblage in AC 1 and include a mixture of glass bottle fragments, ceramic dishware, animal bones, metal cans, and bottle caps. The bulk of the bottle assemblage is composed of amber- and clear-colored glass shards from beverage and food containers; aqua-, green-, amethyst-, milk-, and cobalt-colored bottle fragments are also present but found in lesser quantities. Ceramic artifacts are fairly common in AC 1 with plain, white dishware the most prevalent recorded type. Four sherds of a higher-quality delftware were also identified in Locus C in the central portion of the concentration. A number of cow bone remains were recorded within AC 1; all of these bones were highly weathered, with a few specimens displaying evidence of butchering marks. Finally, a handful of sanitary and hole-in-top metal cans, as well as metal bottle caps, were also noted scattered throughout the concentration.

FIGURE REMOVED FOR CONFIDENTIALITY

TABLE 5.3.2.5-1
ESTIMATES OF ARTIFACTS BY TYPE AT KD SITE 1

Artifact Concentration		AC 1									AC 2			AC 3						
Locus		A	B	C	D	E	F	G	H	I	A	B	C	A	B	C	AC 4	AC 5	AC 6	Total
Vessel glass	Green	2	1		5	10		5		5	10				5		5	2	5	**55**
	Clear	3	30	25	15	10	20	10		5	100	2	30				15	5	5	**275**
	Amber			30	30		75	50	5	30	50	1	15		30		15	40	50	**421**
	Aqua			15	15	10	20	10	5	15	10			20	40		3	100	75	**338**
	Amethyst			5	1	5	5		5	5				15	10		50	20		**121**
	Milk	2	2	1	1	2													5	**13**
	Cobalt						1			1	5									**7**
	Yellow												3							**3**
Ceramic	Plain white dishware				30	20	50	5	1	10	15		10	25	1			30	20	**217**
	Delftware			4															2	**6**
	Slipped terracotta									1									21	**22**
	Fiestaware										17								10	**27**
Animal bone			20	10	8		24						5	6		10	10			**93**
Structural and industrial artifacts	Brick	15		10		10	20	3	1			16	22					1		**98**
	Corrugated metal			1																**1**
	Marble trim		1			1														**2**
	Concrete								2											**2**
	Metal nail			1		1	1										2	1		**6**
	Metal bolt			1					1											**2**
	Metal wire						1													**1**
	Metal pipe							1											1	**2**
	Metal cable							3												**3**
	Metal strip					1			3									2		**6**
	Ceramic insulator						3													**3**
	Ceramic lightbulb base			1		1							1						1	**4**
	Carbon battery rods	2	7	5			5	13		1			1							**34**
	Rubber-lined fabric	3																		**3**
	Milled wood																		2	**2**
Metal containers	Metal can						1	10			9		5	10	5					**40**
	Rectangular container					2					2									**4**
	Bucket				1				1		2									**4**
	Bottle cap				5															**5**
	Metal drum																1			**1**
Miscellaneous artifacts	Clothing rivet			4																**4**
	Glass spectacles			1																**1**
	Rubber shoe sole										3									**3**
	Metal fragments		1,000	800	1,000	200	2,000	1,000	400	200	80	30	300	200	50	6	20	100	100	**7,486**
	Charcoal piece							1												**1**
Total		**27**	**1,061**	**914**	**1,111**	**273**	**2,226**	**1,111**	**424**	**273**	**303**	**49**	**392**	**276**	**141**	**16**	**121**	**301**	**297**	**9,316**

A diverse assemblage of structural- and industrial-related artifacts was also recorded within AC 1. Over half of these artifacts consist of brick fragments, several of which had the brand name "Cowen" impressed onto their faces (Image 5.3.2.5-2, *Portion of Brick Identified in Artifact Concentration 1 at KD Site 1*). Archival data indicates that these bricks were manufactured in northern England by Joseph Cowen and Company between 1823 and 1904.[221] Large quantities of firebrick were imported into California from Europe as shipping ballast during the latter part of the 19th and early 20th centuries.[222]

Image 5.3.2.5-2. Portion of Brick Identified in Artifact Concentration 1 at KD Site 1

This type of firebrick (also called refractory, or kiln bricks) was made of higher-density clay that could be pressed to remove air and water, thereby enabling the brick to withstand high temperatures. Evidence of vitrification and blackening on some of the bricks in AC 1 suggests these artifacts were exposed to high temperatures during their use life. A cursory examination of the remnants of furnaces or ovens at the nearby Inyo Development Company facility indicates that a similar type of brick was used in the construction of these features, suggesting these remains originated from the soda ash plant.

Other possible structural- or industrial-related artifacts identified in AC 1 include corrugated metal sheets, pieces of marble trim, hardened concrete concentrations, metal nails and bolts, metal wire and cable, metal pipe fittings, metal strips, a ceramic insulator, ceramic lightbulb bases, carbon battery rods, several fragments of a rubber-lined fabric, and a large piece of burned wood.

Some of the most interesting finds in AC 1 are personal items, most of which were found in Locus C. These include a broken pair of eyeglasses and four metal clothing buttons (Image 5.3.2.5-3, *Broken Eyeglasses from Locus C, AC 1 at KD Site 1*). No information could be found on the manufacturer of the eyeglasses or the date of their production. The buttons appear to derive from overalls or work clothing and are embossed with the logo of their respective companies of manufacture (B & L Crown Brand buttons [$n = 2$], the Levi Strauss Company [$n = 1$], and the Eloesser-Heynemann Company [$n = 1$]).

[221] Gurcke, Karl. 1987. *Bricks and Brickmaking*, pp. 71. University of Idaho Press, Boise.

[222] Perry, Frank. 2008. Bricks Tell of 16,000-mile Voyage. *Lime Kiln Chronicles*. University of California, Santa Cruz.

Image 5.3.2.5-3. Broken Eyeglasses from Locus C, AC 1 at KD Site 1

A total of 21 artifacts with temporally diagnostic maker's marks were recorded in AC 1 at KD Site 1. A summary of each artifact and its date of production are provided in the DPR form for KD Site 1 in Appendix C. An examination of the distribution of date ranges associated with these artifacts indicates that trash may have been deposited in the area of AC 1 as early as the late 1800s, with most of the dates clustering around the early decades of the 20th century. Some evidence was also found to suggest trash deposition continued in the area at late as the 1960s. These data suggest long-term use of KD Site 1 as a dumping locale for both household and industrial refuse.

Artifact Concentration 2 (AC 2). This historic period artifact concentration measures 90 feet by 60 feet and consists of three loci (A, B, and C), each of which represents multiple episodes of trash deposition. The feature is located along the northern extent of the site immediately north of the abandoned dirt road (Figure 5.3.2.5-1). A total of 744 artifacts comprise AC 2, the bulk of which are unidentified metal fragments ($n = 410$) (Table 5.3.2.5-1). Culinary-related artifacts are the most abundant identified remains and include 226 fragments of clear-, amber-, green-, aqua-, and yellowish-colored bottle glass. A variety of white ceramic dishware and Fiestaware (turquoise-, green-, and yellow-slipped) are also present in AC 2. Finally, sanitary and hole-in-top metal can fragments and animal bones are represented within the trash scatter.

Found in substantially smaller quantities, structural- and industrial-related artifacts in AC 2 include brick fragments, along with single occurrences of a carbon battery rod and ceramic light bulb base (Table 5.3.2.5-1). While the presence of a "Cowen" stamp on one of the bricks indicates that the remains may have been deposited in this area as early as the late 1800s, most of the temporally diagnostic artifacts identified in AC 2 indicate a later date of deposition (see DPR form for KD Site 1 in Appendix C). Specifically, the dated materials from this concentration suggest the most intensive use of the area as a trash dump between the 1930s and 1960s.

Artifact Concentration 3 (AC 3). This artifact concentration measures 125 feet by 150 feet and is located in the eastern portion of KD Site 1 (Figure 5.3.2.5-1). Consisting of three loci (A, B, and C), AC 3 contains a total of 433 artifacts (Table 5.3.2.5-1). Unidentified metal fragments comprise the

largest proportion of the assemblage with 59 percent of recorded remains ($n = 256$). Unlike AC 1 and AC 2, AC 3 is almost exclusively composed of culinary-related remains that include: 120 fragments of aqua-, amber-, amethyst- and green-colored bottle glass, 26 pieces of plain ceramic dishware, 26 pieces of weathered animal bone, and 25 metal food can fragments.

Although no maker's marks were identified on artifacts in AC 3, temporal information collected during site recordation indicate a relatively early date of use of this area for trash deposition. One piece of clear bottle glass was found in Locus B that was embossed with the wording "Dr. Kilmer's Swamp Root Kidney, Liver, & Bladder Remedy." Archival research indicates that this bottle was manufactured by Dr. Kilmer & Company, Binghampton, New York, sometime between 1895 and 1906.[223] An early-20th-century use date is also suggested by the relatively large number of solarized glass fragments recorded in the artifact concentration.[224]

Artifact Concentration 4 (AC 4). This small artifact concentration measures 45 feet by 20 feet and is located just north of the abandoned road and east of the Carson & Colorado Railroad (Figure 5.3.2.5-1). A total of 121 artifacts were recorded in the concentration (Table 5.3.2.5-1), most of which were amethyst-, clear-, amber-, green-, and aqua-colored container glass ($n = 88$). Other artifacts reported in the scatter include unidentified metal fragments, animal bone, two metal nails, and a large metal drum. The presence of solarized glass fragments in AC 4 indicates that the trash was deposited in this area prior to World War I.[225]

Artifact Concentration 5 (AC 5). This artifact concentration measures 30 feet by 20 feet and is located in the southern portion of the site to the west of the Carson & Colorado Railroad (Figure 5.3.2.5-1). Bottle glass fragments comprise the bulk of the identified remains ($n = 167$) and include aqua-, amber-, amethyst, clear- and green-colored containers (Table 5.3.2.5-1). A relatively large quantity of plain, white dishware was also identified in AC 5 ($n = 30$). Smaller quantities of structural- or industrial-related items were recorded in the concentration and include two metal strips, a brick fragment, and a metal nail. Maker's marks on two glass bottle bases suggest the concentration likely represents trash deposited in the early 20th century (Appendix C).

Artifact Concentration 6 (AC 6). This artifact concentration measures 60 feet by 45 feet and is located south of the abandoned road and north of AC 5 (Figure 5.3.2.5-1). Culinary-related debris comprises the bulk of the remains in the concentration and includes 140 glass bottle fragments (aqua-, amber-, green-, clear-, and milk-), a variety of ceramic dishware (plain white, Delftware, Fiestaware, and slipped terra cotta ware). Industrial- or structural-related artifacts consist of a section of metal pipe, a ceramic lightbulb base, and two fragments of milled wood (Table 5.3.2.5-1). Temporally diagnostic artifacts indicate that these remains may have been deposited in the area during the 1930s or possibly later.

Road Alignment. A 550-foot-long section of an abandoned dirt road was located in the western and central portions of KD Site 1 (Figure 5.3.2.5-1). The feature runs in the southwest-to-northeast direction and consists of a linearly deflated area that averages 25 feet in width (Image 5.3.2.5-4, *Abandoned Road at KD Site 1 with Artifact Concentration 4 in the Background*). While an exact date of construction is not known, examination of historic maps of the area indicates that the road

[223] Smith, Ruthann. 2006. "What's in your Closet?" In *Idaho Archaeological Society 21*(1).

[224] Lockart, Bill. 2006. "The Color Purple: Dating Solarized Amethyst Container Glass." *Historical Archaeology* 40(2):45-56.

[225] Lockart, Bill. 2006. "The Color Purple: Dating Solarized Amethyst Container Glass." *Historical Archaeology* 40(2):45-56.

was likely built sometime between 1941 and 1951 (Image 5.3.2.5-5, *Historic 1951 USGS 15-Minute Topographic Map of Keeler, California, Showing Road Segment at KD Site 1*).[226,227] No artifacts appear to be directly associated with the road alignment. However, the proximity of the feature to AC 1 and AC 2, which both contain trash that post-dates the road construction, suggests that local populations may have accessed the area via the roadway to dispose of household refuse.

IMAGE REMOVED FOR CONFIDENTIALITY

Image 5.3.2.5-4. Abandoned Road at KD Site 1 with Artifact Concentration 4 in the Background

[226] Automobile Club of Southern California. 1941. *US395 US6 Map Section from Automobile Club of Southern California Mojave & Colorado Deserts*. Available at http://www.historicalroadmaps.com/CaliforniaPage/DeathValleyPage/image2.html

[227] United States Department of the Interior Geological Survey. 1951. *15-Minute Topographic Map of Keeler, CA*. Denver, CO.

IMAGE REMOVED FOR CONFIDENTIALITY

Image 5.3.2.5-5. Historic 1951 USGS 15-Minute Topographic Map of Keeler, California, Showing Road Segment at KD Site 1

Finally, evidence of prehistoric use at KD Site 1 can be seen in the two possible cairn features that were identified in the southwestern portion of the site (Figure 5.3.2.5-1). Located just south of Artifact Concentration 6, the possible cairns consist of small clusters of rock, each of which contained at least one piece of ground stone (Image 5.3.2.5-6, *Photograph of Cairn 2 at KD Site 1*). Although no other artifacts were associated with these features, a basalt core (Core 2) was found in close proximity (see Figure5.3.2.5-1). A yellow cryptocrystalline silicate (jasper) core was also identified in the eastern portion of the site (Core 1). The location of this artifact in a deflated area downslope from CA-INY-6502 suggests that the artifact may have been washed into the area during a recent rainstorm.

Image 5.3.2.5-6. Photograph of Cairn 2 at KD Site 1

A high degree of similarity can be seen in the composition of the six historic artifact concentrations at KD Site 1. All of these assemblages are dominated by culinary artifacts with structural- and industrial-related items comprising relatively small proportions of the total artifact counts. The abundance of household refuse indicates that the area containing KD Site 1 may have been regularly used for the disposal of domestic trash. The lack of evidence of residential structures in the immediate vicinity, as well as proximity of the area to historic roads, indicates that these remains were the product of secondary dumping, in which accumulated trash from residential loci were transported to another location for deposition. The large quantity of artifacts found at the site suggests that the accumulated refuse was the result of multiple dumping episodes that took place over a relatively long period of time.

Given the volume and diversity of artifacts at KD Site 1, analysis of the historic remains may be used to address a wide variety of research issues including socioeconomic status, ethnicity, health/hygiene practices, dietary habits, technology, trash disposal methods, and demography. Based on the potential of the historic component of KD Site 1 to contribute important information about early-20th-century life in the Owens Valley, this cultural resource is recommended eligible for inclusion on the NRHP under Criterion D.

In evaluating a property's eligibility under Criterion D, the physical characteristics and features of a site must retain enough integrity to convey its significance. Historical archaeological sites related to waste disposal contain some unique aspects of integrity.[228] Because by definition the waste has been removed from its initial point of use and may be mixed with other deposits, the importance of the contextual relationship among and between items is vastly diminished. Therefore, the association of the deposit with the source of the trash is very important. In the case of KD Site 1,

[228] Sullivan, Michael, and Carol Giffith. 2005.*Down in the Dumps, Context Statement and Guidance on Historical-Period Waste Management and Refuse Deposits*, pg. 27. Contributions from the SHPO Advisory Committee on Historic Archaeology, State Historic Preservation Office, Phoenix.

the presence of firebricks and other industrial artifacts suggest that the refuse may be associated with the nearby Inyo Development Company facility, situated less than 0.2 mile away on the historic lakeshore. However, a number of temporally diagnostic artifacts were identified at the site which postdate 1920, when operations at the soda ash plant were discontinued.[229] These data indicate that a more likely source of the historic trash at KD Site 1 was the community of Keeler, located approximately 1 mile to the southeast. Archaeological research on historic dump sites in Arizona indicates that communal open dumps of this type are usually located between 1 and 3 miles from the community generating the materials.[230]

The prehistoric component of KD Site 1 is also recommended eligible for the NRHP under Criterion D. These remains have the potential to provide important information about prehistoric land use practices of the Owens Lake shoreline. Examination of the cairn features indicate they are characterized by a high level of integrity with no evidence of disturbance in the immediate area.

KD Site 2. This site consists of a section of the Old State Highway that runs from a point south of Keeler to a point north of Swansea along the northwestern edge of Owens Lake (Figure B-4). Although most of the alignment is located outside of the proposed project / proposed action area, a short section of the road traverses the southwestern portion of the APE. The historic road segment is aligned in the southwest-to-northwest direction and measures appropriately 5.0 miles in length with an average width of 18 feet. An exact date of the construction of the road could not be ascertained. However, a historic map of the area dating to 1913 depicts a road running along this portion of the lakeshore between Lone Pine and Keeler just south of the Carson & Colorado Railroad line (Image 5.3.2.5-7, *1913 USGS Topographic Map of Keeler Area Showing Alignment of KD Site 2*).[231]

[229] University of Nevada, Reno. n.d. *A Guide to the Records of the Inyo Development Company*. Collection No. NC73. Special Collections Section, University of Nevada, Reno. Available at: http://www.library.unr.edu/specoll/mss/NC73.html

[230] Sullivan, Michael, and Carol Giffith. 2005.*Down in the Dumps, Context Statement and Guidance on Historical-Period Waste Management and Refuse Deposits*, pg. 15. Contributions from the SHPO Advisory Committee on Historic Archaeology, State Historic Preservation Office, Phoenix.

[231] U.S. Geological Survey. 1913 (reprinted 1921) 1:250,000 Series Ballarat, California, Topographic Quadrangle.

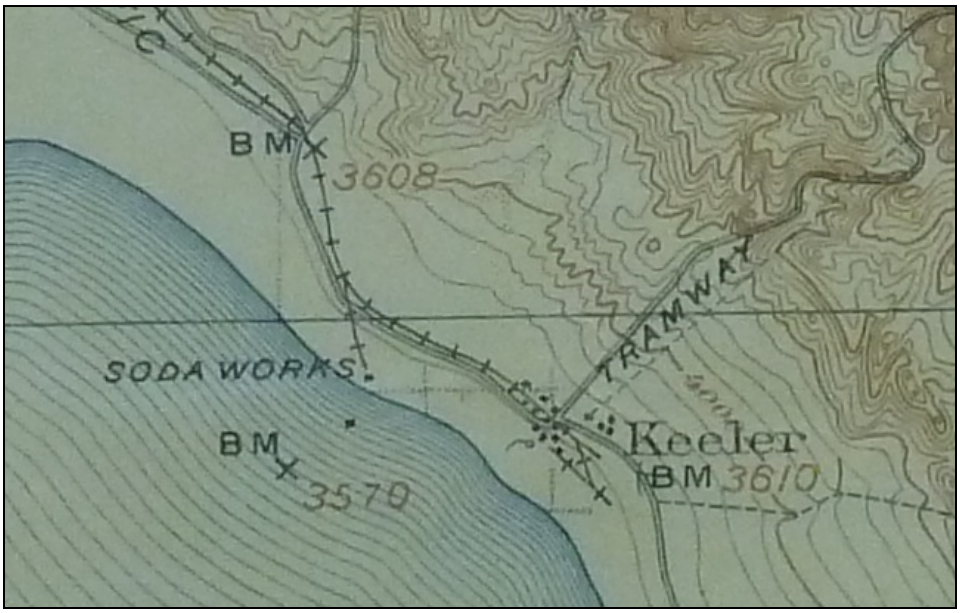

Image 5.3.2.5-7. 1913 USGS Topographic Map of Keeler Area Showing Alignment of KD Site 2

Archival information indicates that the Lone Pine to Keeler road was added to the State Highway System in 1933 as part of Legislature Route Number (LRN) 127, which connected U.S. Route 99 at Tipton to U.S. Route 66 at Baker.[232] LRN 127 was later divided into three separate state routes, with the portion of the road between Lone Pine and Keeler renumbered State Route 136. The portion of the roadway between Swansea and Keeler was realigned in the early 1950s due to blowing sands from Owens Lake and moved further eastward to its current location along the base of the Inyo Mountains.[233] While the road is no longer part of the highway system, it is still regularly used to access Keeler Dunes and the adjacent lakebed.

In this area, natural and cultural processes have resulted in the destruction or alteration of much of the original roadbed of the Old State Highway. Within the proposed project / proposed action area, the site is largely covered by active sand dunes and is no longer visible on the ground surface (Image 5.3.2.5-8, *View of KD Site 2 in the Proposed Project / Proposed Action Area, Looking Southeast*). Further to the north, portions of the road have also been severely damaged by recent alluvial activity resulting in the deposition of silt over the roadbed. Finally, as illustrated in Figure B-4, a 0.5-mile-long section of the original road north of the proposed project / proposed action area has been destroyed by the implementation of dust mitigation measures along the historic shoreline.

[232] Caltrans 2009. *State Route 136 Transportation Concept Report*. Caltrans District 9 Office of System Planning, Bishop California.

[233] Hancock, Paul. 18 November 2004. "Keeler Right of Way, History and Chronology." Independence, CA: County of Inyo Department of Public Works.

IMAGE REMOVED FOR CONFIDENTIALITY

Image 5.3.2.5-8. View of KD Site 2 in the Proposed Project / Proposed Action Area, Looking Southeast

The Old State Highway was once a significant transportation corridor within the Owens Valley. As such, it may be eligible for inclusion on the NRHP under Criterion A, for its association with important events and trends that have contributed to the broad patterns of our history. As discussed above, however, the road suffers a severe lack of integrity due to erosional processes and realignment of portions of the roadway. Due to the loss of integrity of KD Site 2, the portion of this cultural resource within the proposed project / proposed action property is recommended ineligible for listing on the NRHP or CRHR.

P-14-7851/CA-INY-6513H. The update to this historic archaeological Department of Parks and Recreations (DPR) site form consists of a previously unrecorded segment of the Carson & Colorado Railroad located in the southwestern portion of the proposed project / proposed action area and APE (Figure B-4). A 706-foot-long segment of the railroad berm was initially recorded in 2005 in the area southeast of Swansea.[234] The site was described as consisting of narrow gauge railroad berm which measured 12 to 18 inches above the surrounding ground surface; associated artifacts included railroad spikes, steel tie plates, and fragments of wooden ties.[235]

As previously mentioned, the Carson & Colorado narrow gauge railway runs from Mound House, Nevada to Keeler. The route crossed the Nevada-California border near Montgomery Pass before heading south near Benton to follow the Owens River and run along the eastern edge of Owens Lake to Keeler. Construction of the northern portion of the 293-mile-long stretch of narrow gauge rail line began in 1880 and with the completion of the railway at Keeler in 1883. While the Carson & Colorado line was primarily built to transport of ore from the mines along east side of Owens Lake, the rail hauled other cargo, including timber and fuel. Agriculture also made up a notable

[234] Burton, Jeffery F. 2005. *Cultural Resources Inventory of a Proposed Temporary Road at Swansea, Inyo County, California.* Manuscript on file, Barnard Construction, Inc., Bozeman, Montana.

[235] California Department of Parks and Recreation. 2005. Update to Primary Record for CA-INY-6513H. Site form on file at the Eastern Information Center, University of California, Riverside, CA.

portion of the railroad's freight, with Owens Valley farmers producing and shipping hay, vegetables, and meat to mining communities in southern Nevada.[236]

Although the Carson & Colorado Railroad was originally intended to continue onto Mojave, this latter section of the railway was never built. The Carson & Colorado Railroad Company controlled the line until its sale to the Southern Pacific Railroad in 1900. The railroad saw regular use until 1920s, when the construction of the Los Angeles Aqueduct and diversion of water from Owens Lake took a significant toll on agricultural production in the area and salt mining on Owens Lake. Use of the rail line steadily decreased in the following decades until the line was abandoned and the rails were pulled in 1960.[237]

Three segments of the Carson & Colorado Railroad were recorded in the proposed project / proposed action area and APE (Figure B-4). The linear segments run in a roughly northwest-to-southeast direction and total 669 feet in length. While the railroad line was, in the past, a continuous alignment, the surrounding dunes have now covered portions of the alignment and buried segments under several feet of sand.

The northern two sections of the railroad line, which measure 397 feet and 60 feet in length, respectively, exhibit a raised rail bed covered with gravel and small cobbles (Image 5.3.2.5-9, *Northern Portion of CA-INY-6513H in the Proposed Project / Proposed Action Area, Looking Northwest*). The berm in these areas measures approximately 14 feet in width with a height ranging from 1 and 2 feet above the surrounding ground surface. The southernmost segment of CA-INY-6513H is 212-feet-long and differs markedly from the other portions of the rail line; this segment is characterized by a linearly deflated area that is largely devoid of any remnants of the railroad bed (Image 5.3.2.5-10, *Southern Extent of CA-INY-6513H in the Proposed Project / Proposed Action Area, Looking Northwest*). Artifacts found along this segment of the railroad alignment, as well as the two northern sections, include rusted railroad spikes, metal ties, and fragments of wooden rail ties.

[236] California Department of Parks and Recreation. 2006. Update to Primary Record for CA-INY-6513H. Site form on file at the Eastern Information Center, University of California, Riverside, CA.

[237] Turner, George. 1965. *Narrow Gauge Nostalgia*. J-H Publications, Harbor City, CA.

IMAGE REMOVED FOR CONFIDENTIALITY

Image 5.3.2.5-9. Northern Portion of CA-INY-6513H in the Proposed Project / Proposed Action Area, Looking Northwest

IMAGE REMOVED FOR CONFIDENTIALITY

Image 5.3.2.5-10. Southern Extent of CA-INY-6513H in the Proposed Project / Proposed Action Area, Looking Northwest

A previous evaluation of CA-INY-6513H was conducted in 2006 by JRP Historical Consulting.[238] At that time, it was concluded that the site did not meet the criteria for listing either on the NRHP or the CRHR. In addition, they noted that the abandonment and salvage of the rail lines, along with the effects of weather and dune formation, have resulted in a severe loss of integrity to the cultural resource. Because the only remaining signs of the site were scattered spikes, tie plates, and related minor debitage, researchers argued that "the passer-by would not readily note it as a railroad."[239] As such, JRP Historical Consulting determined that the lack of integrity associated with the cultural resource also excludes it from inclusion on the NRHP or CRHR.

The three segments of CA-INY-6513H that were recorded by Sapphos Environmental, Inc. within the proposed project / proposed action area exhibit a similar level of integrity as the previously documented sections of the railroad alignment. Given this, the portion of the site located within the proposed project / proposed action area is recommended not eligible for listing on the NHRP or CRHR.

Isolates. Seventeen archaeological isolates were identified during surveys conducted in conjunction with Mr. Greg Haverstock. Sixteen of the isolates date to the historic period and are located within Staging Area 3 or the 100 foot buffer. A prehistoric isolate was recorded by Mr. Haverstock within a temporary irrigation line leading to Staging Area 2. None of the isolates are recommended eligible to the NRHP or CRHR. Table 5.3.2.5-2, *BLM Recorded Archaeological isolates within the APE* provides a summary of the isolates and eligibility status.

[238] California Department of Parks and Recreation. 2006. Update to Primary Record for CA-INY-6513H. Site form on file at the Eastern Information Center, University of California, Riverside, CA.

[239] California Department of Parks and Recreation. 2006. Update to Primary Record for CA-INY-6513H. Site form on file at the Eastern Information Center, University of California, Riverside, CA.

TABLE 5.3.2.5-2
BLM RECORDED ARCHAEOLOGICAL ISOLATES WITHIN THE APE

Resource ID	Period	Description	Eligibility Recommendations
BLM ISO-1	Historic	Brown colored, thick walled, mold blown bottle	Recommended Not Eligible
BLM ISO-2	Historic	2 fragments of broken ceramic electrical insulator	Recommended Not Eligible
BLM ISO-3	Historic	Metal fragments, log bolt, large bolt	Recommended Not Eligible
BLM ISO-4	Historic	Sheet metal	Recommended Not Eligible
BLM ISO- 5	Historic	Steel pipe, 6 fragments,	Recommended Not Eligible
BLM ISO-6	Historic	2 fragments of broken ceramic electrical insulator	Recommended Not Eligible
BLM ISO-7	Historic	Steel sheet with bolt holes and opening, riveted	Recommended Not Eligible
BLM ISO- 8	Historic	Steel wire, 2 gauges, fragments, 9 segments	Recommended Not Eligible
BLM ISO-9	Historic	Ceramic electrical insulator fragments	Recommended Not Eligible
BLM ISO-10	Historic	Telephone pole cross member with insulated post	Recommended Not Eligible
BLM ISO-11	Historic	Karo syrup bottle fragment, clear glass (1968-present)	Recommended Not Eligible
BLM ISO-12	Historic	Gallon and 1/2 gallon wine jugs clear glass	Recommended Not Eligible
BLM ISO-13	Historic	Solarized brown Clorox bottle neck and rim (1958-present), and glass ketchup bottle, octagonal with solarized clear glass	Recommended Not Eligible
BLM ISO-14	Historic	Brown Duraglas been bottle(1947)	Recommended Not Eligible
BLM ISO-15	Historic	Brown Duraglas been bottle(1941)	Recommended Not Eligible
BLM ISO-16	Historic	Wire sand fence (8 strands)	Recommended Not Eligible
BLM ISO-17	Prehistoric	Elongated rock cairn	Recommended Not Eligible

Summary of Class III Survey Results

Three additional areas containing cultural resources were identified during the limited Class III survey of three of the four proposed staging area and access route locations. A very sparse scatter (approximately 1 artifact per 900 square meters) of obsidian debitage was identified on the alluvium sediment surrounding Staging Area 1. A second obsidian scatter of lower density was identified on the aeolian deposits near the planned access route leading to Staging Area 2. A few isolated bone fragments were observed along the southeastern portion of the northwest-southeast access route within 20 meters of the CA-INY-6502 site boundary. These artifacts were not formally recorded in the field – their extremely low density precluded them from being recorded as a site, and suggests that they are associated with the known archaeological sites in the vicinity.

Alternative staging area and access route locations were surveyed in order to find areas completely free of surface cultural resources (Figure 4.3.2-1). An alternative northwest-southeast access route segment was found that would avoid the bone fragments observed near CA-INY-6502 by at least 100 feet. An alternative location and alternative access route were surveyed for Staging Area 2 that avoided all identified cultural resources by at least 100 feet, and an alternative location and alternative access route were found for Staging Area 1 that would disturb a minimal amount of identified cultural resources.

5.3.2.6 Native American Sacred Sites and Human Remains in the Cultural Resources Study Area

A Native American sacred site is defined by the NAHC as an area that has been, and often continues to be, of religious significance to Native American peoples, such as an area where religious ceremonies are practiced or an area that is central to their origins as a people.[240] Results of a record search of the Sacred Lands File for the proposed project / proposed action site by the NAHC failed to indicate the presence of any sacred sites in the cultural resources study area (see Appendix A).[241] However, the NAHC did indicate that the Keeler Dunes area is known as a culturally sensitive area and recommended that additional coordination be undertaken with local Native American groups and individuals on the matter. As a result of this recommendation, Sapphos Environmental, Inc. sent letters to 10 Native American contacts classified by the NAHC as potential sources of information related to cultural resources in the vicinity of the proposed project / proposed action area. This outreach resulted in responses from two tribal representatives:

Matthew Nelson, a Tribal Historic Preservation Officer and NAGPRA Coordinator of the Bishop Paiute Tribe, did not identify any specific sacred sites in the cultural resources study area but noted that:

> [I]t is known among cultural staff, elders and traditionalists that the Keeler Dunes and foothills of the Inyo Mountains east of Owens Lake contain heavy densities of cultural resources and extremely culturally sensitive areas.[242]

Kathy Fabunan, a tribal administer for the Lone Pine Paiute-Shoshone Tribe, indicated that she could not give out information about sensitive sites around the Keeler Dunes area. She stated she would forward a request for information to the Cultural Committee:

> The Tribe's policy is that all information of that nature must come from the Chairman so as to assure that the information is has the OK of the membership.[243]

As of this writing, Sapphos Environmental, Inc. has received no response from the Cultural Committee of the Lone Pine Paiute-Shoshone Tribe.

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[240] Native American Heritage Commission. Accessed 21 July 2006. "Understanding Cultural Resources." Available at: www.nahc.ca.gov/understandingcr.html

[241] Singleton, Dave, Native American Heritage Commission, Sacramento, CA. 31 August 2011. Letter response to Clarus Backes, Sapphos Environmental, Inc., Pasadena, CA.

[242] Nelson, Matthew, Tribal Historic Preservation Officer and NAGPRA Coordinator, Bishop Paiute Tribe, Bishop, CA. 8 December 2011. Email response to Clarus Backes, Sapphos Environmental, Inc., Pasadena, CA

[243] Kathy Fabunan, Tribal Administer, Lone Pine Paiute-Shoshone Reservation, Lone Pine, CA. 3 October 2011. Email response to Clarus Backes, Sapphos Environmental, Inc., Pasadena, CA

Consultation efforts undertaken by BLM indicate that the archaeological remains associated with CA-INY-6502 are culturally and religiously significant to Native American groups living in the Owens Valley.[244] As previously stated, the archaeological evidence suggests that this area within the Keeler Dunes was used prehistorically as a burial site. Ethnographic information collected during the Phase II investigations at the sites also indicate that a Shoshone massacre may have taken place at this locale during the Indian Wars.[245] Mr. Melvin Checo, a Koso Shoshone elder, reported that the cairns that comprise CA-INY-6502 represent burials of Native Americans that were killed by the U.S. Calvary at Keeler Dunes in the 1860s.[246] Specifically, Mr. Checo stated that the people that were killed were buried individually where they died with all their belongings.

Each cairn represents the place:

> where they were gunned down at and whoever survived go on putting rocks in and bury em see.[247]

Taken together, the archaeological and ethnographic data indicate that CA-INY-6502 is a Native American sacred site that is part of a larger mortuary complex containing multiple prehistoric and possibly historic period burial features.

5.3.3 Application of the Criteria of Adverse Effect

In accordance with Section 106 of the NHRP, the Criteria of Adverse Effect was applied to the historic properties in the APE of the proposed project / proposed action (as defined in Section 2.0, *Project Description*). This section describes the results of this assessment, details the effects of the undertaking on significant cultural resources, and explains why the undertaking was found to have no adverse effects on historic properties.

5.3.3.1 Definition of Criteria of Adverse Effect

Adverse effects were evaluated with regard to the Criteria of Adverse Effect, formulated by the Advisory Council on Historic Preservation. According to these criteria,

> An *Adverse Effect* is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that

[244] Halford, F. Kirk and Kim Carpenter. 2005. *Results of Limited Phase II Testing at the Keeler Dunes Sites, Owens Valley, California*, pp. 20. Cultural Resource Project: CA-170-03-11. Report prepared by Far Western Anthropological Research Group, Inc., Davis, CA.

[245] Halford, F. Kirk and Kim Carpenter. 2005. *Results of Limited Phase II Testing at the Keeler Dunes Sites, Owens Valley, California*, pp. 20. Cultural Resource Project: CA-170-03-11. Report prepared by Far Western Anthropological Research Group, Inc., Davis, CA.

[246] Halford, F. Kirk and Kim Carpenter. 2005. *Results of Limited Phase II Testing at the Keeler Dunes Sites, Owens Valley, California*, pp. 20. Cultural Resource Project: CA-170-03-11. Report prepared by Far Western Anthropological Research Group, Inc., Davis, CA.

[247] Halford, F. Kirk and Kim Carpenter. 2005. *Results of Limited Phase II Testing at the Keeler Dunes Sites, Owens Valley, California*, pp. 20. Cultural Resource Project: CA-170-03-11. Report prepared by Far Western Anthropological Research Group, Inc., Davis, CA.

> may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, by farther removed in distance or be cumulative. (36 CFR Part 800.5 [a] [1])

Examples of Adverse Effects on historic properties under 36 CFR 800.5 (a) (2) include, but are not limited to,

(i) Physical destruction of or damage to all or part of the property;
(ii) Alteration of a property that is not consistent with the Secretary of Interior's Standards for treatment of historic properties (36 CFR 68) and applicable guidelines;
(iii) Removal of the property from its historic location;
(iv) Change of the character of the property's use or of physical features within the property's setting that contribute to its historical significance;
(v) Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting;
(vi) Neglect of a property resulting in its deterioration or destruction; and
(vii) Transfer, lease, or sale of the property.

5.3.3.2 Historic Properties in the APE

To evaluate the adverse effects of the proposed project / proposed action on cultural resources in the Keeler Dunes area, the APE was mapped in relation to known archaeological sites within the cultural resources study area (Figure B-5, *Locations of Archaeological Sites and Historic Buildings and Structures in Relation to APE* and Figure B-6, *Detailed Map of Archaeological Sites in APE* [Appendix B]). As previously discussed, the APE includes all of the elements and areas of planned ground disturbance, along with a 100-foot buffer. As shown on Figure B-5, portions of four archaeological sites are found within the APE: CA-INY-6502, KD Site 1, KD Site 2, and BLM-Site 1. Although the latter two cultural resources are ineligible for inclusion on the NRHP, both CA-INY-6502 and KD Site 1 were determined to be historic properties. As such, an assessment of the adverse effect of the proposed undertaking on these significant cultural resources is necessary.

5.3.3.3 Avoidance Measures

As shown in Figure B-6, the portions of CA-INY-6502 and KD Site 1 located within the APE primarily fall within the area designated for 85 percent dust control efficiency. The main DCM in these areas will be the planting of native vegetation and the placement of straw bales that will act as temporary wind breaks within active dune areas. These materials will be transported to the area using all-terrain vehicles (ATV) along a temporary access route that will be run along the northern edge of CA-INY-6502 (see Figure B-6). No vehicular traffic shall occur within the site boundaries. The vegetation and straw bales will be hand carried along designated foot paths to their respective planting areas. The planting of vegetation will involve the hand excavation of small holes (less than one-foot in depth) for the placement of individual seedlings. The seedlings will be clustered in groups of three and will be spaced approximately 2 to 4 meters from one another. Individual straw bales will be positioned on the windward side of the seedlings to provide protection to the small plants; these straw bales will be left *in situ* to decompose.

The 85 percent dust control efficiency that would be implemented during the proposed action allows some flexibility in the locations of the plant and straw bale clusters. As such, areas within CA-INY-6502 and KD Site1 that contain culturally sensitive deposits can be avoided under the

proposed undertaking. These areas tend to be located in deflated areas between the active dunes where cultural remains have been exposed by moving sands. To ensure that no cultural deposits within CA-INY-6502 and KD Site 1 are adversely affected by the transport and placement of the vegetation and straw bales, a qualified archaeologist will undertake an intensive surface survey of the portions of CA-INY-6502 and KD Site 1 falling within the APE prior to the initiation of construction activities. This work will involve the identification and recording of identified artifacts and features using handheld global positioning system (GPS) units. A spatial analysis in GIS will then be undertaken to determine the specific placement of vegetation, straw bales, and foot paths within the site boundary of CA-INY-6502 and KD Site 1 in order to avoid impacts to significant cultural deposits. The District shall submit a final proposed construction scenario to the BLM for approval prior to the initiation of ground disturbing activities that depicts the location of these elements and their relation to surface artifacts and features.

Given the cultural sensitivity of the Keeler Dunes area, it is recommended that the BLM archaeologist coordinate a preconstruction briefing to provide information to workers regarding the procedures and regulatory requirements for the protection of significant archaeological resources. Construction personnel should be instructed on procedures to be followed in the event that cultural resources are encountered during construction. The District should also retain a qualified archaeologist and Native American monitor to be present during all ground-disturbing activities undertaken in, or within 100 feet of, the CA-INY-6502 and KD Site 1 site boundaries. If previously undocumented cultural remains are encountered during project / proposed action implementation, operations should be immediately stopped in the area, and the BLM Bishop Field Office manager and archaeologist should be notified immediately. Once the find was assessed and evaluated, modification to the proposed project / proposed action would be made as need to avoid impacts of these archaeological discoveries prior to the resumption of work.

5.3.3.4 Assessment of Adverse Effects on Historic Properties in the APE

The proposed project / proposed action will not alter or damage any portion of CA-INY-6502 and KD Site 1 that qualifies the cultural resources for inclusion on the NRHP under Criterion D, their ability to yield information important to the study of prehistory or history. Minor ground disturbance resulting from the planting of seedlings, placement of straw bales, and inadvertent foot traffic, is expected to occur within the site boundaries of CA-INY-6502 and KD Site 1. However, the proposed project / proposed action has been designed to limit these disturbances to those areas of the sites that lack significant cultural deposits. Because the data potential of these historic properties will not be impacted by the undertaking, the proposed project / proposed action would not constitute an adverse effect under Adverse Effect Criterion 2(i).

The planting of native vegetation and placement of straw bales does not have the potential to change physical features within the properties' setting or introduce visual elements that are out of character with CA-INY-6502 and KD Site 1 (Adverse Effect Criteria 2[iv] and 2[v], respectively). As discussed above and in Section 2.0, *Project Description*, a variety of native plant species will be established in the APE in a manner that mimics indigenous vegetation in the Keeler Dunes area. Because these newly established biotic communities will be similar to the vegetation in the surrounding environs, the physical and visual changes that will result from this DCM can be considered compatible with the current setting and feeling of the historic properties. The placement of straw bales within the boundaries of CA-INY-6502 and KD Site 1 has the potential to visually alter or change the properties' setting; however, due to the temporary nature of the straw bales, this DCM does not represent an adverse effect to the historic properties. This undertaking will not physically or visually alter or damage the portions of CA-INY-6502 and KD Site 1 in the

APE in such a manner that would diminish the integrity of their location, design, setting, materials, workmanship, feeling, and association.

Other examples in the assessment of adverse effect do not apply to the proposed project. Specifically, the undertaking will not alter a property that is not consistent with the Secretary of Interior's Standards for treatment of historic properties (36 CFR 68) and applicable guidelines (Adverse Effect Criteria 2[ii]). Furthermore, the proposed project / proposed action will not remove any property from its historic location (Adverse Effect Criteria 2[iii]); neglect a property resulting in its deterioration or destruction (Adverse Effect Criteria 2[vi]); or transfer, lease, or sale a property (Adverse Effect Criteria 2[vii]).

5.4 SUMMARY OF FINDINGS

The results of the paleontological field survey, Class I and Class III inventories, and site recordation efforts presented in this Cultural Resources Technical Report demonstrate that the proposed undertaking will not adversely affect significant paleontological or cultural resources within the APE. As such, a finding of no adverse effect is appropriate for the undertaking.

SECTION 6.0
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