

**OWENS VALLEY SOLAR ARRAY EXPANSION PROJECT
DRAFT ENVIRONMENTAL ASSESSMENT
INYO COUNTY, CALIFORNIA**



PREPARED FOR
NEW JERSEY INSTITUTE OF TECHNOLOGY

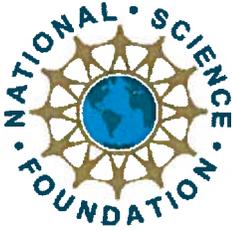
ON BEHALF OF THE
NATIONAL SCIENCE FOUNDATION

PREPARED BY
TEAM ENGINEERING & MANAGEMENT, INC.

TEAM

ENGINEERING & MANAGEMENT, INC.
Bishop and Mammoth Lakes, California

August 17, 2010



**DRAFT ENVIRONMENTAL ASSESSMENT
FOR THE
PROPOSED OWENS VALLEY SOLAR ARRAY EXPANSION PROJECT**

The National Science Foundation (NSF) has prepared a Draft Environmental Assessment (Draft EA) to analyze the potential environmental impacts of the proposed Owens Valley Solar Array Expansion Project (OVSA Expansion Project). The Draft EA was prepared pursuant to the National Environmental Policy Act (NEPA), 42 U.S.C. §§4321, *et seq.*, NEPA's implementing regulations found at 40 C.F.R. Parts 1500–1508, and NSF's NEPA regulations found at 45 C.F.R. Part 640. The purpose of this letter is to request public review and comments on the Draft EA.

The New Jersey Institute of Technology (NJIT) is proposing an expansion of an existing solar radio-telescope array, the Owens Valley Radio Observatory (OVRO), which is located northeast of Big Pine, California on Los Angeles Department of Water and Power (LADWP)-owned land in Inyo County. The site is leased to the California Institute of Technology for scientific research purposes. The proposed OVSA Expansion Project would entail the installation of 13 new antenna pads with associated two-meter antennas distributed in a three-arm spiral configuration of radius 900 meters at the OVRO facility. This proposed OVSA Expansion Project would also include placement of a new modular control building, access roads and cable trenching along the access roads. If approved, the OVSA Expansion Project would be funded by the National Science Foundation (NSF) through monies made available from the American Recovery and Reinvestment Act of 2009 (ARRA).

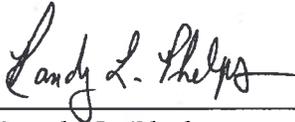
The purpose of the proposed OVSA Expansion Project is to study the causes and impacts of solar magnetic storms, ultimately leading to forecasting and prediction of these disruptive phenomena. Project telescopes will measure and record radio-wave output from the sun in order to collect data on the sun's magnetic field, temperature, density and particle energy. These measurements will generate information regarding solar flares and other energy releases, sunspot structure, solar acceleration of high-energy particles, and the impact of solar radio noise on communication and navigation systems on Earth. This research has the potential to identify especially dangerous regions of the sun and improve forecasting of when sunspot regions turn into disruptive flare-producing events. This research also has the potential to improve forecasting of intense solar activity and to predict the impacts from these solar storms at Earth.

The Draft EA is hereby released for public review and comment. The public comment period, which has been scheduled to allow for potential funding with ARRA funds, begins on August 18, 2010, and closes on September 7, 2010. The Draft EA can be accessed via the internet at the following address:

<http://www.nsf.gov/od/oia/programs/mri/>. Public comments can be submitted either by mail or e-mail to the following address:

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I hereby acknowledge that this Draft EA for the proposed OVSA Expansion Project was prepared under my direction and the information submitted, to the best of my knowledge, fully addresses document content requirements.



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1.0 PURPOSE AND NEED

1.1 INTRODUCTION

An existing radio-telescope observatory, the Owens Valley Radio Observatory (OVRO), is located northeast of Big Pine, California on Los Angeles Department of Water and Power (LADWP) owned land in Inyo County (Figure 1). The site is leased to the California Institute of Technology for scientific research purposes. The New Jersey Institute of Technology (NJIT) is proposing an expansion of the existing solar radio-telescope array which would entail the installation of 13 new antenna pads with associated two-meter antennas distributed in a three-arm spiral configuration of radius 900 meters at the OVRO facility (Figure 2). This proposed expansion project, the Owens Valley Solar Array (OVSA) Expansion Project (project), would also include placement of a new modular control building, access roads and cable trenching along the access roads. This proposed expansion, if approved, would be funded by the National Science Foundation (NSF) through monies made available from the American Recovery and Reinvestment Act. Accordingly, to analyze the impacts in accordance with the National Environmental Policy Act (NEPA), this Draft Environmental Assessment (Draft EA) was prepared on behalf of NSF.

1.2 BACKGROUND

The proposed OVSA Expansion Project is located on the Owens Valley floor north of Big Pine, east of the Owens River at approximately 3,900 feet above sea level, within the existing OVRO lease area. The proposed project area falls within the Big Pine 7.5-minute USGS quadrangle map. The project area is mostly undeveloped land and consists primarily of alkaline shrub vegetation in sandy soils. No surface water exists at the location of the proposed project. The closest surface water is the Owens River which is approximately one mile west of the project location. Current land uses in the vicinity include operation of various radio telescopes, including the solar radio-telescope array, and cattle grazing.

The Owens Valley Radio Observatory was initially constructed in the 1950s by the California Institute of Technology. The existing solar radio-telescope array was developed in the 1980s and 1990s to study radio-wave emissions from the sun. The existing array includes seven telescopes with the largest two being 27 meters in diameter (Figure 3). The OVRO currently has 10 buildings on site including offices, control centers, machine shops, a lunch facility and a dormitory. On average, there are approximately 30 full time employees (FTE) on site. The number of persons on site varies due to time of year, number of active projects and number of visiting scientists.

1.3 PURPOSE AND NEED FOR PROPOSED ACTION

The proposed purpose of the OVSA Expansion Project is to study the causes and impacts of solar magnetic storms, ultimately leading to forecasting and prediction of these disruptive phenomena.

Project telescopes will measure and record radio-wave output from the sun in order to collect data on the sun's magnetic field, temperature, density and particle energy. These measurements will generate information regarding solar flares and other energy releases, sunspot structure, solar acceleration of high-energy particles, and the impact of solar radio noise on communication and navigation systems on Earth. This research has the potential to identify especially dangerous regions of the sun and improve forecasting of when sunspot regions turn into disruptive flare-producing events. This research also has the potential to improve forecasting of intense solar activity and to predict the impacts from these solar storms at Earth.

In addition to studying the sun during daylight hours, astronomers use the radio-telescope array to investigate transient sources of radio waves at night. This research is used to improve the general understanding of the universe.

The Owens Valley is a unique location for radio-wave observation due to its rural setting, benign weather, flat population growth, and low generation of terrestrial radio waves.

The current array consists of seven antennas that are approximately 20-30 years old. The proposed OVSA expansion project would add eight new two-meter diameter antennas and relocate the five existing two-meter antennas, and completely replace the signal transmission and processing system with modern, state-of-the-art technology, thereby modernizing the existing array for new scientific discoveries, and extending its useful life by at least 10 years.

1.4 SCOPING AND ISSUES

An initial project location was proposed to integrate the new telescopes with existing telescopes to update the existing array. The proposed project location also sought to maximize use of existing disturbed areas for roads, cable trenches, antennae pads and the modular building in order to minimize new disturbances. Cultural and biological resource scoping was performed in May 2010 to identify possible impacts related to the proposed project and to discern the least disruptive location.

Two alternative locations to the original proposed project location were developed east of the original location in order to avoid areas of cultural significance as determined by Trans-Sierran Archeological Research (TSAR) during the May cultural survey (Appendix A). Supplemental cultural and biological resource surveys were conducted in June 2010 on the two alternative project locations (see Appendix A and B for locations). Based on the results of these additional surveys, Alternative 1 was chosen as the preferred location for the proposed project to avoid sensitive cultural and biological areas. In addition to project relocation, consultation occurred between NJIT and the Big Pine Paiute-Shoshone Tribe regarding the cultural survey results.

1.5 PLAN CONFORMANCE AND LAND USE STATUS

The proposed project is subject to the Inyo County General Plan (ICGP) and the Los Angeles Department of Water and Power's (LADWP) proposed Owens Valley Land Management Plan (OVLMP).

The preferred site is located in Inyo County on land zoned OS-40: open space miscellaneous rural, fee land. The project area is designate NR: Natural Resources Designation, in the ICGP. The NR designation is applied to land or water areas that are “essentially unimproved and planned to remain open in character, provides for the preservation of natural resources, the managed production of resources, and recreational uses.” (ICGP, 2001) The proposed OVSA Expansion Project is in conformance with the ICGP.

The OVRO and proposed project are located on LADWP-leased land. As of March 2010 LADWP’s OVLMP is in the final environmental review process. The Initial Study and Mitigated Negative Declaration for the OVLMP is available online at <http://www.ladwp.com/ladwp/cms/ladwp013221.jsp> or by contacting LADWP. The goals of the OVLMP are to provide for the continuation of sustainable uses while promoting biodiversity and a healthy eco-system.

The proposed project is in conformance with the relevant sections of the OVLMP, including section 1.4.4.2:

1.4.4.2 Cultural Resources Management Measures

“For archeological sites, avoidance and preservation in place are the preferable forms of mitigation. When avoidance is infeasible, a data recovery plan would be prepared which adequately provides for recovering scientifically consequential information from the site. Studies and reports resulting from excavations must be deposited with the California Historical Resources Regional Information Center.” (OVLMP, 2010)

2.0 DESCRIPTION OF ALTERNATIVES

2.1 PROPOSED PROJECT

NJIT is proposing an expansion of the existing radio-telescope array which would entail the installation of 13 new antenna pads with associated two-meter antennas distributed in a three-arm spiral configuration of radius 900 meters at the OVRO facility (Figure 4). The OVSA Expansion Project would also include emplacement of a new modular control building, access roads and cable trenching along access roads.

The proposed project would add eight antennas and relocate five existing antennas in the array, thereby modernizing the existing array and extending its useful life by at least 10 years. The antenna pads would be concrete pads with dimensions of 16 feet by 16 feet. It is estimated that the antenna pads would be surrounded by a seven-foot wide perimeter of disturbed area. A limited number of site access roads would be created (Figure 5). Trenching for project-related cables would occur, where possible, along existing roadways or disturbed areas.

Both the existing radio-telescopes and project telescopes are passive radio-wave receptors. The array receives and monitors radio waves; it does not produce emissions.

Implementation of the proposed project, including building and testing of prototype telescopes, would occur over two years, with the OVSA Expansion Project operational by year three. The proposed project, if approved, would commence in the Spring of 2011. During the operations phase, it is estimated that 2.5 FTE would work out of the new modular control building (approximately 60 feet by 24 feet in size) emplaced next to the existing OVRO Meyer Control building.

2.2 NO ACTION ALTERNATIVE

Under this alternative, the proposed OVSA Expansion Project would not be authorized and no alterations to the site would take place. The existing OVRO's research capabilities would continue to decline, and additional research on the sun's behavior would not be generated.

3.0 AFFECTED ENVIRONMENT

3.1 GENERAL SETTING AND LOCATION

The proposed project lies in eastern California between Big Pine and Bishop in the Owens Valley, approximately one mile east of the Owens River. The Owens Valley is a deep, north-south trending basin located between the Sierra Nevada mountain range to the west and the White Mountain range to the east. The Owens Valley is a fault-block basin with the valley floor dropped down relative to the surrounding mountain blocks. The Owens Valley is the westernmost basin in the Basin and Range province, a region of fault-bonded, closed basins stretching from central Utah to the Sierra Nevada. (Hollet et al., 1991)

The proposed project area is located at an elevation of approximately 3,900 feet. Average precipitation in the region ranges from more than 30 inches per year (in/yr) at the crest of the Sierra Nevada to about 5-6 in/yr on the valley floor. The climate in the Owens Valley floor is characterized as high desert rangeland. (Hollet et al., 1991) The dominant plant community at the proposed project area is Alkaline shrub consisting of primarily saltbush (*Atriplex canescens* and *Atriplex confertifolia*), greasewood and rabbit brush (*Chrysothamnus nauseosus*).

The Owens River, which flows south through the valley, is a trunk stream; the Owens Valley is a closed drainage system. The valley floor is characterized as having low precipitation, abundant sunshine, frequent and highly variable winds, moderate to low humidity and high potential evapotranspiration. Monthly air temperature on the valley floor ranges from below freezing in the winter to more than 100 degrees Fahrenheit in the summer. Daily changes in air temperature can span 50 degrees Fahrenheit. (OVLMP, 2010)

A majority of the land on the Owens Valley floor is owned either by LADWP or by the U.S. Government (Bureau of Land Management or Forest Service) and is undeveloped.

3.2 CULTURAL RESOURCES

Located in Appendix A is *An Archaeological Survey of the Proposed Owens Valley Solar Array Expansion, Inyo County, California, June 2010*. This report describes the cultural resource surveys conducted by TSAR in May and June 2010 for the proposed project. A summary of the cultural setting from this report is as follows:

During the May and June 2010 scoping events, fieldwork totaling 12 person-days was conducted by a crew of two archeologists walking the entire proposed project areas with the purpose of determining if any archaeological sites were located within the proposed project's boundaries and, if present, whether any sites were eligible for listing in the National Register of Historic Places (NRHP). Preceding these field surveys, a California Historic Resource Inventory System (CHRIS) records search was conducted and no known sites were identified; no surveys had been conducted within the proposed project area.

The cultural surveys covered a total of 65 acres. Whenever any cultural material was encountered, the immediate vicinity was examined thoroughly for additional materials. All areas that potentially met CHRIS criteria for sites received further evaluation. Shovel testing at depths

from 60 to 80 centimeters was conducted in selected areas to identify whether modern disturbance and soil deposition might have obscured potential cultural deposits.

During the May survey, TSAR determined that four potential sites were recommended as eligible for NRHP listing and that the proposed project's location if built at the originally preferred location, would have had an adverse effect on one primary site recommended as eligible for the NRHP, OVSA-1 (See Appendix A, Figure 5, page 12). At OVSA-1, dense prehistoric artifacts scatters were located, including projectile points, bifaces, cores, and freshwater shell fragments. Based on these initial findings, the initial location was rejected and the proposed project site was relocated to the east of OVSA-1 (Figure 6) and a supplemental cultural resource survey was conducted in June 2010 which included shovel testing to determine evidence of potential subsurface cultural deposits.

During TSAR's June event, approximately 15 additional acres were surveyed, 13 shovel test pits were dug to depths of 60-80 centimeters, and the previously recorded sites were better defined. Based on results from the shovel test pits, it is estimated that OVSA-1 contains an artifact density of about 250 per cubic meter. The four shovel test pits located near the southeastern edge of OVSA-1 (closest to the proposed project's area) contained no cultural material. In June, TSAR also determined that two additional sites were recommended as eligible for NRHP listing. Both of these additional sites were located outside of the proposed project's area.

3.3 BIOLOGICAL RESOURCES

Located in Appendix B is *Biological and Botanical Scoping, OVSA Expansion Project, Inyo County, California, June 23, 2010*. This report describes the two biological resource surveys conducted by TEAM Engineering & Management, Inc. (TEAM) in May and June 2010 for the proposed project. A summary of the biological setting from this report is as follows:

TEAM conducted a botanical and biological survey for the proposed OVSA expansion in May and June. Work included evaluating the potential impacts on any populations of federal or state-listed threatened, endangered or special status plant, wildlife or invertebrate species that may occur due to the OVSA Expansion Project. Database research was conducted prior to field surveys and a list of all threatened, endangered and special status botanical and wildlife species, which were determined to have the potential to occur within the project area, was developed and reviewed.

The two field surveys totaled two person days and generally followed California Native Plant Society (CNPS) Botanical Survey Guidelines. Plants encountered on site were identified to a taxonomic level. The two field surveys occurred during the Owens Valley spring bloom, facilitating accurate identification of plant species.

3.4 TOPOGRAPHY, GEOLOGY AND SOILS

The OVSA Expansion Project is located on the floor of the Owens Valley. Topographic slopes range from 0-2 percent grades in the proposed project area. The Owens River is located approximately one mile west of the proposed project. Stream terraces (ancient oxbows from the Owens River) are located less than a half-mile west of the proposed project.

The general geologic setting of the project is previously described. No substantial oil, gas or mineral resources are known to be located in the proposed project area.

The soils in the Owens Valley contain mostly Quaternary aged alluvial fan, basin-fill and lacustrine deposits. More specifically the project is located in a soils area classified by the National Resource Conservation Service (NRCS) as Cajon-Mazourka Complex (C-M Complex). According to the NRCS, this complex is a mixture of Cajon and Mazourka soils. The C-M Complex exhibits slopes of 0-2 percent, is moderately suited for natural roads with fair performance expected, is somewhat excessively well-drained, and very slightly to slightly saline. The C-M Complex consists primarily of sands and loamy sands to five feet. There are no limitations for small commercial building development on these soils. (NRCS, 2005)

The Cajon-Mazourka Complex's NRCS Cultivated Agriculture rating is Grade 4 – Very Poor, with a California Sortie index of 38 – Poor for potential agricultural cultivation. Its Wind Erodibility Group is 1, most susceptible to wind erosion.

A small portion of the proposed project's existing access roads are located on Mazourka Hard Substratum Mazourka Eclipse Complex soils. This complex exhibits slopes of 0-2 percent, is well drained and well suited for roads (natural surfaces), and is non-saline to very slightly saline.

3.5 VISUAL RESOURCES

The proposed project is located at an existing radio-telescope array. There are currently 10 existing antennae, including one existing 40 meter telescope, two existing 27 meter telescopes, and 10 existing buildings. The primary view point for the project is US Highway 395, located approximately three miles to the west. There are no Officially Designated State Scenic Highways within sight of the proposed project. The three existing large telescopes (40 and 27 meters) are visible from two residential areas, one located three miles southwest and another located six miles northwest of the OVRO. The existing two-meter telescopes are not visible from either residential area.

3.6 NOISE

The OVSA Expansion Project is located east of the existing OVSA. The OVRO is located in a rural setting, more than two miles from the nearest permanent residence and more than three miles east of US Highway 395. There is a dormitory on the existing OVRO site for temporary and visiting astronomers.

Both the proposed and existing radio telescopes are passive receptors. The primary ambient noise generators on site are from air-conditioning units, machine shop related noise, and delivery trucks.

There are no permanent noise-sensitive human receptors at the OVRO site, such as residences, schools, hospitals, or other similar land uses where people generally expect and need a quiet environment.

3.7 AIR QUALITY

The proposed action is located in Inyo County, part of a region designated as non-attainment for PM₁₀ dust (PM10) emissions. This non-attainment area is under the jurisdiction of Great Basin Unified Air Pollution Control District (GBUAPCD). Wind-blown PM10 dust emissions originating primarily from the Owens Dry Lake located 50 miles to the south are the primary cause of the PM10 violations. The proposed project is located approximately 20 miles north of the northern boundary of the Federal PM10 nonattainment area.

The relevant air quality plan for the proposed project area is the Final 2008 Owens Valley PM10 Planning Area Demonstration of Attainment State Implementation Plan (SIP) (GBUAPCD, 2008). The focus of this planning document is implementation of dust control measures at Owens Dry Lake, the major particulate matter source in the valley.

3.8 NATURAL HAZARDS

Flood Hazards:

The proposed project is located outside the Federal Emergency Management Agency's (FEMA) area inundated by 100-year flooding and located outside of National Wetland Inventory land. This includes the two-meter telescope locations, the associated trenching, the project use of existing roads, and the project control building. However, part of the existing OVRO site is within the FEMA 100-year flood area and is listed in the National Wetlands Inventory as Palustrine emergent, seasonally flooded. The primary source of flooding is the Owens River, located approximately one mile west of the proposed project and approximately 20 feet lower in elevation.

Seismic Hazards:

The proposed project area is located within U.S. Geological Survey Quadrangles containing delineated Alquist–Priolo Earthquake Fault Zones. The Owens Valley Fault, the White Mountain Fault and the Deep Springs Fault are the primary faults located in the vicinity of the proposed project. All three of these faults are considered seismically active and may produce moderate to large earthquakes. In addition, there are several unnamed faults within a five-mile radius of the proposed project. (CDCDMG, 2000).

The OVSA Expansion Project is located approximately one mile north-east of a State of California Earthquake Fault Zone fault. This fault is considered to have been active in the Holocene and to have a relatively high potential for surface rupture. (CDCDMG, 2000).

The proposed project is located in a Uniform Building Code Zone 4 area. Areas within Zone 4 are expected to experience maximum magnitudes and damage in the event of an earthquake. Additional hazards associated with seismic events include soil liquefaction and soil compaction. (ICBO, 1997)

According to the United States Geological Survey's 2009 PHSA Model, the probability of a 6.0 Magnitude earthquake to occur within 30 kilometers of the site in the next 20 years is 20-25 percent (Figure 7).

3.9 RESOURCES NOT ADDRESSED

Due to the geographic location, existing environmental conditions, size and configuration of the proposed project, many resource values do not occur or exist in the area potentially affected by the OVSA Expansion Project. Below are listed resources considered and discarded from further evaluation.

Farms:

The area is not considered prime farmland by the NRCS and is not designated as agricultural lands in the ICGP or by the State of California Department of Conservation. The proposed project would have no impact on agricultural zoning or Williamson Act contracts.

Transportation and Traffic:

The proposed project will result in a small number of construction vehicles traveling on existing roads to the project site during periods of construction and installation. The proposed project is located in a rural setting and there will be no impact to traffic patterns in the nearby town of Big Pine (population of 1,313 in 2007). The access road to the OVRO is rarely used by traffic unrelated to the facility.

The operational phase of the proposed project is expected to require 2.5 FTEs (an increase of 1.5 FTE over current staffing). The existing roadways will continue to be suitable for their existing uses and no new roadway hazards will be created.

Natural Resources:

The proposed project will have no affect on the following areas as none are located in the vicinity of the project: Coastal Barrier Resources, Natural Landmarks, National Wilderness Preservations, National Wildlife Refuge System, or California State Parks. There are no Areas of Critical Environmental Concern, Wild and Scenic Rivers, Wilderness Study Areas, or Essential Fish Habitat within the proposed project site.

Other:

The proposed project will have no effect on Environmental Justice, Recreation, Social and Economic Values, or Community Facilities and Services. The existing waste disposal facilities on site are more than adequate to handle the additional 1.5 FTEs. Due to the minor number of additional employees, there will be no impact on Solid Wastes or Water Quality.

4.0 ENVIRONMENTAL IMPACTS ANALYSIS

4.1 PROPOSED ACTION

4.1.1 Land Use and Existing Activities

The proposed project is consistent with the applicable Inyo County and LADWP land-use designations. The proposed project would add radio telescopes to an existing array and would have negligible effects on grazing or other existing activities on site.

The proposed project will have a negligible impact on Land Use and Existing Activities.

4.1.2 Cultural Resources

Based on results from the May 2010 TSAR survey, the OVSA Expansion Project was relocated to the east in order to avoid impacting a recommended NRHP-eligible cultural site, OVSA-1. Two alternative project locations were considered: Alternative 1 and 2.

According to the June 2010 TSAR survey, a finding of no adverse effects is recommended for Alternative 1 provided that: (1) trenching within the site boundaries of OVSA-1 is monitored by an archaeologist or that trenching is relocated around the boundaries of OVSA-1; and (2) ground disturbance related to the emplacement of the modular control building is monitored by an archaeologist. An alternative cable trenching route which avoids OVSA-1 was included in TSAR's report and this alternative cable trenching route was included in NJIT's final project plan. NJIT has committed to having an archaeologist on site during installation of the new modular building. NJIT has also committed to having a tribal monitor from the Big Pine Paiute-Shoshone Tribe on site during pad installation and trenching.

Based on efforts undertaken to identify, avoid and minimize project impacts related to cultural resources, the proposed project will have a minor, adverse, short-term impact on cultural resources.

4.1.3 Biological Resources

The proposed project would require approximately 3.5 acres of disturbance to install antenna pads, and necessary additional access roads and cable trenching.

No federally or state-listed threatened, endangered or special status plant, wildlife or invertebrate species were observed during the May 3 field survey at any of the proposed locations identified for ground disturbing activities within the OVSA Expansion Project area.

Oryctes nevadensis has been previously identified on the southeast side of the proposed project area (CNDDDB, 2010). *Oryctes nevadensis* is an annual herb that is native to Nevada and California and is included on the California Native Plant Society (CNPS) inventory of Rare and Endangered plants, it is classified as rare, threatened or endangered in California, common elsewhere. Ground disturbing activities in this area are proposed to be limited to trenching along

an already existing access road, and this species was not observed during the May 3, 2010 field event on or adjacent to this road.

On June 4, 2010 TEAM conducted additional botanical and biological surveys on two alternate locations for the proposed expansion. *Oryctes nevadensis* was found in OVSA Alternative 2 location but not in the Alternative 1 location. Therefore, the Alternative 1 location was selected as the preferred location for the OVSA Expansion Project.

No other federally or state-listed threatened, endangered or special status plant, wildlife or invertebrate species were observed during the June 4 field survey at any of the proposed locations identified for ground disturbing activities within the OVSA expansion area.

Based on efforts undertaken to identify, avoid and minimize project impacts related to biological resources, the proposed project will have a negligible, adverse, short-term impact on biological resources.

4.1.4 Topography, Geology and Soils

The proposed project will not substantially alter existing topography of the site. There will be no reduction in access to potential mineral or oil resources caused by the proposed project.

The primary impact to topography, soils and geology from the proposed project would be due to loss of disturbed soils due to wind erosion. The proposed project has been designed to utilize as much previously disturbed land as feasible. New disturbance for roads, trenching and antennae pads is expected to be less than 3.5 acres. The soils on site are listed by the NRCS as Very Poor for Cultivated Agricultural activities.

Because the project design minimizes new disturbance on site soils, the proposed project will have a negligible impact on Topography, Geology and Soils.

4.1.5 Visual Resources

The proposed project would add eight two-meter antennas and one modular building to an array of seven existing antennae, including two existing 27 meter telescopes, and 10 existing buildings.

The proposed project would not attract additional attention to the existing radio-telescope array nor would the proposed project become the dominant feature in the existing landscape. The proposed project would entail minor alteration of land and vegetation and would not remove mature, scenic trees. No scenic resources would be significantly affected by the addition of the two meter telescopes.

Based on existing site conditions, the proposed project would have a minor, adverse, long term impact on visual resources.

4.1.6 Noise

The primary noise concern for the proposed project is related to short-term construction activity. Aside from temporary construction, there would be no permanent increase in ambient noise levels related to the proposed project. This is because the existing and proposed project-related radio-telescopes are passive radio wave receptors.

Noise-generating construction equipment would be used for minor earthmoving and grading, installation of antennae pads, and installation of the modular control building. Construction noise may be temporarily noticeable to OVRO employees or visitors. Staff and visitors conduct research indoors. Due to the generally remote location of the proposed project's construction activities, (one-half mile east of OVRO) and the short duration of activities at any one location, maximum acceptable noise levels prescribed by the ICGP Table 9.9 (60-65 Ldn, Day-Night Average Sound Level for office buildings, business commercial and professional) are not anticipated to be exceeded.

Construction activities may create minor ground-borne vibration. Due to the distance to occupiable structures from the construction sites and the short duration of the construction activity, impacts related to temporary ground borne vibration will be less than significant.

Therefore, implementation of the proposed project would result in a minor, adverse, short-term affected on Noise.

4.1.7 Air Quality

On-site construction from the OVSA Expansion Project could potentially result in the emission of PM₁₀ dust. The GBUAPCD has not established specific quantitative thresholds of significance for air emissions from construction. However, the proposed project would be required to meet GBUAPCD Rule 401, which requires that fugitive dust emission control measures be implemented to adequately prevent visible dust from leaving the property and to maintain compliance with the PM10 standard.

To minimize PM10 emissions, all construction and operations associated with this proposed project would be required to follow applicable State and Federal guidelines to control PM10 emissions from unpaved roads, trenches, and disturbed surface areas. Water or LADWP-accepted dust palliative would be used during construction to limit fugitive dust from blowing off site. Wind screens, barriers, dust suppressants, gravel cover, planted vegetation, compacted surface or other measures would be used to minimize dust emissions from disturbed surface areas.

A plan to minimize wind-borne dust emissions during the operational phase of the proposed project would be implemented. Once installed, the concrete antennae pads would prevent wind-borne dust emissions, but revegetation with an LADWP approved native seed mixture would take place around the perimeter of the antennae pads to minimize potential dust emissions related to wind erosion. Throughout the construction and operational phases of the proposed project, vehicular speeds on unpaved roads would be limited to 15 miles-per-hour to minimize wind-borne dust emissions.

Based on the proposed conditions designed to minimize impacts, the proposed project would have a minor, adverse, short-term affect on Air Quality.

4.1.8 Natural Hazards

The primary natural hazard within the proposed project area is seismic disturbance. The proposed project includes the installation of one modular control building in addition to several two-meter diameter telescopes on concrete pads. The proposed project is located outside of the FEMA 100-year flood plain but within an area of seismic activity.

The proposed project would have no affect on the existing flood and seismic features on site. The existing OVRO site is currently exposed to both seismic hazards and flood hazards generated by a 100-year flooding event. In the context of the existing facilities, the proposed project would not subject OVRO staff or structures to natural hazards greater than the existing, background level.

To minimize exposure of people or structures to potential adverse affects related to seismic activity, all project structures should, however, be designed in compliance with current Federal and State building codes related to seismic safety. The proposed project would comply with the Alquist-Priolo Earthquake Fault Zoning Act, which restricts the construction of buildings near active fault traces. The proposed project would also comply with the ICGP Section 9 relating to geologic and seismic hazards.

Based on the existing background level of natural hazards and on the efforts listed above to minimize natural hazards, the proposed project would have a minor, adverse, long term impact on Natural Hazards.

4.1.9 Cumulative Impacts

The proposed project is an expansion of an existing radio-telescope array. No additional projects within the proposed project area are reasonably foreseeable. Moreover, the impacts resulting from past activities are included in the discussion of the affected area (*see* Section 3.0) and, thus, the impacts from past activities at the proposed project's location are included in the base-line for assessing impacts from implementation of the proposed project. Therefore, because there are no additional impacts from past, present, and reasonably foreseeable activities at the proposed project site, adding the impacts from the proposed project to those of the past, present, and future, no cumulative impacts on the human environment are anticipated.

4.2 NO ACTION ALTERNATIVE

There would be negligible impact under the No-Action Alternative, as the proposed OVSA Expansion Project would not occur on LADWP leased property at the OVRO.

5.0 PERSONS, GROUPS AND REFERENCES

This Draft EA was prepared by TEAM with input from: Walt Pachucki, president of TEAM, engineer and California Environmental Protection Agency Department of Toxic Substances Control Registered Environmental Assessor; Keith Rainville, Staff Geologist; and Greg Foote, Staff Biologist. The cultural resource survey was prepared by Jeffery F. Burton, M.A., R.P.A of TSAR.

The following persons were consulted during preparation of this Draft EA: Paula Hubbard, LADWP Watershed Resource Specialist; Dr. Dale Gary, Distinguished Professor, Physics, NJIT.

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For a list of cultural resource references see Appendix A, page 25, References Cited.

For a list of biological resource references, see Appendix B, Section 4.0, References.

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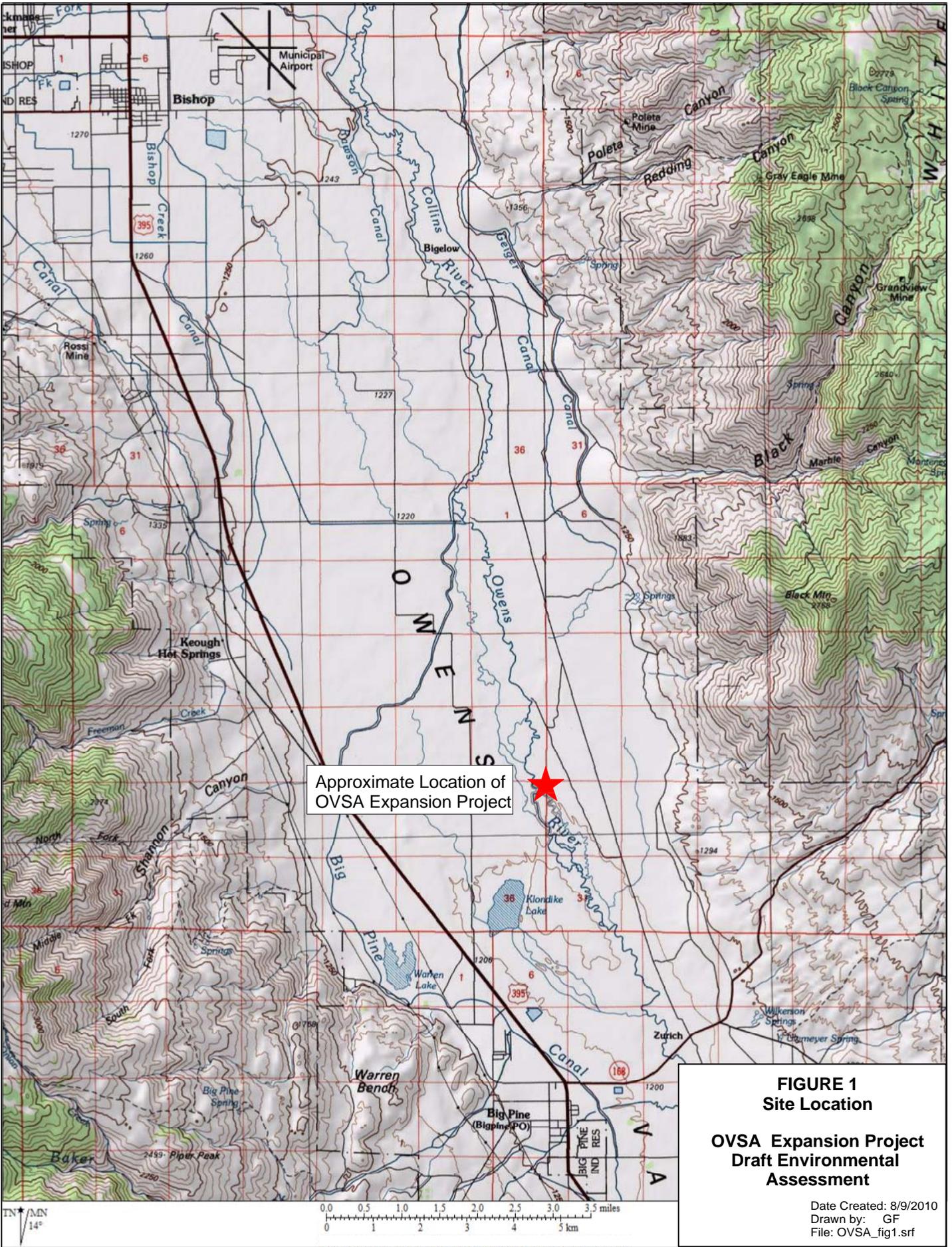
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FIGURES



Approximate Location of
OVSA Expansion Project

FIGURE 1
Site Location
OVSA Expansion Project
Draft Environmental
Assessment

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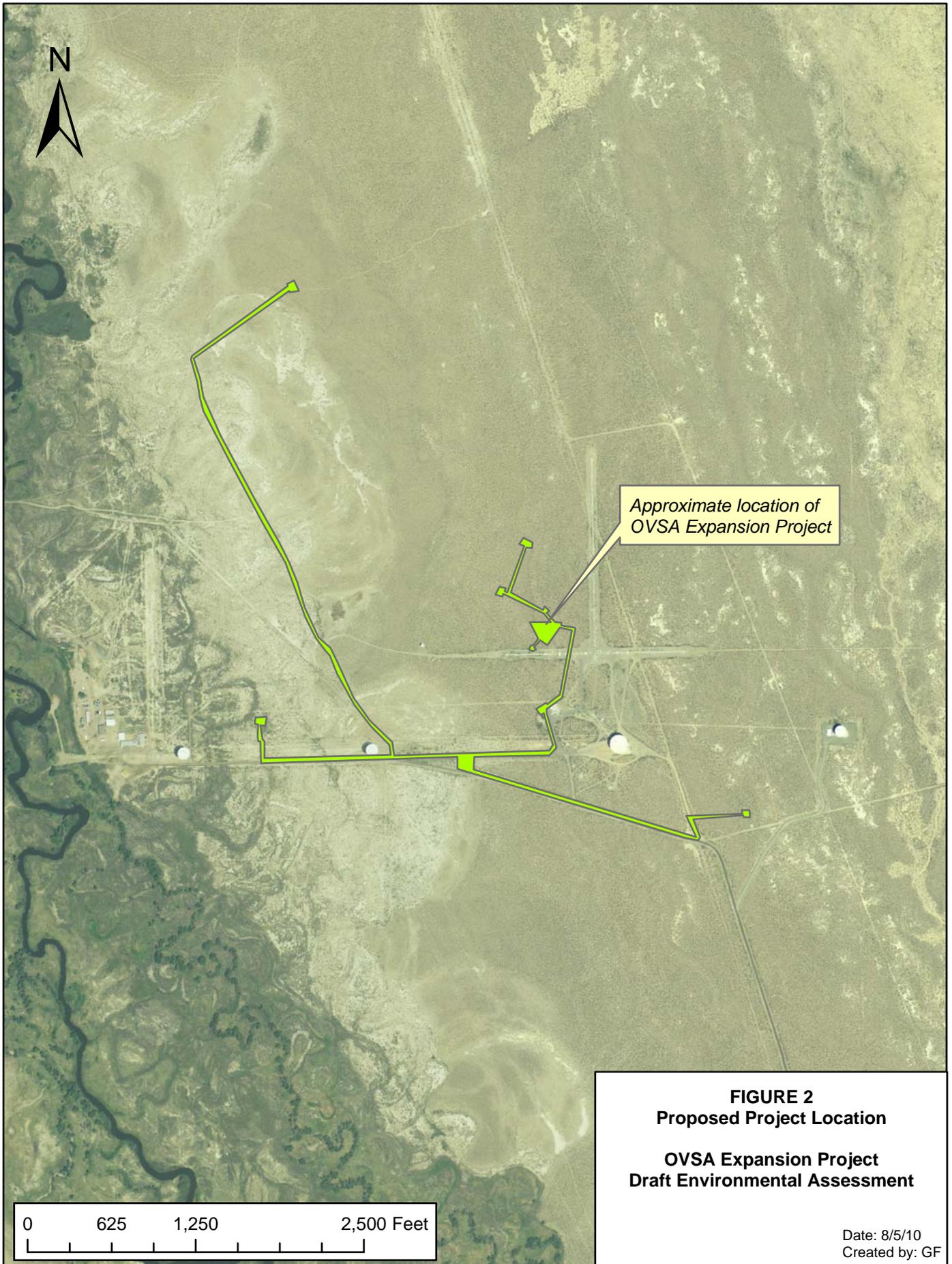


FIGURE 3
Aerial Photos of Existing Site
OVSA Expansion Project Draft Environmental Assessment



The existing Owens Valley Radio Observatory as seen from the southeast. From west to east (left to right) are the main building cluster, two 27-meter diameter telescopes, a 40-meter diameter telescope, and a smaller telescope. The two 27-meter telescopes would be incorporated into the proposed Owens Valley Solar Array Expansion Project. The proposed project would, primarily, be located in the area of the 40 meter telescope. (Photo: Kjell Nelin Fall, 2009)



A view of the 40-meter telescope from the south with the existing Meyer Control Building to its west. The proposed project would add a modular control building west of Meyer in the previously disturbed parking area. (Photo: Kjell Nelin, Fall 2009)

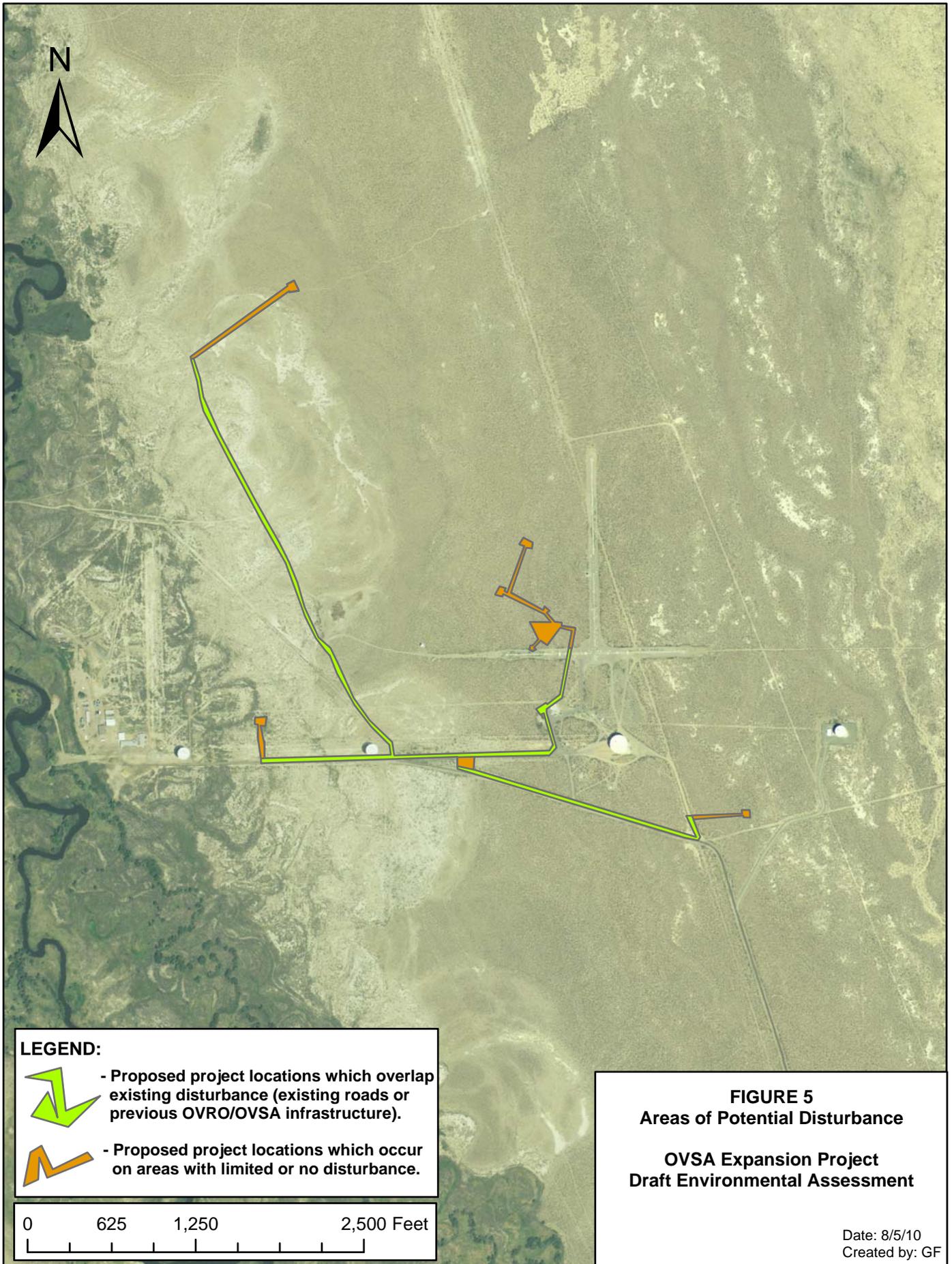


A view of the existing OVRO building cluster from the west with one of the existing 27-meter telescopes in the upper right corner. An oxbow of the Owens River can be seen in the lower left corner. (Photo: Kjell Nelin, Fall 2009)

FIGURE 4
Artist Rendition of Proposed OVSA Expansion Project
OVSA Expansion Project Draft Environmental Assessment



Using 3-D modeling, this artist rendition of the OVSA Expansion Project shows the proposed project as seen from the southwest with Black Mountain in the background. The two large radio-telescopes are the existing 27-meter scopes. Nine of the proposed two-meter radio-telescopes are visible between the existing 27-meter scopes. Four additional two-meter scopes would be located outside the view of this model. The proposed modular control building is shown east of (behind) the eastern 27-meter scope (far right).



- LEGEND:**
-  - Proposed project locations which overlap existing disturbance (existing roads or previous OVRO/OVSA infrastructure).
 -  - Proposed project locations which occur on areas with limited or no disturbance.



FIGURE 5
Areas of Potential Disturbance
OVSA Expansion Project
Draft Environmental Assessment

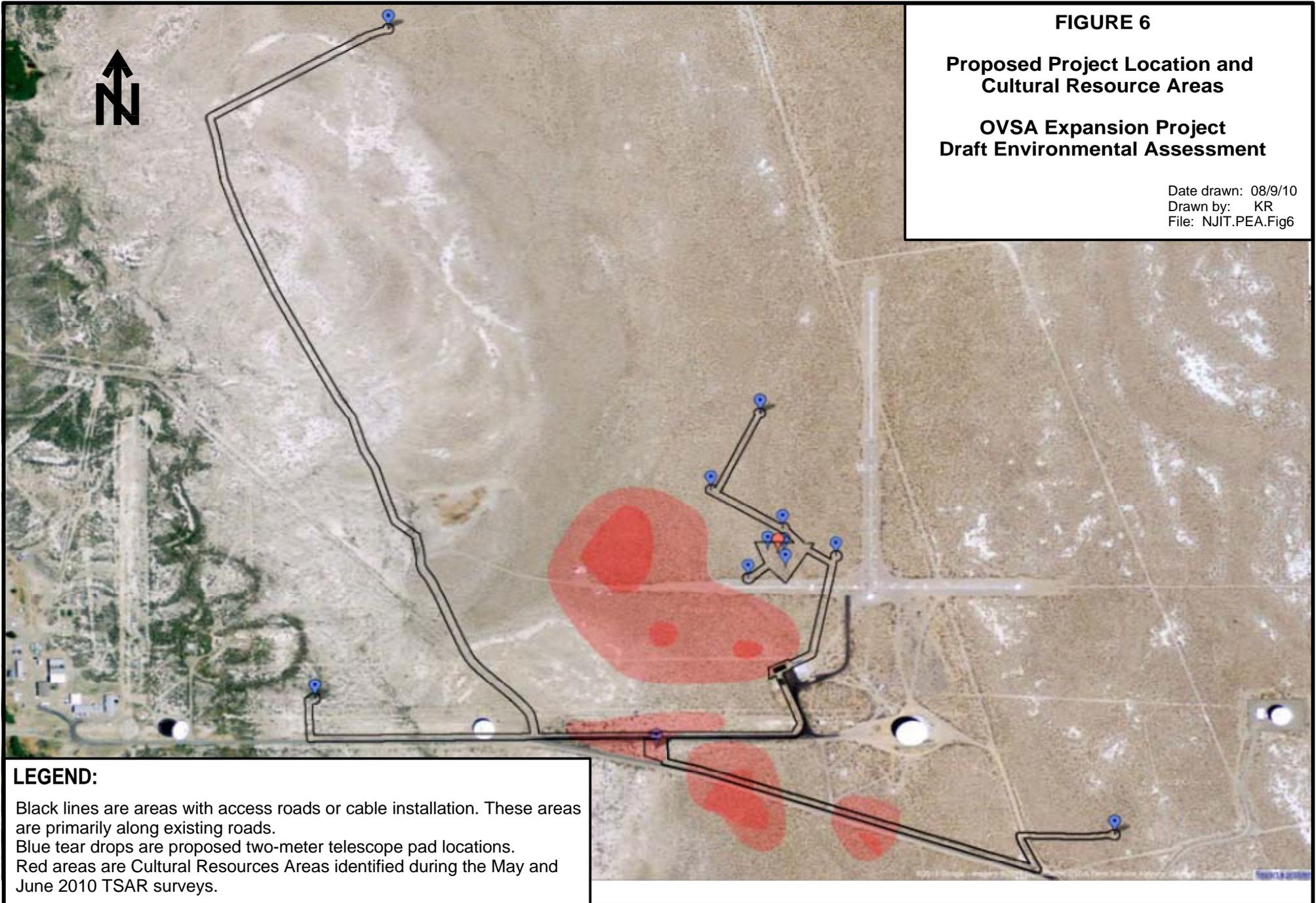
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FIGURE 6

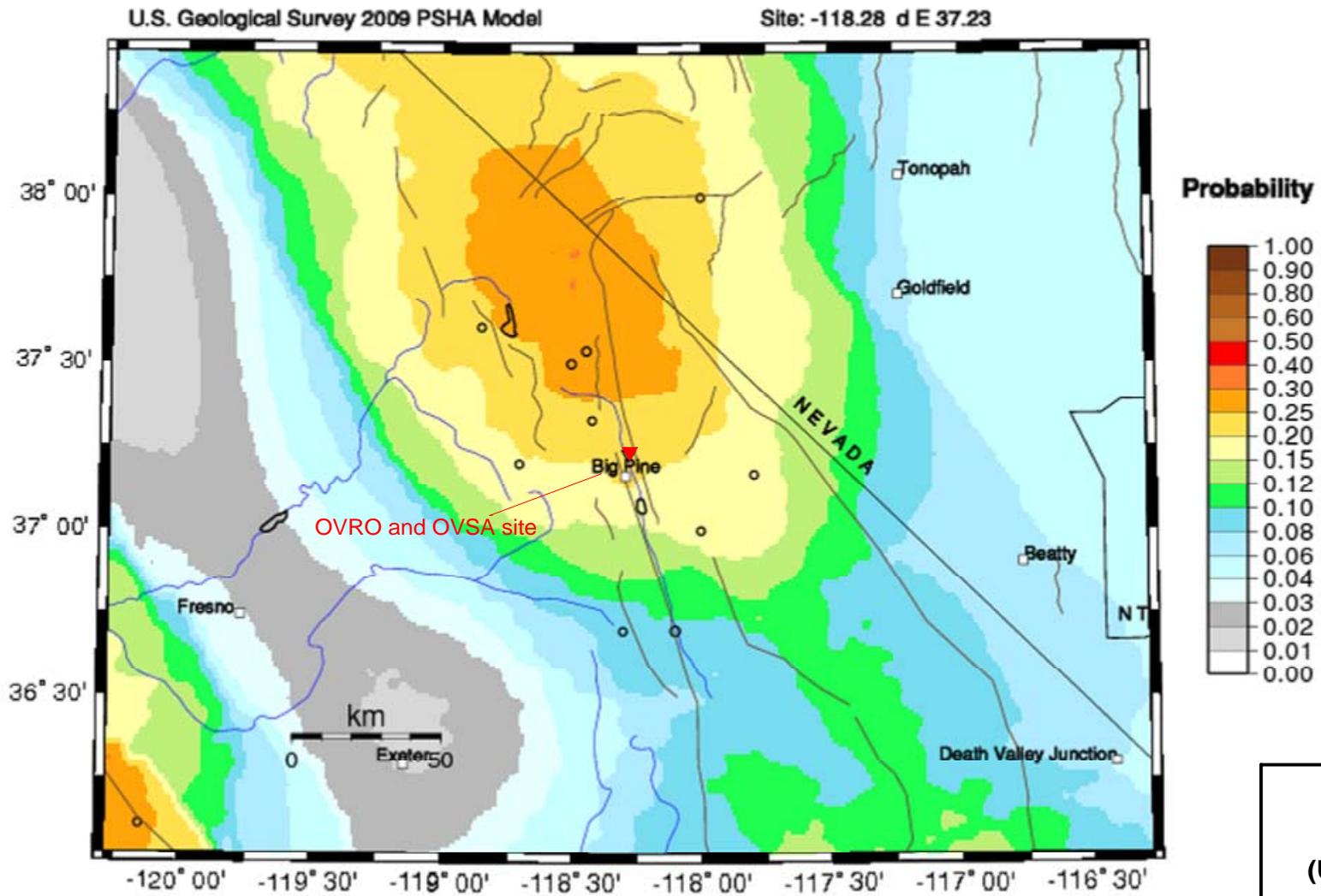
**Proposed Project Location and
Cultural Resource Areas**

**OVSA Expansion Project
Draft Environmental Assessment**

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File: NJIT.PEA.Fig6



Probability of earthquake with $M > 6.0$ within 15 years & 50 km



LEGEND:

Earthquake probabilities from USGS OFR 08-1128 PSHA. 50 km maximum horizontal distance
 Fault traces are brown; rivers blue. Epicenters Magnitude ≥ 6.0 circles
 Approximate OVRO and OVSA Expansion Project Location: red triangle

FIGURE 7

Seismic Probability
 (USGS 2009 PSHA Model)

OVSA Expansion Project
 Draft Environmental
 Assessment

Date drawn: 08/9/10
 Drawn by: KR
 File: NJIT.PEA.Fig7

APPENDIX A

**AN ARCHAEOLOGICAL SURVEY OF THE PROPOSED
OWENS VALLEY SOLAR ARRAY EXPANSION
INYO COUNTY, CALIFORNIA**

An Archaeological Survey of the Proposed Owens Valley Solar Array Expansion Inyo County, California

Jeffery F. Burton

REVISED FINAL REPORT



Trans-Sierran Archaeological Research
Contributions to Trans-sierran Archaeology No. 66
June 2010



An Archaeological Survey of the Proposed Owens Valley Solar Array Expansion Inyo County, California

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TSAR Project No. 110
Contributions to Trans-sierran Archaeology No. 66
June 2010

Management Summary

In May and June 2010, Trans-Sierran Archaeological Research conducted an archaeological survey for the proposed Owens Valley Solar Array expansion. Located on Los Angeles Department of Water and Power land within Inyo County, California, the project would entail construction of 13 new 2-m radio telescopes, a control building, and access roads. A total of 65 acres was intensively surveyed with six sites and 41 isolates located and recorded. The project is funded by a National Science Foundation grant, making the project a federal undertaking, under the National Historic Preservation Act (NHPA).

Treatment of archaeological sites affected by federal undertakings depends upon whether the sites are eligible for listing on the National Register of Historic Places. Five of the six sites recorded for this project are recommended as eligible. The isolates and the sixth site are not eligible for the National Register. Therefore, no further archaeological work is recommended for them. Of the five eligible sites, one would have been adversely impacted by the project as originally proposed. To avoid impacting this site, the project proponent designed two alternatives, both of which were included in the June archaeological survey. No archaeological sites were encountered in the two alternative project areas, and it is recommended that one of the alternatives be selected over the original proposed project area. In both alternatives, a cable would be buried next to the existing dirt road that bisects one of the significant sites, and a modular building would be constructed adjacent to an existing building on the site's periphery. Because of previous disturbance, the activities are considered to have "No Adverse Effect" on historic properties, but should be monitored by an archaeologist. To reach a "No Historic Properties Affected" determination, the cable could be routed along other existing roads and thus avoid all archaeological sites.

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Introduction

Under contract with TEAM Engineering of Bishop, California, Trans-Sierran Archaeological Research (TSAR) completed an archaeological survey of 65 acres for the proposed Owens Valley Solar Array (OVSA) expansion. Located 4½ miles north of the town of Big Pine, the project area is on land owned by the City of Los Angeles and administered by the Department of Water and Power (LADWP). The proposed expansion would be located within the current OVSA lease boundary in sections 19 and 30, Township 9 South, Range 34 East, Mount Diablo Baseline and Meridian (Figure 1).

The current project calls for the construction of thirteen new 2-m radio telescopes. Two existing 27-m telescopes would also be upgraded and connected to the new array. Each 2-m telescope would be placed on a 16-by-16-ft concrete pad and surrounded by a chain-link fence enclosure (Figure 2). The telescopes would be distributed in a spiral configuration of a radius of 900 m. Construction would entail trenching to bury cables to link the telescope sites and the grading of new dirt roads to access them.

In addition to the radio telescopes, a new modular building of approximately 1,500 square feet would be constructed next to the existing Meyer control building. This new building would be built in a previously disturbed area, and would use existing well and sewer utilities. During construction, a temporary construction trailer would be placed near the center of the spiral, resulting in roughly 1,000 square feet of additional cleared ground.

The New Jersey Institute of Technology (NJIT) would receive a National Science Foundation grant for the project. When projects are funded in whole or in part by Federal agencies, they are considered “undertakings” subject to the Section 106 of the National Historic Preservation Act. According to Section 106, Federal agencies must take into account the effects of their undertakings on historic properties. As defined in the law, “historic properties” include districts, sites, buildings, structures, and objects eligible for the National Register of Historic Places. Historic properties merit special consideration in planning, and the process is outlined in Title 36, Code of Federal Regulations, Section 800.

The survey described in this report was designed to determine if any archaeological sites are located within the project’s area of potential effect, and if present, whether those archaeological sites are likely eligible for the National Register of Historic Places. The survey conducted in May determined that one archaeological site (OVSA-1, described below) likely eligible for the National Register was located within the originally proposed project area. To avoid impacting this site, the project proponent designed two alternative project locations, which were surveyed in June (Figure 3).

This report discusses the methods and results of the survey, followed by site descriptions and management recommendations. For detailed background on the archaeology, ethnography, and history of the area, the reader is referred to Bettinger (1975, 1982a, 1989a), Busby et al. (1980), Chalfant (1922), Liljelad and Fowler (1986), Steward (1930, 1933, 1934, 1938), and others (e.g. Bettinger et al. 1984; Bouscaren 1985; Burton 1996; Nadeau 1950).

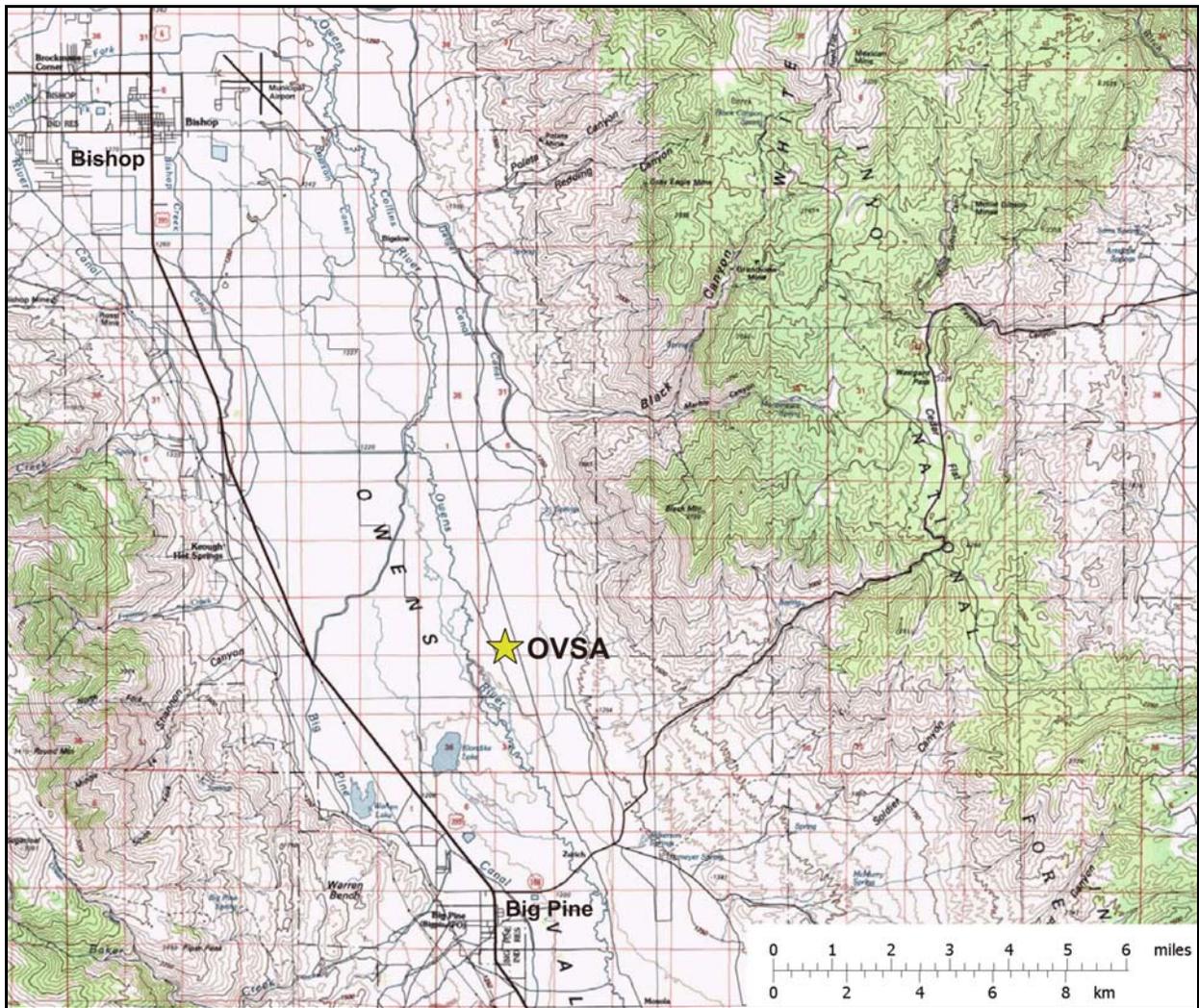


Figure 1. OVSA Project location.



Figure 2. 2-m radio telescope.

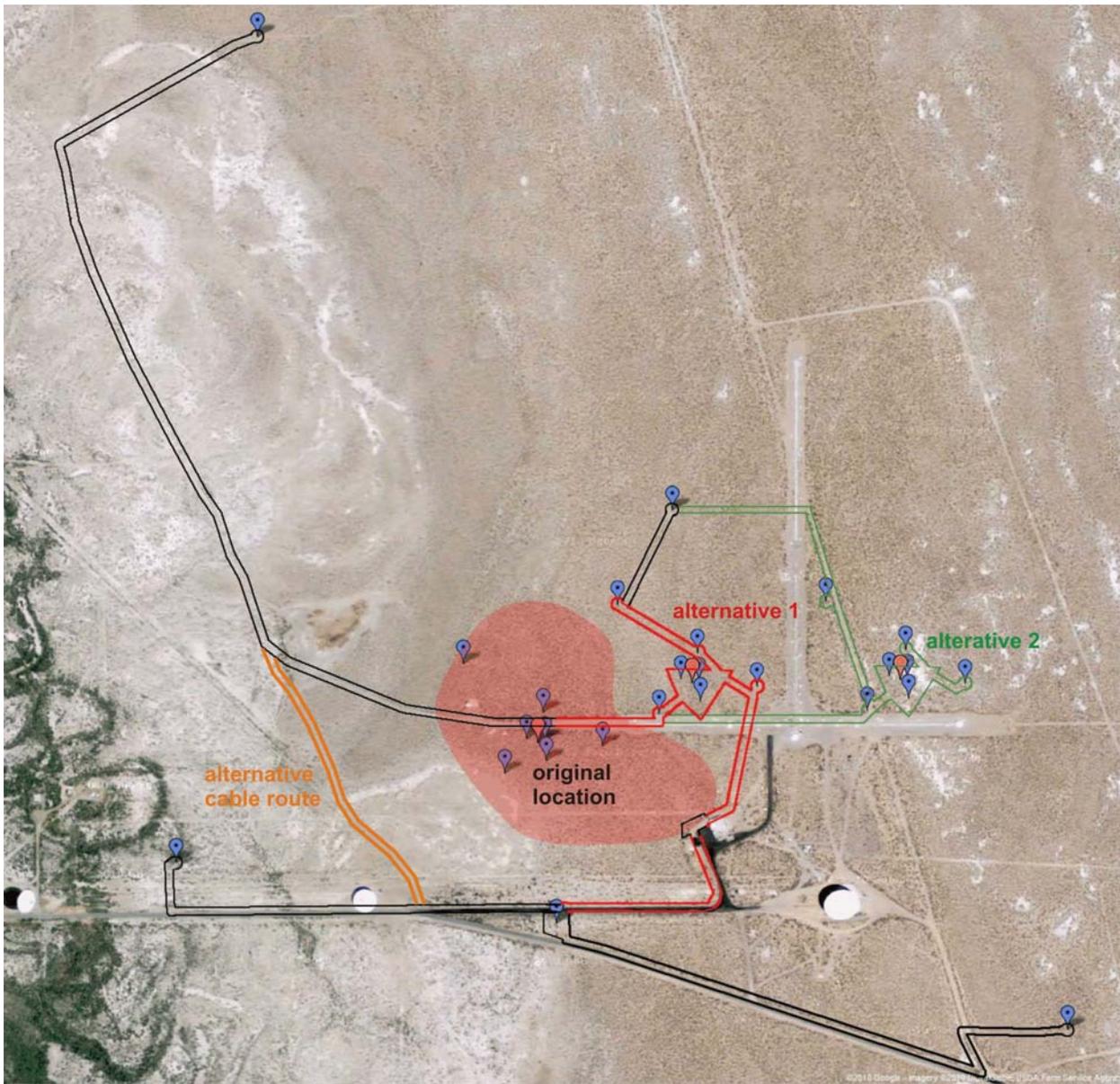


Figure 3. OVSA project alternatives.

Environmental Background

The project area is located at an elevation of approximately 4100 feet (1200 m) in Owens Valley, a fault-graben at the western edge of the Great Basin. Both the Sierra Nevada to the west and the White Mountains to the east of Owens Valley reach over 14,000 feet. Less than a quarter mile west of the project area, the Owens River flows from north to south. The project area itself is located on low-lying alluvial floodplains and terraces along the river, with soils of silts, sands, gravels, and small cobbles. Small obsidian cobbles occur naturally in the area, and alkaline soils are evident in playa-like areas, former oxbows of the Owens River. Within the desert scrub vegetation community, dominant plant species include indigo bush (*Psoralea fremontii*), shadscale (*Atriplex confertifolia*), rabbitbrush (*Chrysothamnus* sp.), and ephedra (*Ephedra* sp.). The climate is semi-arid,

with mild summers, cold winters, and about 8 inches of precipitation annually. Paleoclimatic data indicate that variations in temperature and moisture over the past 10,000 years had profound effects on the density and distribution of plant species, which in turn would have affected human settlement.

Cultural Background

Overviews by Bettinger (1982a), prepared for the Forest Service, and Busby et al. (1980), prepared for the Bureau of Land Management (BLM), discuss archaeological work in the Owens Valley. In northern Owens Valley, excavations have been conducted at permanent village sites as well as at temporary camps used for gathering plants or hunting (Basgall and Giambastiani 1995; Bettinger 1989a; Bettinger et al. 1984; Bouscaren 1985; Burke et al. 1995; Burton 1986, 1996, 2005a, b; Delacorte and McGuire 1993; Garfinkel 1980). Other notable work includes an extensive sample survey by Bettinger (1975) and von Werlhof's (1965) study of Owens Valley rock art. More recently, numerous archaeological sites have been excavated in advance of construction along U.S. Highway 395 (e.g. Basgall et al. 2003; Delacorte 1999; Delacorte et al. 1995; King et al. 2001; Zennah and Leigh 2002).

The following chronology, based on time-sensitive projectile points, has been proposed by Bettinger (1982a:89-92; cf. Bettinger and Taylor 1974) for the eastern Sierra region:

Pre-Mediterranean

Mohave complex (pre-3500 B.C.) indicated by Mohave, Silver Lake, and Great Basin Transverse point assemblages.

Mediterranean

Little Lake Period (3500 to 1200 B.C.) indicated by Little Lake and Pinto series points and Humboldt Concave Base bifaces.

Newberry Period (1200 B.C. to A.D. 600) indicated by Elko Series projectile points.

Haiwee Period (A.D. 600 to 1300) indicated by Eastgate and Rose Spring Series projectile points and Humboldt Basal Notched bifaces.

Marana Period (A.D. 1300 to historic times) indicated by Cottonwood and Desert Side-notched projectile points.

Information compiled from various excavations and surveys provides a glimpse of prehistoric lifeways in the region. The earliest sites contain small artifact assemblages that included bifaces, simple flake tools, faunal remains, and occasionally millstones. The high percentage of non-obsidian material noted at these early sites has been attributed to wide-ranging mobility. The following Little Lake period is also characterized by high mobility: free-ranging groups maintained base camps adjacent to riparian areas, and made frequent short-term use of temporary camps to exploit a variety of ecological zones.

During the Newberry period, biface types were standardized and ground stone became formalized.

Subsistence focused on dryland and wetland seeds, lagomorphs, birds, and fish. Intensive production of bifaces of Casa Diablo obsidian, from Long Valley to the north, has been well-documented for this time period, and there is some evidence that pinyon pine nuts were being collected by A.D. 1. House structures suggest base camps, and hunting blinds suggest hunting of large game by small groups.

During the Haiwee period, there appears to be increasing settlement centralization, and a shift towards intensive land use focused on increased use of small animals and plants. Haiwee artifact components are dominated by casual flake tools and shaped groundstone artifacts. In the Marana period, the trend toward intensifying land use in the Owens Valley continued, with some villages occupied essentially year-round. Collection of seeds and pinyon pine nuts intensified, and seed collection expanded in marginal areas, including high elevations. There was also an increased use of marginal resources, such as fresh-water mussel. There may have been a greater shift to expedient technologies, with more common use of flakes as tools and the re-introduction of casual groundstone types.

The inhabitants of the Owens Valley at the time of Euroamerican contact were the Paiute, Numic speakers of the Uto-Aztecan language family. Ethnographic information on the region is found in works by Steward (1930, 1933, 1934, 1938), Stewart (1939, 1941), Coville (1892), Irwin (1980), Kroeber (1925), and Merriam (1955). There are several excellent reviews of what is known about the ethnography of the region, in the Forest Service and BLM overviews mentioned above and in the series of reports describing investigations along Highway 395 (Basgall et al. 2003; Delacorte 1999; Delacorte et al. 1995; King et al. 2001; Zannah and Leigh 2002).

The Owens Valley Paiute were relatively sedentary for a Great Basin group, with year-round occupation in permanent villages located along streams flowing from the Sierra Nevada. Short-term visits were made to temporary camps for resource procurement. In contrast to other groups in the area, leadership was hereditary (Liljeblad and Fowler 1986). Headmen were responsible for organizing communal work projects, such as irrigation, and festivals, which may have served to redistribute resource surpluses as well as other social functions (for complete discussions, the reader is referred to Bettinger and King 1971). In addition, there is evidence of territoriality among the Owens Valley Paiute (Bettinger 1982b).

Owens Valley was traversed by Euroamericans as early as 1829-1830, when the British trapper Peter Skene Ogden passed through the area. Expeditions by J.W. Walker in 1833-1843 led to the occasional use of the eastern Sierra valleys as part of an immigrant trail (Busby et al. 1980:37-39). In 1855, Von Schmidt was commissioned to map lands east of the Sierra, which included Owens Valley. In Owens Valley, Von Schmidt unknowingly recorded Paiute irrigation ditches (Lawton et al. 1976).

Prospecting and mining in the region began in the 1850s; the first mining district in the Inyo Mountains was established in 1860. The first permanent herds of cattle were brought into Owens Valley in 1861 to supply the growing mining camps of the Inyo region. The grazing, along with the cutting of pinyon for lumber and firewood by the miners and ranchers, reduced the Paiute food

supply greatly by the winter of 1862. Descriptions of the ensuing battles between the Paiute and the new settlers are given in numerous accounts (e.g. Chalfant 1922, Wright 1879). The army established Camp Independence near the present day town of Independence in 1862. The main fighting was over by 1863 and most of the Paiute in the region were moved south to a reservation at Fort Tejon.

Some of the Paiute who remained after the forced removal continued attacks, but hostilities ended by the winter of 1865-66. Over the next few years most of the displaced Paiute returned; however, they were then largely dependent on the Anglo economy. By that time, farming was well established in the Owens Valley. With the ending of hostilities, settlement of the region continued unabated. Mining provided an early incentive for development and the Laws to Keeler segment of the Carson and Colorado Railroad was completed by 1883. Between 1900 and 1905 the railroad became a subsidiary of the Southern Pacific Railroad. In 1943 it was dismantled (Turner 1964, 1965).

In the 1880s, cattle ranching and lumber production replaced mining as the main enterprise, although small-scale mining still continued. By the early twentieth century homesteaders had established residences and farms in many parts of Owens Valley, most of them heavily dependent upon irrigation. In the early 1900s the eastern Sierra was promoted as a resort destination.

In 1905 Los Angeles began buying water options and rights-of-way for an aqueduct that would eventually take most of the Owens Valley water to supply the growing city. The 233-mile-long Los Angeles aqueduct, completed in 1913, carried only surplus water to Los Angeles until 1919. Local farmers prospered as farm prices rose with the expanded markets of World War I. But after several years of drought and exponential population growth, Los Angeles increased its export of water from the Owens Valley. LADWP land ownership continues to affect settlement patterns in the region. A second Los Angeles Aqueduct, supplementing the one completed in 1913, was completed in 1970. Although ranching still continues on a small scale in the Owens Valley, recreation and tourism have become the dominant industry in the region.

Research Topics

One of the criteria for the National Register of Historic Places is “that have yielded, or may be likely to yield, information important in prehistory or history” (criterion D, 36 CFR 60.4), and archaeological sites are often determined eligible for the Register for their potential to address research questions. As a result of previous archaeological work in the Inyo-Mono region, many research questions have been identified. For ease of reference, these can be divided into the eight thematic categories below. Not all sites in the region will have information on all, or even most, categories. But by estimating the quantity and quality of data categories present at a particular site, its information potential (and therefore National Register eligibility under criterion D) may be addressed (see Moratto 1981). Although the project area is too small to provide definitive answers for most of these questions, data from sites in the project area can be combined with data from other sites to discern regional patterns.

Prehistoric Subsistence, Production, and Exchange

Subsistence change: Bettinger (1975, 1976, 1977, 1982a, 1999) has interpreted archaeological evidence in Owens Valley as indicating changes in subsistence through time. Bettinger and Baumhoff (1982) relate some of these changes to the Numic invasion/incursion, and postulate that a different Numic subsistence strategy supplanted the pre-Numic strategy. Other researchers (Hall 1981; Munday and Lincoln 1979; Bouscaren et al. 1982; cf. Bettinger 1979, 1981) have questioned whether there is sufficient evidence to support these inferences. Some researchers have postulated subsistence intensification through time (Basgall and McGuire 1988; Delacorte 1999). Are these changes evident in the project area? If so, do they reflect more labor-intensive strategies, or involve more marginal resource areas? Data on subsistence are found in evidence of food procurement and diet (e.g., vertebrate faunal remains, shell, floral remains, fire-cracked rock) and tools related to subsistence (e.g., projectile points, milling equipment, pottery, hearths).

Obsidian production: Did the technology of obsidian reduction change through time? Did climatic or catastrophic events (Hall 1983, 1984) disrupt production? Are there differences in production for exchange of luxury or utilitarian items (Moratto 1972)? Data on obsidian production can be derived from sites containing evidence of local manufacture of trade items such as obsidian bifaces (preforms) or cores and from the analysis of lithic debris.

Regional and inter-regional (trans-sierran) exchange systems: What was the direction and intensity of exchange? Who were the producers, and who were the consumers? Was obsidian obtained directly by visiting groups or through exchange with the local inhabitants or middlemen? What is the antiquity of formalized exchange systems; estimates vary from as early as 3500 B.P. (cf. Bettinger 1982a; Hughes and Bettinger 1984), to as recent as the late prehistoric (Basgall 1983, Bouey and Basgall 1984). In Owens Valley, shell and stone beads have been equated with a local money economy in late prehistoric times (Bettinger 1982b; Bettinger et al. 1984). Is this money economy reflected in the archaeological record of the project area? How would it have affected local subsistence and trade? Exchange system data can be found in artifacts that reflect trade (e.g., non-local material or manufacture).

Technology, tool use, and curation: Can the timing, causes, and consequences of technological innovations, such as the introduction of the bow and arrow or ceramics, be defined and clarified? Bettinger et al. (1984) have postulated that differences in pre-Numic and Numic subsistence strategies would result in differences in tool use and curation. For example, the “traveler” strategy of the pre-Numic would result in longer curation and more caching of artifacts than the Numic “processor” strategy.

Prehistoric Demography and Settlement Patterns

Settlement patterns: Often intimately tied with subsistence, the questions listed under Subsistence, Production, and Exchange also will pertain here. However, settlement pattern studies may include specifics of site location. For example, are sites more likely on ridgetops or along drainages? Were certain soil types, or vegetation covers, more likely chosen for habitation or campsites? Did the types of locations occupied change through time? Does intra-site or regional patterning reflect social organization?

Cultural succession: Investigate the hypothesis concerning the Numic invasion/migration as forwarded by Lamb (1958) and elaborated upon by others (Ambler and Sutton 1989; Bettinger and Baumhoff 1982; Sutton 1986). Relevant data can be found in rock art sites, changes in artifact styles, and settlement types.

Art, Ritual, and Cultural Identity

Art and ritual: Can the analysis of artifact designs, style, or function provide clues to ritual or symbolic content? Can any ritual artifacts or features be identified?

Rock art: Analysis of designs, style, environmental context, and associations may provide information on ritual communities (Whitley 1987), social function, style, and cultural identities. For example, Bettinger and Baumhoff (1982) use rock art data as one line of evidence in their argument concerning Numic replacement of pre-Numic populations.

Cultural affiliation: Can culture affiliation be discerned through culturally diagnostic artifacts, features, technology, or ethnically-controlled raw material?

Ethnography: Test the fit between the ethnographic and archaeological records (Thomas 1973).

Acculturation: Examine the effects of the Euroamerican incursion on local native groups, through their material correlates.

Prehistoric Social Organization and Territoriality

Social organization: The documented presence of craft specialization and hereditary headmen in the Owens Valley argues for established sociopolitical complexity in the protohistoric-historic period (see Bettinger and King 1971). Evidence of craft specialization in the project area may provide data on the geographic extent of this complexity.

Territoriality: Territoriality is manifested in the degree of resource protection or restriction. Bettinger (1982b) has postulated that Owens Valley groups were territorial, based on the distribution of artifacts made of Fish Springs obsidian. Is there archaeological evidence of territoriality in the project area?

Regional Chronology

Chronology: Researchers have provided and refined a basic chronology useful for the Western Great Basin (Bettinger and Taylor 1974; Heizer and Hester 1976; Thomas 1981). However, refinement of this chronology is desirable because of the morphological and temporal overlap of projectile point types in the Inyo-Mono region (Jackson and Bettinger 1985:49-50; Flenniken 1985; Flenniken and Raymond 1986). Further, some types, such as Great Basin stemmed series projectile points, are less well defined. Other temporally diagnostic artifacts, such as shell beads, have been dated primarily in contexts outside east-central California, often using highly variable radiocarbon associations. Chronometric data can be derived from sites that permit temporal control (e.g., time sensitive artifacts, organic materials suitable for radiocarbon dating, or obsidian for hydration dating).

Paleoenvironmental Reconstruction

Past climates: Test and refine existing models of climate reconstructions. Can the effect of climate change on human occupation be discerned in the archaeological record? Relevant data can be found in faunal and floral remains, fossil pollen, and tephra. Investigate floral succession and changes in faunal distributions and their effect on human occupation.

Formation Processes

Site formation processes: What postoccupational human or natural agencies have altered the presence, condition, distribution, and nature of archaeological remains? What kinds of materials may have been present, but not preserved in archaeological deposits? How has mixing (Zeanah and Leigh 2002) affected the archaeological record?

Obsidian hydration: Clarify source-specific obsidian hydration rates. Can problems in application be overcome (Bettinger 1989b; Green 1986, Jackson 1984a, b)?

Scavenging and reuse: Have the deposits or cultural materials been reworked or disturbed by past occupants? There is a growing body of data suggesting that scavenging of both flaked and ground stone artifacts is common (Bettinger 1989a); what is the effect on the archaeological record? Detailed lithic analysis, in combination with precise temporal control, is generally needed to address this issue.

Historical Period

The following general research themes are adapted from those suggested by Hardesty (1990) for historical sites in the intermountain West.

Acculturation and adaptation: What are the mechanisms of acculturation and adaptation when groups of different cultural backgrounds (e.g., Anglo settlers and native Paiute) meet?

Economics and land-use: What are the characteristics of boom-bust cycles? How does the retraction and expansion of capital for mining and ranching (often from distant sources) affect the local economy and culture? Hardesty notes that during the nineteenth century change was often more rapid in the countryside than in towns, because of rural ties with urban capitalism. How rapidly did change in styles or technology reach the eastern Sierra? How are economic ties to metropolitan areas structured? Although the West is famous for images of rugged individualism and independence recently manifest in the “Sagebrush Rebellion,” to what extent are the western economies actually dependent upon the Federal government (e.g., dam projects, military bases)? How accurately does the historic record reflect actual land use patterns and economies?

Prefield Research

A records search was conducted through the California Historical Resources Inventory System (CHRIS), Eastern Information Center, located at the University of California, Riverside. As the information center for Inyo County, CHRIS has copies of all archaeological reports and site records for the area. The records search also included a review of the listings of the National Register, California Historic Landmarks, and the California Inventory of Historic Places, as well as early USGS maps and GLO plats.

CHRIS records indicate that no survey had been done of the project areas and that there were no known sites within the project area (Appendix A). The 1950 USGS map shows no historic buildings within the project areas, however the Southern Pacific Railroad dismantled in 1943 is still depicted. Two surveys have been conducted in the project vicinity. Sample survey of one quadrat (Bettinger 1975) within bottomland areas encountered no archaeological sites, although a survey of the riparian river corridor (McCombs 2008) did encounter and record one site, a portion of the Sanger Ditch. The Sanger Ditch includes a low rock diversion dam, headgate, and unlined ditch. Built prior to 1913, the ditch is still depicted on the most recent USGS map, about 200 m west of the project area.

Methods

Fieldwork, totaling 12 person-days, was conducted May 3-4, and June 26-27, 2010. The proposed project areas were easily located in the field, because they were either staked or along existing roads. A crew of two archaeologists walked the entire proposed project areas, for the originally proposed project and for the two alternatives. Where proposed road or trench alignments were staked, one archaeologist walked the just off the center line in both directions, while the other archaeologist walked parallel 10 m away, for a survey corridor 25 m wide. Along paved and dirt roads, one archaeologist walked both sides of the road and another walked 10 m beyond the road, for a corridor 30 m wide. The linear surveyed totaled 4.7 km by 25-30 m.

The telescope locations were staked, so were generally surveyed to include an area 30 m in diameter. However, in all alternatives, telescope locations A-1-4 and the proposed location for the construction trailer are close enough that they formed a small polygon parcel, about 5,500 sq m in size. Telescope locations A-5, -6, and -7 were adjacent and overlapping. Telescope location A-9, between two paved roads, was slightly larger, 40 by 40 m, or 1,600 sq m. These parcels were walked at 10 m or less intervals along compass transects. During the June field work additional areas were surveyed to better define previously recorded sites and determine the potential effects of the proposed alternatives. Another 15 acres was cursorily examined to fully record sites that extended beyond the proposed project areas.

In all, the survey covered 65 acres. Whenever any cultural material was encountered, the immediate vicinity was examined carefully for additional materials. All areas that met (or that were potentially close to meeting) the CHRIS criteria for sites were returned to later, for further examination and recording. Items not meeting these criteria were recorded as isolates. Each site was recorded on standardized California Historical Resources Inventory System (CHRIS) site survey forms. Selected



Figure 4. Excavating shovel test pit.

artifacts were photographed; artifact locations were plotted with a Trimble GPS unit; numbers and types of artifacts were estimated, and a sketch map was prepared for each site.

Because modern disturbance and soil deposition can affect the visibility of archaeological sites, shovel testing was used to augment the survey results in and around archaeological site OVSA-1. Each shovel test pit was 25 cm by 25 cm in plan, and between 60 and 80 cm deep. Eight shovel test pits were placed at 20 m intervals along the existing road within the site boundaries (Figure 4). Four additional shovel test pits, at 10 m intervals, were excavated near the southwest edge of the site, near the proposed control building location, adjacent to the parking lot for the existing CARMA buildings. One shovel test pit unit was excavated in a dense part of the archaeological site to provide comparative data about the depth and density of the cultural deposit. Each shovel test pit was dug by hand with a shovel or trowel in 10 or 20 cm levels, with all excavated sediments screened. All artifacts encountered were identified, counted, and then replaced in the unit, which was then backfilled.

Results

Six sites and 41 isolates were recorded during the surveys (Figure 5). All of the sites are prehistoric, as were 25 of the isolates. Prehistoric artifacts found include projectile points (Figure 6), a drill, bifaces, cores, core fragments, flakes, groundstone, and freshwater shell fragments. The sites and isolates are summarized below and archaeological site survey records are included as Appendix B.

OVSA-1

OVSA-1 is a dense prehistoric artifact scatter located on a low terrace overlooking an old meander of the Owens River. The site is 300 m north-south by 350 m east-west, or 68,100 square meters (16.8 acres). Artifacts at the site include projectile points, bifaces, retouched flakes, cores, core fragments,

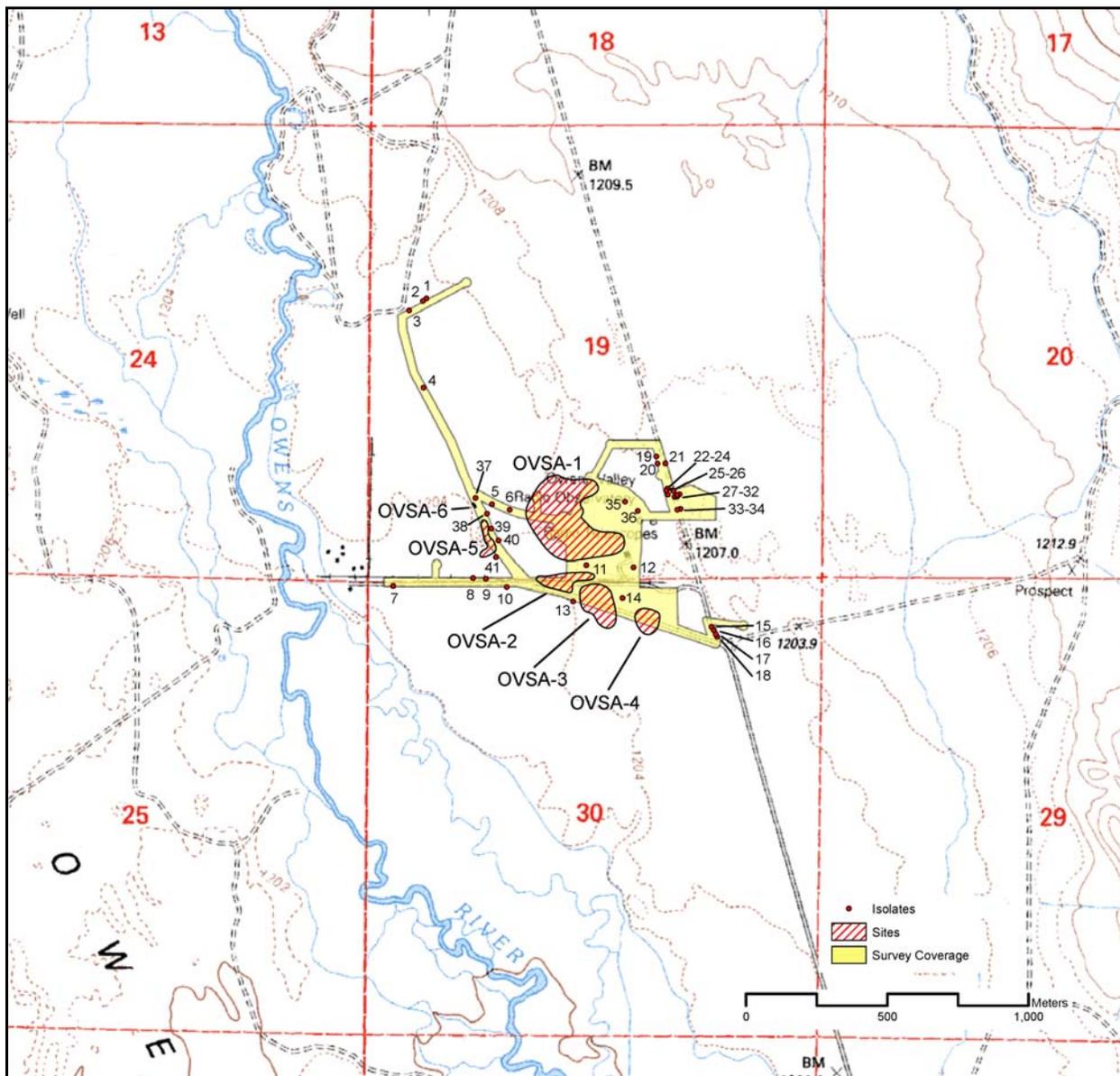


Figure 5. Survey coverage, site, and isolate locations.

debitage (obsidian, chert, and basalt), groundstone, a possible carved stone, and freshwater shell fragments. Four artifact concentrations were identified at the site. Locus 1 includes up to 20 flakes per square meter, Locus 2 includes up to 5 flakes per square meter and hundreds of freshwater shell fragments, and Locus 3 includes up to 5 flakes per square meter and several finished tools. Locus 4, discovered upon closer examination of the site during the June survey, includes a biface fragment and about 100 flakes. The type and diversity of remains indicate intensive occupation, but outside of the loci boundaries, artifact density is less, typically no more than 1 per square meter. A Desert Side Notched projectile point suggests post A.D. 1300 site use. Existing impacts include concrete pads for a 1-m and a 5-m radio telescope, a dirt road, a buried cable, cattle grazing, and erosion.

Shovel testing was undertaken at OVSA-1 to better define the vertical and areal extent of the site (Table 1). The dirt road through the site appears to have been bladed through the cultural deposit,

Table 1. Shovel Test Units at Site OVSA-1.

Unit	Level (cm)	Artifacts	Soil Notes
1	0-20	0	loose
	20-40	0	
	40-60	0	very compact
2	0-20	0	
	20-40	0	
	40-60	0	very compact
3	0-20	0	loose
	20-40	0	very compact at 30 cm
	40-60	0	slightly compact
4	0-20	0	loose
	20-40	0	very compact at 30 cm
	40-60	0	slightly compact
5	0-20	5 obsidian flakes	
	20-40	0	very compact at 30 cm
	40-60	0	
6	0-20	4 obsidian flakes, 1 shell fragment	
	20-40	0	very compact
	40-60	0	slightly compact
7	0-20	1 obsidian flake	
	20-40	1 obsidian flake	very compact at 25 cm
	40-60	3 obsidian flakes	slightly compact
	60-80	0	
8	0-20	4 obsidian flakes	
	20-40	2 obsidian flakes	
	40-60	0	
9	0-20	1 obsidian flake	
	20-40	1 obsidian flake	very compact at 30 cm
	40-60	2 obsidian flakes	slightly compact
	60-80	0	
10	0-20	0	
	20-40	0	very compact at 30 cm
	40-60	0	slightly compact
11	0-10	1 obsidian flake	loose
	10-20	1 obsidian flake	

Table 1. Shovel Test Units at Site OVSA-1.			
Unit	Level (cm)	Artifacts	Soil Notes
	20-30	3 obsidian flakes	very compact
	30-40	2 obsidian flakes	slightly compact
	40-50	0	
	50-60	3 obsidian flakes	
	60-70	0	
	70-80	0	
12	0-20	0	
	20-40	0	very compact at 30 cm
	40-60	0	slightly compact
A	0-10	1 obsidian biface fragment, 19 obsidian flakes, 1 basalt flake	loose
	10-20	6 obsidian flakes	loose
	20-30	3 obsidian flakes	
	30-40	0	very compact
	40-50	0	slightly compact
	50-60	0	
	60-70	0	
	70-80	0	
Soil consisted of sandy-silt with a few gravels, increasing silt content with depth, 7.5 YR 7/1 (light gray) to 10 YR 6/2 (light brownish gray). No rocks were encountered.			

and it was not known if intact cultural material was still present beneath the roadway. Near the southeastern edge of the site, it was not clear if adjacent modern disturbance obscured cultural deposits. Six of the eight shovel test pits excavated in the road contained artifacts, consisting of between 4 and 10 obsidian flakes; one shell fragment was also encountered. In two of the six units with cultural material, the artifacts were confined to the top 20 cm, but in three of the units, artifacts were encountered below 40 cm depth. Extrapolating these results yields an estimate of artifact density of about 250 per cubic meter. None of the four shovel test pits excavated near the southeastern edge of the site contained cultural material. The shovel test pit excavated in Locus 1 of the site and about 50 m to the north of the road yielded 30 artifacts, extending to 30 cm depth. Here, artifact density would be extrapolated to be about 1440 per cubic meter.

OVSA-2

OVSA-2 is a prehistoric artifact scatter located on a low ridge that extends into a playa that was a former meander or oxbow lake of the Owens River. The site is 60m north-south by 200m east-west, or 8,200 square meters (2 acres). Artifacts at the site include an obsidian biface fragment, a retouched

obsidian flake, an obsidian core, about obsidian 100 flakes, two mano fragments, a metate fragment, and a few freshwater shell fragments. The ridge appears to have been created during road construction from fill that was removed from roads within site OVSA-3. The cultural material therefore is most likely a secondary deposit. Most of the site area is fairly sparse, but there are up to 5 flakes per square meter in one area.

OVSA-3

OVSA-3 is a prehistoric artifact scatter located on a low terrace overlooking an old meander of the Owens River. The site is 160 m north-south by 120 m east-west, or 14,230 square meters (3.5 acres). The site is bisected by a road cut and truncated on the north by another, wider, road cut. No artifacts were found along the road edges, suggesting that the road cuts are well below the cultural deposit. Material from the road cuts was apparently used for road fill to the west (OVSA-2). Artifacts at the site include two biface fragments, a core, a core fragment, three retouched flakes, and abundant debitage, all obsidian. Other artifacts noted consist of a groundstone fragment and a few freshwater shell fragments. Two artifact concentrations were identified at the site. Locus 1 includes up to 10 flakes per square meter. Locus 2 consists of an area of eroding artifacts along the upper edges of the road cut at the north end of the site, suggesting a buried cultural deposit. It includes up to 12 flakes per square meter.

OVSA-4

OVSA-4 is a prehistoric artifact scatter located on a low terrace east of an old meander of the Owens River. The site is 90 m north-south by 85 m east-west, or 6,280 square meters (1.5 acres). The site is bisected by a paved road. No artifacts were found along the road edge, suggesting that the road cut is well below the cultural deposit. Artifacts include a Rose Spring Corner Notched projectile point reworked into a drill, two biface fragments, a core fragment, and about 200 flakes, all obsidian. Two artifact concentrations were identified at the site. Locus 1 includes up to 10 flakes per square meter, Locus 2 includes up to 5 flakes per square meter. The Rose Spring Corner Notched projectile point suggests A.D. 600-1300 use.

OVSA-5

This site consists of three biface fragments, a metate fragment, and about 100 flakes located on a playa and the adjacent hillslope. The site is 130 m north-south by 65 m east-west, or 6,280 square meters (0.8 acres). Most of the artifacts occur within a 30-m-diameter area; those found outside that concentration, appear to have been spread out by disturbance. Currently impacted by roads and several buried cables, OVSA-5 is outside the current project areas, and would not be impacted by either the originally proposed project nor the two alternatives.

OVSA-6

This site consists of a small obsidian core and 11 obsidian flakes, with ten of the flakes located on the playa, and the core and one flake 15 m to the south on a sandy hillside. Likely representing a one-time knapping event, the site is outside the project areas would not be impacted by the proposed project nor the two alternatives.

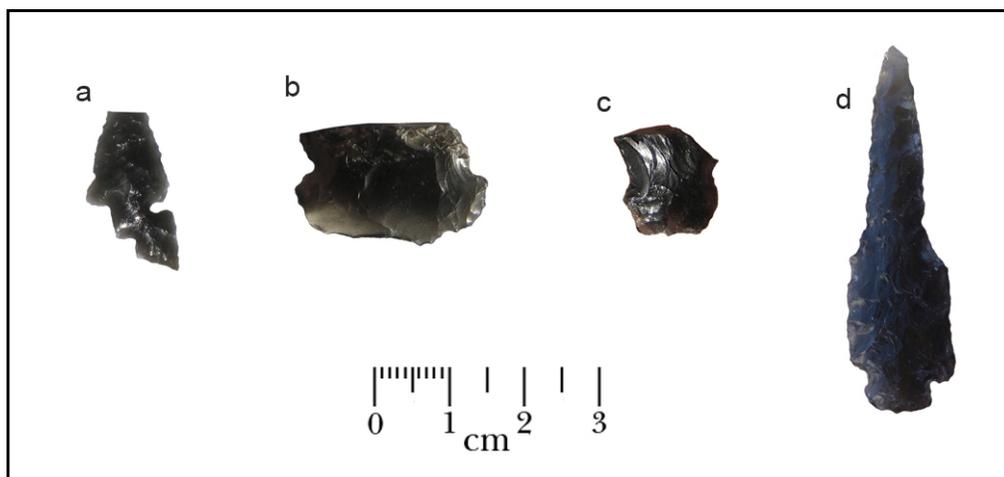


Figure 6. Projectile points found during the OVSA survey, a. Desert Side Notched (OVSA-1), b. large side notched (OVSA-1), c. stem fragment (OVSA-1), d. Rose Spring Corner Notched reworked into drill (OVSA-4).

Isolates

Forty-one isolates, occurrences of cultural material that did not meet the criteria for site designation, were recorded and plotted (Table 2). The 25 prehistoric isolates consist of a secondary deposit of obsidian flakes, a retouched obsidian flake, an obsidian biface fragment, an obsidian core, a grouping of two obsidian flakes, and 20 single unmodified obsidian flakes. The 16 historic isolates included eight cans, a barrel hoop, a metal band, two broken railroad spikes, and four railroad ties or railroad tie fragments. Although the secondary deposit includes 19 flakes, it was not recorded as a site because it is obviously a recent deposit of cultural material. Although the flakes may have come from one of the sites in the vicinity, they lack integrity of location, setting, and context. The railroad spikes and ties were not recorded as a site for a similar lack of integrity: the railroad bed is now a graded road, and the two railroad ties and tie fragments lack historical context.

Significance

The legal guidelines for evaluation and management of archaeological sites on public land or effected by a federal undertaking are outlined by the National Historic Preservation Act, as amended, and specified in the Code of Federal Regulations, Title 36, Section 60.6, which states:

The quality of significance in American history, architecture, archeology, and culture is present in districts, sites, building, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

- (A) that are associated with events that have made a significant contribution to the broad patterns of our history; or
- (B) that are associated with the lives of persons significant in our past; or

(C) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(D) that have yielded, or may be likely to yield, information important in prehistory or history.

Archaeological sites are usually evaluated against National Register criterion D: the ability to provide information that is important in prehistory or history. Implicit in National Register criterion D is the need to measure sites against viable research questions. However, this quality of significance, the ability to provide information in history and prehistory, or address scientifically consequential research questions, has been subject to much discussion. The Advisory Council on Historic Preservation, in *Treatment of Archaeological Properties: A Handbook* (1980) states that sites "... are important ... because they may contribute to the study of important research problems" (Principle III, p. 8).

1. obsidian flake	21. obsidian flake
2. obsidian flake	22. hole-in-cap can
3. obsidian flake	23. obsidian flake
4. obsidian flake within dirt road	24. 12 ft long metal band
5. obsidian flake	25. broken railroad spike
6. obsidian flake	26. obsidian flake
7. two obsidian flakes on south edge of paved road	27. hole-in-cap can
8. 19 obsidian flakes in two concentrations, 20 m apart within radio telescope trackway	28. low-profile MJB coffee can
	29. sanitary seal can
9. obsidian flake	30. hole-in-cap can
10. obsidian flake	31. can top fragment
11. obsidian flake	32. sanitary seal can
12. obsidian flake	33. barrel hoop
13. obsidian flake	34. obsidian flake
14. obsidian core	35. retouched obsidian flake
15. railroad tie fragment	36. obsidian biface tip
16. railroad tie	37. obsidian flake
17. three railroad tie fragments	38. obsidian flake
18. railroad tie	39. obsidian flake
19. broken railroad spike	40. obsidian flake
20. church-key opened can	41. obsidian flake

The evaluation of archaeological sites would ideally consider (1) the relative abundance of the resources to be affected, (2) the degree to which specific kinds of data are confined to the study area, (3) the range of research topics to which the resources may contribute, and (4) recognized deficiencies in current knowledge of cultural history in and near the project area (Scovill et al. 1972:21). The first two factors are often difficult to apply, given our incomplete knowledge of the resources in the region. Developments in archaeological methodology, in general, and past research in the region do provide information for the last two factors.

With the identified research questions as a guide, the significance of the sites, as measured by their eligibility for the National Register of Historic Places, can be addressed. It should be noted, however, that the recommendations made in this report are the author's opinion, only. The lead agency (National Science Foundation), in consultation with the land-managing agency (Los Angeles Department of Water and Power) and the State Historic Preservation Officer (SHPO), decides whether a property is eligible for the National Register, with the final determination made by the Keeper of the Register.

OVSA-1, OVSA-3, and OVSA-4, OVSA-5, and OVSA-6 are recommended as eligible for the National Register for their potential to provide information important in addressing many of the research questions outlined above. OVSA-1 appears to be particularly important: few sites with abundant shell remains have been investigated. Preliminary research has inferred that freshwater mussels were not routinely used, because the work required to collect and process the resource was relatively great, compared to the calories obtained. OVSA-1, OVSA-3, and OVSA-4 are fairly large in size, and all appear to contain subsurface cultural materials. Obsidian from at least three different sources was encountered, as well as projectile points, biface fragments, cores, core fragments, and debitage. This evidence suggests that the sites are not the manifestations of only one-time or ephemeral use, and in fact may represent more substantial patterned behavior. The Owens River is known to have been an important resource area and travel route in ethnographic times, and Stewart's (1933) ethnographic map of the northern Owens Valley shows the project vicinity as a seed gathering and fishing area. The river was undoubtedly important throughout the millennia of human occupation in Owens Valley, and the sites could provide a wealth of data about subsistence, settlement patterns, exchange, obsidian production, and technology. There have been very few archaeological investigations of prehistoric sites east of the Owens River, so the data obtained are not likely to be redundant. OVSA-5 and OVSA-6 are smaller, and OVSA-6 in particular may represent a one-time knapping event. Nevertheless, these two sites may be able to provide important information about ancillary activities that could augment the data potential of the three larger sites.

OVSA-2 is recommended as not eligible, given its lack of integrity. Previous disturbance suggests little potential for any significant data beyond that noted in the survey. While it could be argued that some information could be obtained by studying this secondary deposit (e.g., obsidian hydration dating), it would seem that any such efforts would be better spent where the material originally came from at OVSA-3, which still has substantial intact (and buried) cultural deposits.

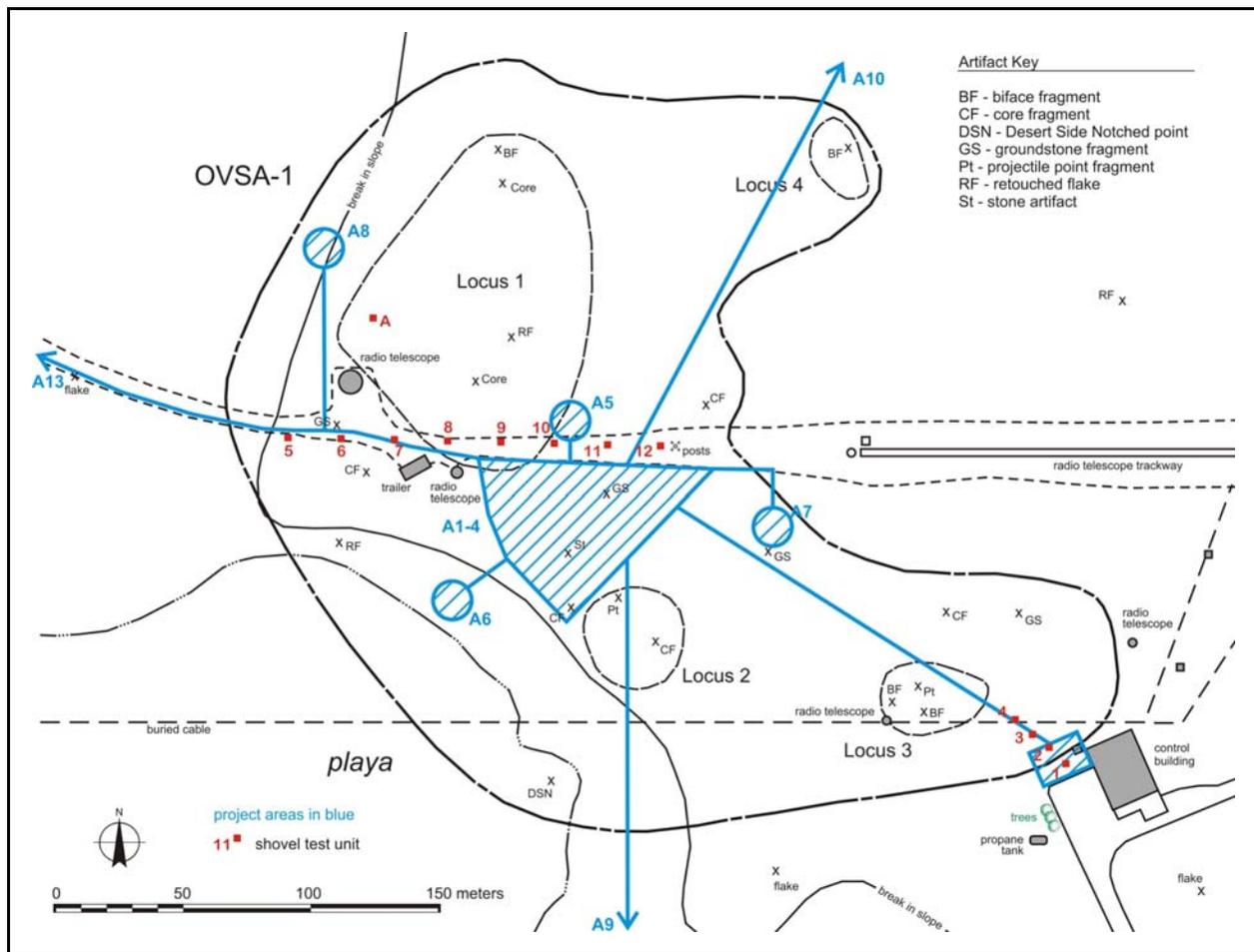


Figure 7. Archaeological site OVSA-1 showing project as originally proposed (in blue).

Recommendations

Four archaeological sites are within the proposed project’s area of potential effect (see Figures 5-7). However, the project as originally proposed would have an “adverse effect,” as defined in 36 CFR 800.5, at only one site (OVSA-1). OVSA-2 is not considered eligible for the National Register, and therefore does not meet the definition of a historic property warranting consideration under the regulations implementing National Historic Preservation Act. Proposed ground disturbance at OVSA-3 and OVSA-4 would occur in previously disturbed areas, and would not affect the cultural deposit nor the information potential of the sites.

OVSA-1 (Figures 7 and 8)

Site OVSA-1 would have been adversely impacted by the project as originally proposed. To avoid impacting this site, the project proponent designed two alternatives.

Original Proposal

The original project proposal called for the construction of seven radio telescopes, installation of buried cables and a temporary construction trailer, and the grading of new roads with this site. In

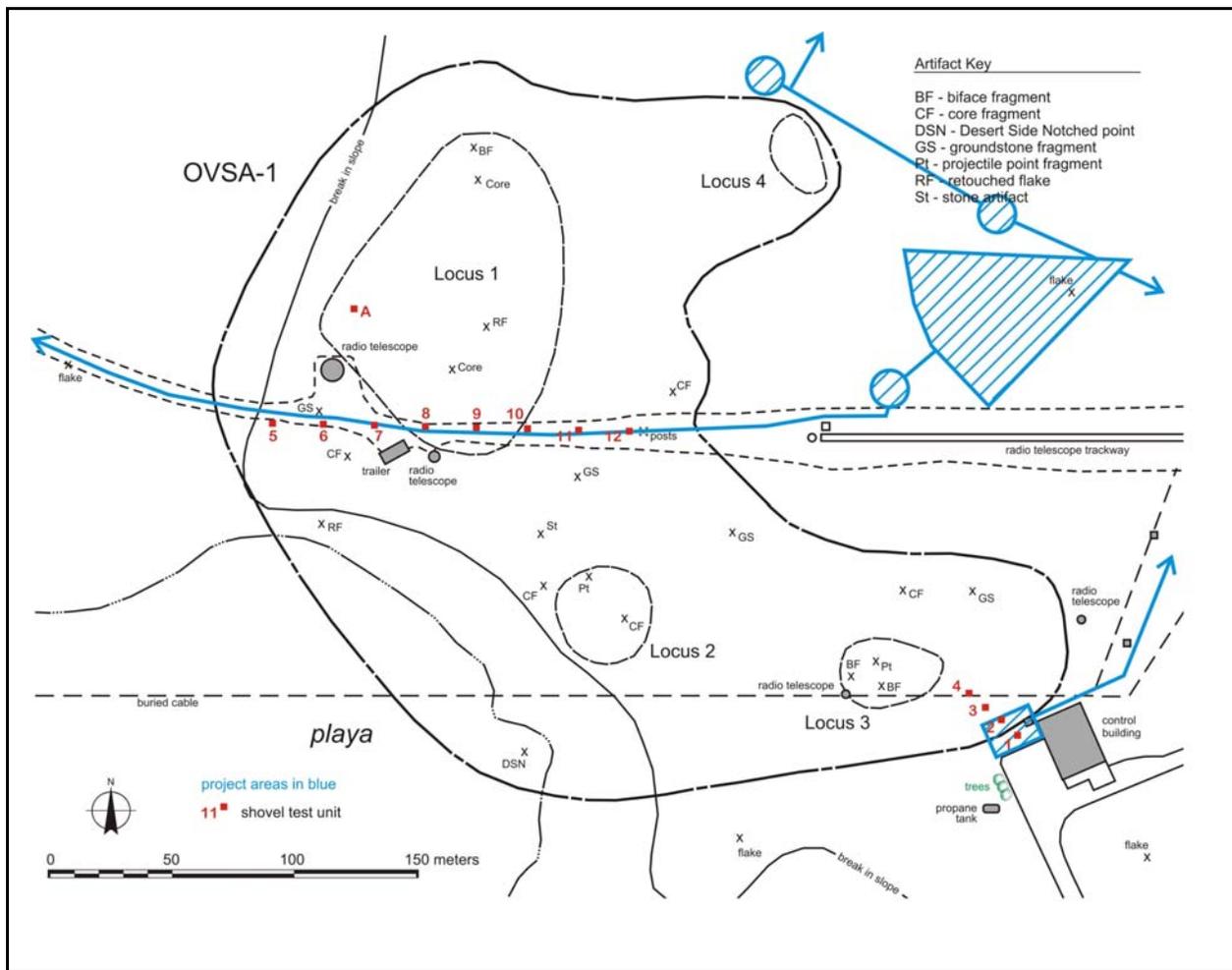


Figure 8. Archaeological site OVSA-1 showing Alternative 1 (in blue).

addition, a permanent control building would be constructed near the site boundary, in a previously disturbed area. When the site was discovered during archaeological survey, avoidance (redesigning the project area to exclude the site) was recommended. The project proponent designed two new alternatives to avoid the site. Although archaeological data recovery and monitoring could mitigate the loss of important information, the preferred treatment for sites from both the archaeological and Native American perspectives is usually avoidance of impacts.

Alternatives 1 and 2

In both Alternatives 1 and 2, the proposed location of the telescopes has been moved to the east to avoid construction within the site. However, in both alternatives, there would still be two project-related activities within the site boundaries:

1. A buried cable would be placed along the dirt road that bisects the site. This area was previously disturbed during road construction, and shovel testing indicates a relatively low density of subsurface artifacts in the roadway, suggesting that the area was not heavily used prehistorically, or that most of the cultural deposit has been removed. It is recommended that trenching for the cable within the site boundaries be monitored, or that an alternative route be

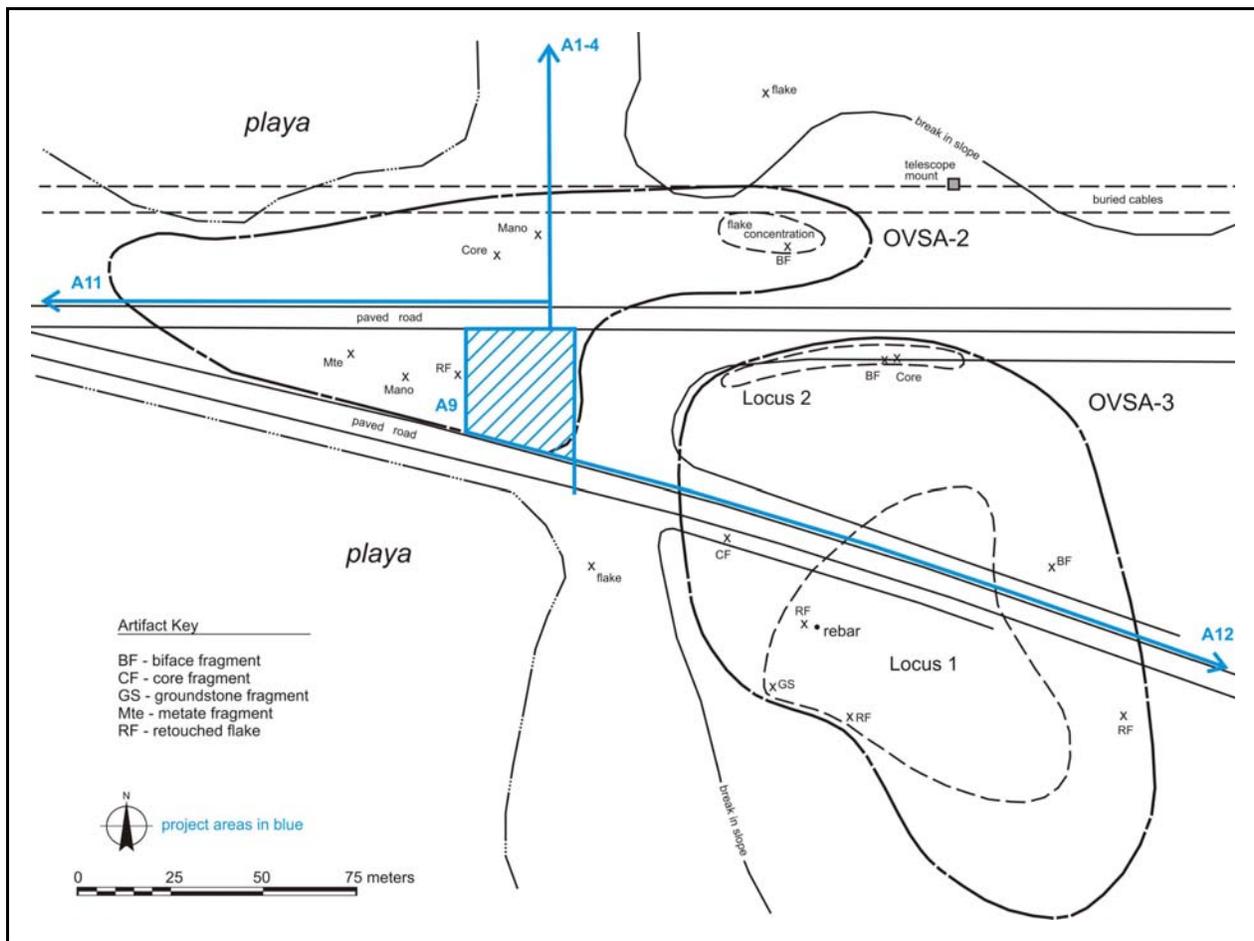


Figure 9. Archaeological sites OVSA-2 and OVSA-3 showing project as originally proposed (in blue).

selected that avoids the site. An alternative route was included in this archaeological survey to confirm that it did not impact other previously unknown sites (See Figure 3).

2. A new modular building of approximately 1,500 square feet would be constructed next to the existing Meyer control building. Although the new building location overlaps the site boundary, it would be built in a previously disturbed area, and would use existing well and sewer utilities. The surface manifestation of the site in this area consists of a few widely scattered flakes, and the shovel test units found no evidence of subsurface cultural deposits. Here, too, even within previously disturbed areas, ground disturbance within the site boundary should be monitored by an archaeologist.

OVSA-2 (Figures 9 and 10)

For the original proposal and for Alternatives 1 and 2 one radio telescope would be constructed, and buried cables installed, within this site's boundaries. However, as described above, the site is a disturbed, secondary deposit, and is not considered to be eligible for the National Register. No further archaeological work is recommended.

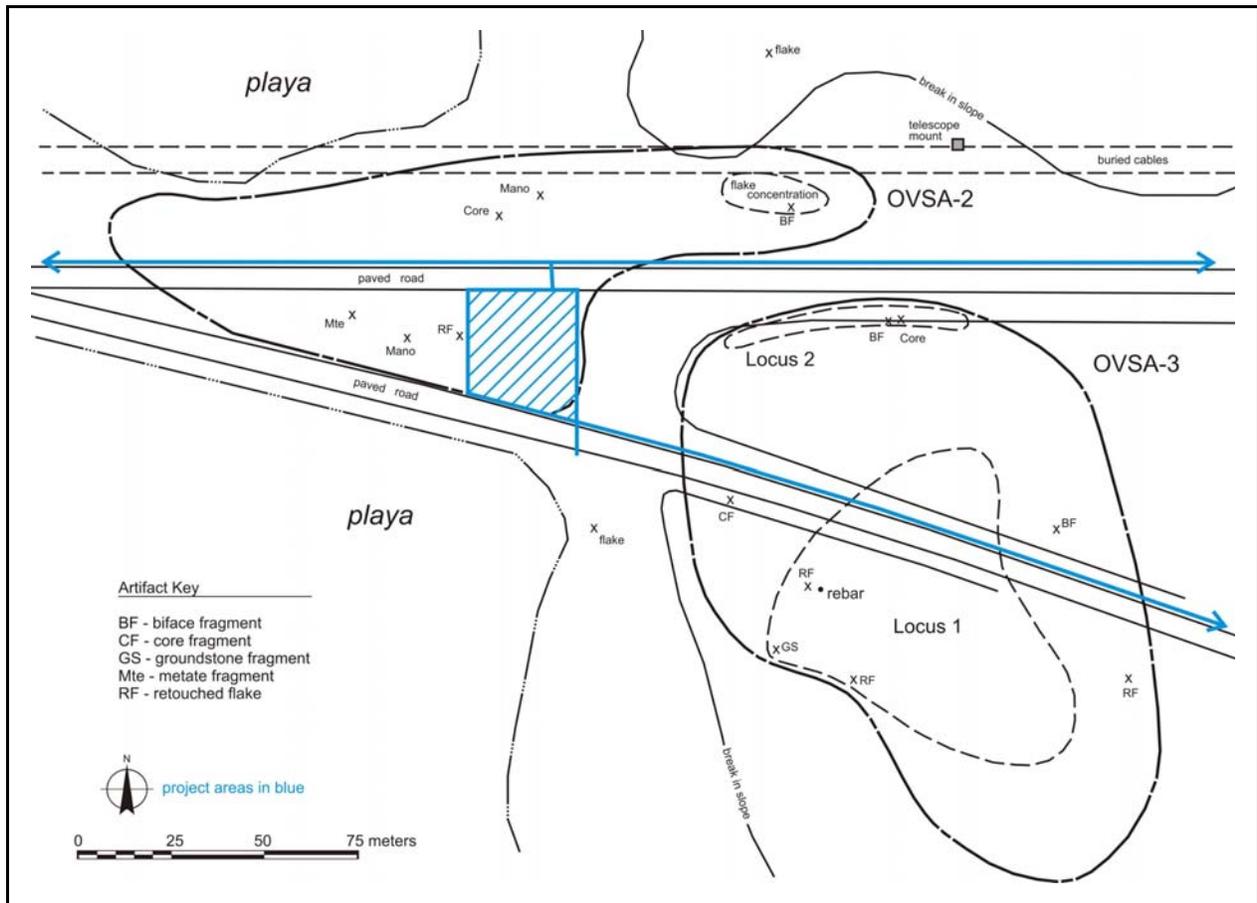


Figure 10. Archaeological sites OVSA-2 and OVSA-3 showing Alternatives 1 and 2 (in blue).

OVSA-3 and OVSA-4 (Figures 9-11)

For the original proposal and for Alternatives 1 and 2, the proposed alignment for a buried cable crosses the boundaries of both of these significant sites. However, the proposed trenching through the site areas would be along the edge of a paved road, and the road cut through the sites is already below the cultural deposit. The road cut is wide enough to accommodate the cable trenching without new disturbance to intact cultural deposits. Therefore, no further archaeological work is recommended at these sites.

OVSA-5 and OVSA-6

Both sites lie outside the proposed project areas, and neither would be affected by the original proposal or Alternatives 1 or 2. The sites are also well west of alternative cable route that would avoid OVSA-1.

Summary

The Owens Valley Solar Array expansion as originally proposed would have an adverse effect on archaeological site OVSA-1, and data recovery would be necessary to mitigate its effects. A finding of “no adverse effect” is recommended for Alternatives 1 and 2, provided that trenching within the site boundaries of OVSA-1 is monitored by an archaeologist. If the alternative route for cable burial is used instead of trenching through OVSA-1, a finding of “no historic properties affected” is

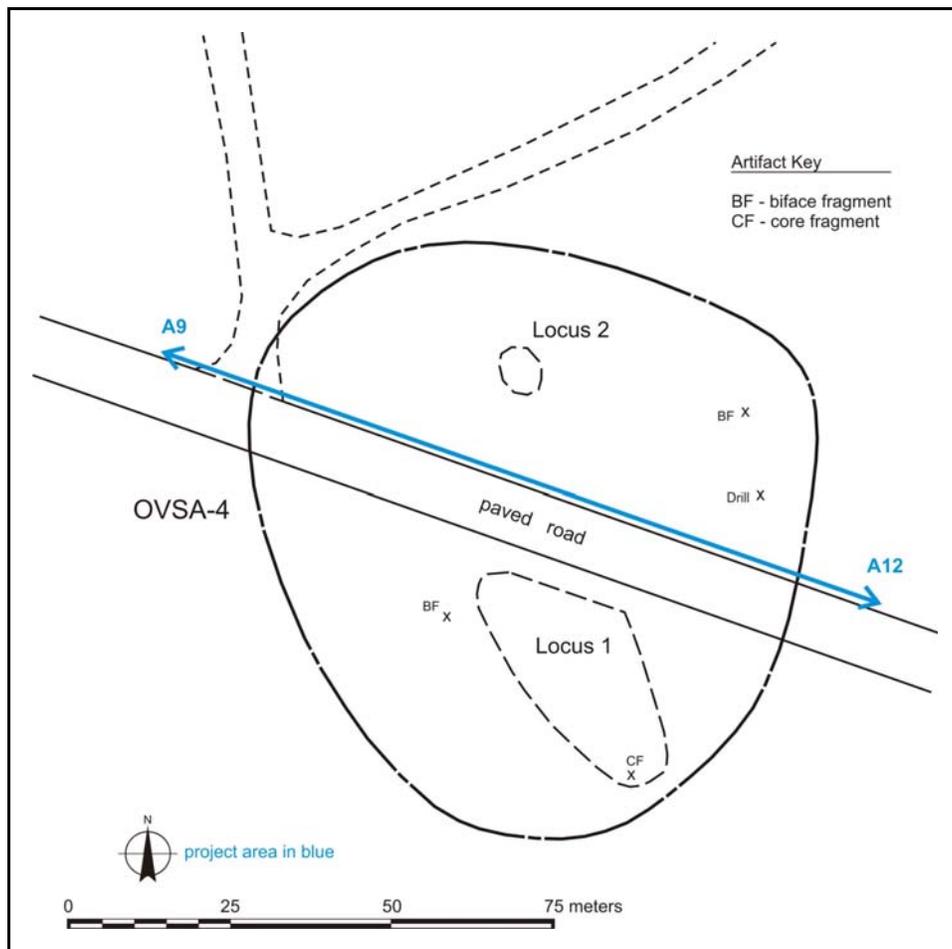


Figure 11. Archaeological site OVSA-4 showing project as originally proposed and for Alternatives 1 and 2.

appropriate. Although the modular building straddles the boundary of OVSA-1 as originally defined, this area has been previously disturbed and shovel testing encountered no evidence of subsurface cultural deposits. As with the recommendations regarding site significance and eligibility for the National Register of Historic Places, these are the author's professional opinions, only. Per the regulations contained in 36 CFR 800, the final finding of effect is made by the lead agency, in consultation with the State Historic Preservation Officer.

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Appendix A
CHRIS Records Search

– not for public distribution –

Appendix B
Archaeological Site and Isolate Records

– not for public distribution –

APPENDIX B

**BIOLOGICAL AND BOTANICAL SCOPING
OVSA EXPANSION PROJECT
INYO COUNTY, CALIFORNIA**

**BIOLOGICAL AND BOTANICAL SCOPING
OVSA EXPANSION PROJECT
INYO COUNTY, CALIFORNIA**



PREPARED FOR

NEW JERSEY INSTITUTE OF TECHNOLOGY

PREPARED BY

TEAM

ENGINEERING & MANAGEMENT, INC.
Bishop and Mammoth Lakes, California

June 23, 2010

**BIOLOGICAL AND BOTANICAL SCOPING
OVSA EXPANSION PROJECT
INYO COUNTY, CALIFORNIA**

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**BIOLOGICAL AND BOTANICAL SCOPING
OVSA EXPANSION PROJECT
INYO COUNTY, CALIFORNIA**

EXECUTIVE SUMMARY

The New Jersey Institute of Technology (NJIT) has proposed an expansion of the existing Owens Valley Radio Observatory located on the Owens Valley floor, northeast of Big Pine, California. To assist with compliance of the California Environmental Quality Act and the National Environmental Policy Act, NJIT retained TEAM Engineering & Management, Inc. (TEAM) to conduct a limited environmental assessment of the subject site relating to the proposed Owens Valley Spiral Array (OVSA) Expansion Project.

TEAM conducted a botanical and biological survey for the proposed OVSA expansion. Work included evaluating the potential impacts on any populations of federal or state-listed threatened, endangered or special status plant, wildlife or invertebrate species that may occur due to the OVSA expansion. Database research and field survey work was conducted in May and June, 2010. Prior to conducting field surveys a list of all threatened, endangered and special status botanical and wildlife species, which were determined to have the potential to occur within the project area, was developed and reviewed.

No federally or state-listed threatened, endangered or special status plant, wildlife or invertebrate species were observed during the May 3 field survey at any of the proposed locations identified for ground disturbing activities within the OVSA expansion area.

On June 4, 2010 TEAM conducted additional botanical and biological surveys on two alternate locations for the proposed expansion.

Oryctes nevadensis was observed near one of the areas identified for construction in Alternative B. *Oryctes nevadensis* is an annual herb that is native to Nevada and California and is included on the California Native Plant Society (CNPS) inventory of Rare and Endangered plants, it is classified as rare, threatened or endangered in California, common elsewhere.

If construction is to occur in the Alternative B area it is recommended that mitigation measure BIO-1 from the Owens Valley Land Management Plan be implemented.

No other federally or state-listed threatened, endangered or special status plant, wildlife or invertebrate species were observed during the June 4 field survey at any of the proposed locations identified for ground disturbing activities within the OVSA expansion area.

1.0 INTRODUCTION

An existing radio-telescope observatory, the Owens Valley Radio Observatory (OVRO), is located northeast of Big Pine, California on Los Angeles Department of Water and Power (LADWP)-owned land in Inyo County (Figure 1). NJIT is proposing an expansion of the existing radio-telescope array which would entail the construction of 13 new antenna pads with associated 2-meter antennas distributed in a three-arm spiral configuration of radius 900 meters at the OVRO facility. This expansion project, the Owens Valley Spiral Array (OVSA) Expansion Project would also include construction of a new modular control building, access roads and trenching. This proposed expansion is being funded by a National Science Foundation (NSF) grant.

NJIT requested that TEAM conduct a biological resource survey in order to facilitate compliance with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). LADWP and the NSF are the lead agencies with respect to the OVSA expansion CEQA and NEPA review.

1.1 BACKGROUND

The project site is located at the existing OVRO array (Figure 2). The proposed project area falls within the Big Pine 7.5-minute USGS quadrangle map. The general boundaries of the biological resource field survey are outlined in Figure 2.

TEAM's biological resource surveys were conducted in May and June 2010, during the Owens Valley floor's spring bloom. This survey included evaluating the potential impacts of the proposed OVSA expansion on any populations of federal or state-listed threatened, endangered or special status plant, wildlife or invertebrate species. TEAM's biological resource survey included coordination and initial site overview with OVRO staff, preliminary literature search, review of existing data including searches of the California Native Plant Society (CNPS) online inventory of Rare and Endangered Plants and California Department of Fish and Game's (CDFG) California Natural Diversity Database (CNDDDB). On May 3, 2010 and June 4, 2010 field surveys for biological and botanical resources were conducted at the proposed OVSA expansion site.

1.2 BIOLOGICAL SETTING

The OVSA expansion project is located on the Owens Valley floor north of Big Pine, east of the Owens River at approximately 3,950 feet above sea level. The dominant vegetation community in this area is chenopod scrub. California vegetation series classification types include mixed saltbush and rubber rabbit brush. The project area consists of primarily sandy substrate. No

surface water exists at the project location. The closest surface water is the Owens River which is approximately one-half mile to one mile west of the project location. Current land uses in the vicinity include agriculture, grazing, and operation of a radio telescope array. Cattle (*Bos taurus*) were present at the time of the May survey.

2.0 METHODS

Prior to conducting field surveys, a table of endangered, threatened and special status species which have been known to occur near the OVSA expansion site was compiled. This list was created from three sources: the United States Department of the Interior, Fish and Wildlife Service (USFWS) list of Listed, Proposed, and Candidate Species Which May Occur in Inyo County; the California Department of Fish and Game's California Natural Diversity Database (CNDDDB) (CDFG, 2010); and the California Native Plant Society online inventory of Rare and Endangered Plants. The USFWS list was based on occurrence in Inyo County. The USFWS list was located online (USFWS, 2010). The CNDDDB and CNPS queries were based on the Big Pine US Geological Survey (USGS) 7.5 minute quadrangle map. These queries included all observations found on the Big Pine quadrangle. Figure 3 depicts the CNDDDB output for a portion of this area. A review of aerial photography was also conducted. These lists as well as the preferred habitat types for the plant and wildlife species listed are presented in Appendix A.

Field surveys were conducted on May 3, 2010 and June 4, 2010 by TEAM Biologist Greg Foote. Prior to conducting field surveys, Kjell Nelin of OVRO provided project locations and boundaries. OVSA antenna pad locations as well as the modular building, roads and trenching locations were marked with stakes and recorded with a handheld GPS. Surveys were conducted on foot and all visible flora and fauna were identified to the lowest possible taxon. All areas proposed to be disturbed by construction activities were surveyed. Surveys and the subsequent report were prepared generally following CDFG and USFWS guidelines (CDFG, 2000; USFWS, 2000).

2.1 SPECIAL STATUS FLORA AND FAUNA

For the purpose of this assessment, special status species were defined as species which are one or more of the following: a) listed as endangered, threatened or are proposed to be listed by the Federal Endangered Species Act, or the California Endangered Species Act; b) designated by the California Department of Fish and Game as a Species of Special Concern; c) considered rare or endangered by the California Native Plant Society.

2.1.1 Plants

After reviewing the lists of special status plant species, six plant species were considered probable to occur in the OVSA expansion area: Shockley's milk-vetch, King's Eyelash grass, Sagebrush loeflingia, Intermontaine lupine, Nevada oryctes and Inyo phacelia. These plants were determined to have the potential to occur on the OVSA expansion area based on previously known occurrences within the Big Pine US Geological Survey (USGS) 7.5 minute quadrangle map as well as preferred habitat availability.

Plant surveys generally followed CNPS Botanical Survey Guidelines (CNPS, 2001). Plants encountered on the project site were identified to a taxonomic level. None of the above listed species were encountered during the field survey conducted on May 3, 2010. During the June 4 survey, *Oryctes nevadensis* was identified near the proposed Alternative B antenna pad identified as A8B.

2.1.2 Wildlife

Following review of the lists of special status wildlife species, it is unlikely that any of these species would rely on habitat in the area proposed for the OVSA expansion. Swainson's hawks are known to occur within a few miles of project area; however, no nesting and limited foraging habitat occurs in the project area. Wildlife was determined to have the potential to occur on the OVSA expansion area based on previously known occurrences within the Big Pine US Geological Survey (USGS) 7.5 minute quadrangle map as well as preferred habitat availability.

All wildlife encountered during the May 3, 2010 and June 4, 2010 surveys at the OVSA expansion site were recorded and are listed in Appendix B.

No special status wildlife species were encountered during the field surveys conducted on May 3, 2010 or June 4, 2010.

3.0 RESULTS

3.1 SPECIAL STATUS PLANTS

Located in Appendix A is an analysis of the potential for any special status plants to occur at the OVSA expansion area. Appendix B lists all species identified at the proposed project area during the May 3, 2010 and June 4, 2010 field surveys. The dominant plant community at the project area is Alkaline shrub consisting of primarily saltbush (*Atriplex canescens* and *Atriplex confertifolia*), greasewood and rabbit brush (*Chrysothamnus nauseosus*).

No special status plant species were observed during the May 3, 2010 field event.

Oryctes nevadensis has been previously identified on the southeast side of the project area (CNDDDB, 2010). Construction in this area is proposed to be limited to trenching along an already existing access road, this species was not observed during the May 3, 2010 field event on or adjacent to this road.

Oryctes nevadensis was identified during the June 4, 2010 field survey in the Alternative B area near proposed antenna pad A8B. *Oryctes nevadensis* were located approximately 40 feet from the proposed pad, (Lat/Long, Decimal Degrees WGS84 37.234363°, -118.28288°). The location of *Oryctes nevadensis* is presented on Figure 2.

If the Alternative B location is selected for construction of a new antenna pad it is suggested that mitigation measure BIO-1 from the LADWP Owens Valley Land Management Plan (LADWP, 2010) be adhered to:

BIO-1 Sensitive plants

- *Where present, areas of Owens Valley checkerbloom, Inyo County star-tulip or other sensitive plant species will be flagged and access restricted during earth disturbing activities (mowing, fence post installation, stockwater well instillation, roadway barrier instillation, herbicide use and/or vegetation removal) to prevent impacts to rare plant species.*
- *Work within areas known for sensitive plants will be done by hand, including pounding fence posts by hand. Vehicles and larger construction equipment will be excluded from areas containing rare plant populations.*

No other special status plant species were observed during the June 4, 2010 field event.

3.2 SPECIAL STATUS WILDLIFE

Wildlife species observed at the proposed project location during the May 3 survey, include Black tailed jackrabbit (*Lepus californicus*) and Long nosed leopard lizard (*Gambelia wislizenii*). Evidence of raptors perching on the existing radio telescope array was identified. Domestic cattle (*Bos taurus*) were also present.

Wildlife species observed at the proposed project location during the June 4 survey include Black tailed jackrabbit (*Lepus californicus*), Great basin whiptail lizard (*Aspidoscelis tigris*), Desert horned lizard (*Phrynosoma platyrhinos*), Red-tailed hawk (*Buteo jamaicensis*) and Western kingbird (*Tyrannus verticalis*).

No federally or state listed threatened or endangered wildlife species were observed within the project area.

None of the special status species summarized in Appendix B are expected to occur in the OVSA expansion area due to the lack of preferred habitat.

4.0 REFERENCES

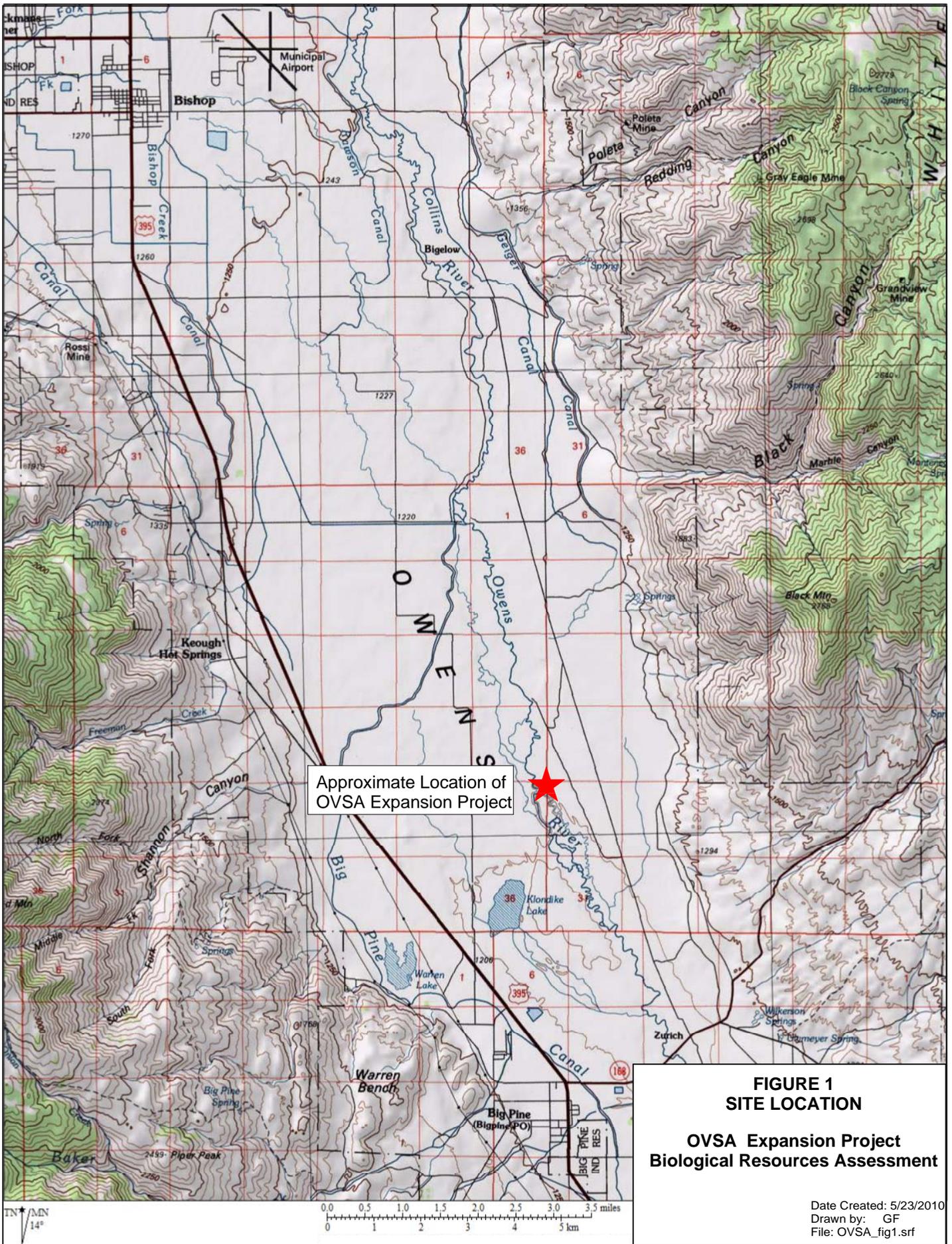
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5.0 GENERAL CONDITIONS

This report has been prepared according to generally accepted standards of environmental practice at the time this assessment was performed. TEAM Engineering & Management, Inc. (TEAM) does not assume responsibility for conditions that did not come to its attention or for conditions not generally recognized as environmentally acceptable at the time this report was prepared.

Biology is an inexact science, and investigative data commonly contain uncertainties. Professional judgments contained in this report are based upon our education and experiences on similar projects. Services performed for this project by TEAM are in accordance with professional standards for biological assessments; no guarantees are either expressed or implied.

FIGURES



Approximate Location of
OVSA Expansion Project

FIGURE 1
SITE LOCATION
OVSA Expansion Project
Biological Resources Assessment

Date Created: 5/23/2010
 Drawn by: GF
 File: OVSA_fig1.srf



Approximate location of
Oryctes nevadensis observation

LEGEND:



-Approximate Survey
Boundaries May 2010



- Approximate Survey Boundaries
Alternate Location A



- Approximate Survey Boundaries
Alternate Location B

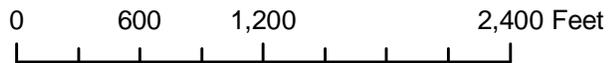
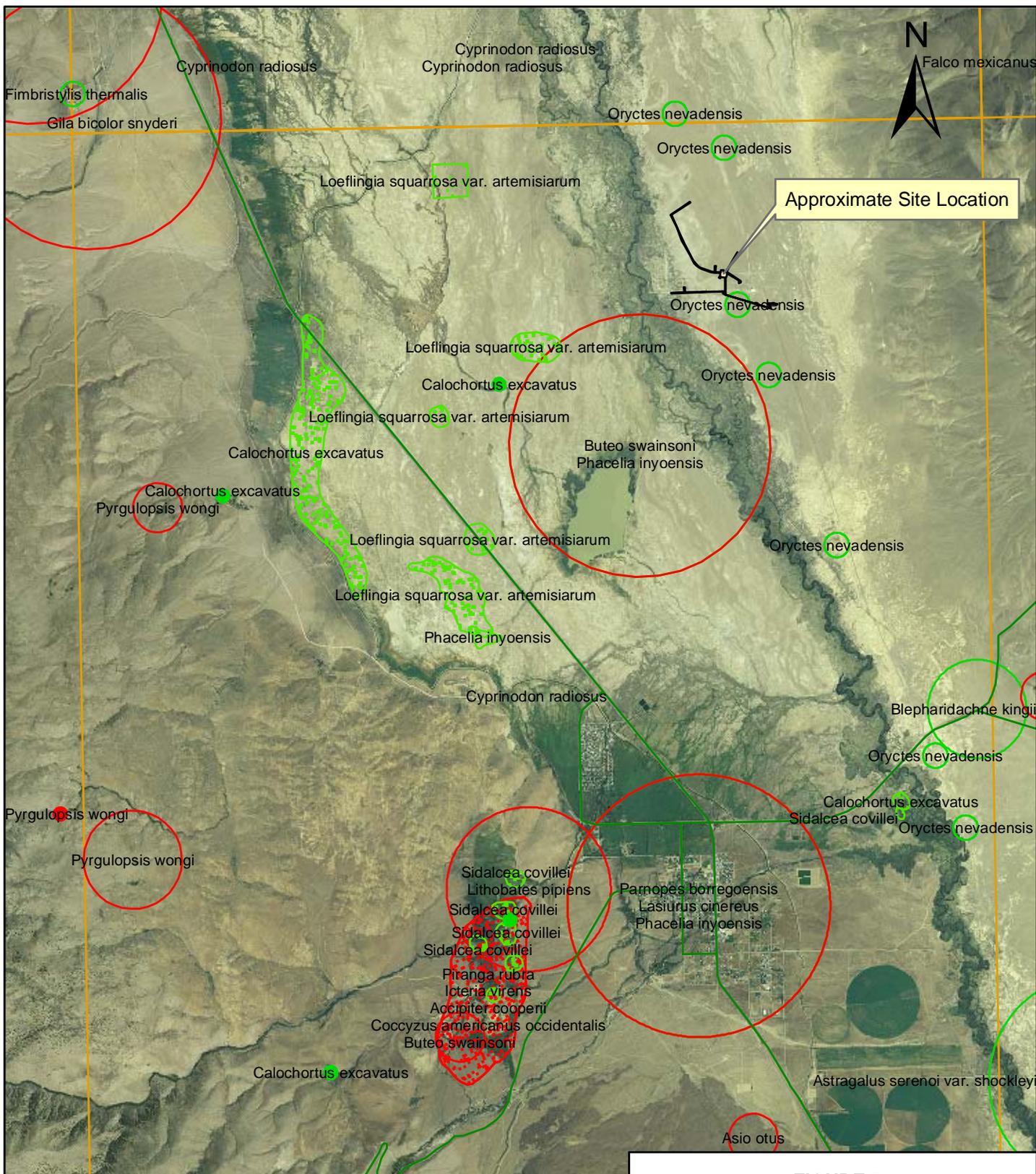
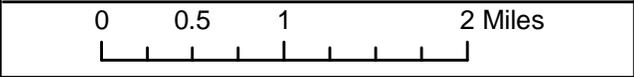


FIGURE 2
APPROXIMATE SURVEY AREA
OVSA Expansion Project
Biological Resources Assessment

Date: 6/20/10
Created by: GF



LEGEND:
 Red symbols represent animal species observations.
 Green symbols represent plant species observations.
 Species names are listed in black.
 Circles represent varying levels of confidence in location of represented species.



**FIGURE 3
 CALIFORNIA DEPARTMENT OF FISH
 AND GAME NATURAL DIVERSITY
 DATABASE QUERY RESULTS**

**OVSA Expansion Project
 Biological Resources Assessment**

Date: 6/23/10
 Created by: GF

APPENDICES

APPENDIX A
Special Status Species
OVSA Expansion Project
Biological Resources Assessment

Species	Status		Distribution and Preferred Habitat	Potential to Occur on Project Locations
	Federal	State *		
<u>Mammals</u>				
<i>Martes pennanti</i> Fisher	Candidate		Fishers are associated with large blocks of mid- and late-successional conifer and mixed conifer hardwood forests.	Unlikely. No preferred habitat nearby.
<i>Microtus californicus scirpensis</i> Amargosa vole	Endangered		Occurs in association with Olney bullrush (<i>Scirpus olneyi</i>) marshes along the Amargosa River, California.	Unlikely. No preferred habitat nearby. Outside of known range.
<i>Ovis canadensis californiana</i> Sierra nevada bighorn sheep	Endangered	CSC	Southern facing slopes in the Sierra Nevada Mountains.	Unlikely. No preferred habitat nearby. Outside of known range.
<u>Birds</u>				
<i>Accipiter cooperii</i> Cooper's hawk			Found in woods and edges of woods, nests in tall trees.	Unlikely. No preferred habitat in project area.
<i>Asio otus</i> Long-eared owl		CSC	Long-eared owls inhabit dense vegetation close to grasslands, as well as open forests shrub lands from sea level up to 2000 m elevation.	Unlikely. No preferred habitat in project area. Closest CNDDB observation app. 6 miles to the South.
<i>Buteo swainsoni</i> Swainson's hawk		Threatened	This hawk prefers open grasslands and desert-like habitats. It is common to see this hawk perched on a fence post in a prairie or open range. It also inhabits agricultural areas, and is known to follow farmer's tractors in search of insect or rodent prey.	Unlikely. Marginal habitat.
<i>Coccyzus americanus occidentalis</i> Western yellow-billed cuckoo	Candidate	Endangered	Yellow-billed cuckoos prefer open woodlands with clearings and a dense shrub layer. They are often found in woodlands near streams, rivers or lakes. In North America, their preferred habitats include abandoned farmland, old fruit orchards, successional shrubland and dense thickets.	Unlikely. No preferred habitat in project area.
<i>Empidonax traillii eximius</i> Willow flycatcher	Endangered	Endangered	This flycatcher breeds principally in (at low elevations) dense willow, cottonwood, and tamarisk thickets and woodland along streams and rivers, and (at high elevations) pure, streamside stands of Geyer willow. Migrants may occur more widely.	Unlikely. No preferred habitat in project area.
<i>Icteria virens</i> Yellow-breasted chat		CSC	The breeding habitats of this species are dense, brushy areas and hedgerows. The nests of these birds are cup-shaped, and are placed in thick shrubs. These birds eat insects and berries, and will forage in dense vegetation.	Unlikely. No preferred habitat in project area.
<i>Pipilo crissalis eremophilus</i> Inyo California towhee	Threatened		This subspecies requires areas of dense riparian habitat to provide nesting substrate. The primary range of the Inyo California towhee is limited to riparian habitats located within the southern Argus Range, Inyo County, California.	Unlikely. No preferred habitat nearby. Outside of known range.
<i>Piranga rubra</i> Summer tanager		CSC	Live in riparian woodlands of cottonwoods and willows. They are also sometimes found in orchards, parks and roadside trees. In the winter, they continue to inhabit open woodlands, as well as tall secondary growth, gallery forest, forest edge, shaded plantations, and trees in parks and gardens along city streets.	Unlikely. No preferred habitat in project area.
<i>Vireo bellii pusillus</i> Least Bell's vireo	Endangered	Endangered	Dense, low, shrubby vegetation, brushy fields, young second-growth forest or woodland, scrub oak, coastal chaparral, and mesquite brushlands, often near water in arid region. Known in Inyo county along Amargosa river.	Unlikely. Outside of known range, no preferred habitat.

APPENDIX A
Special Status Species
OVSA Expansion Project
Biological Resources Assessment

Species	Status		Distribution and Preferred Habitat	Potential to Occur on Project Locations
	Federal	State *		
Reptiles				
<i>Gopherus agassizii</i> Desert tortoise	Threatened	Threatened	Desert scrub and desert wash habitats.	Unlikely. No preferred habitat nearby. Outside of known range.
Amphibians				
<i>Anaxyrus canorus</i> Yosemite toad	Candidate		High elevation, open, montane meadows, willow thickets, and adjoining forests.	Unlikely . Outside of known range.
<i>Lithobates pipiens</i> Northern leopard frog		CSC	They are found in permanent ponds, swamps, marshes and slow moving streams throughout forest, open and urban areas.	Unlikely. No preferred habitat in project area.
<i>Rana muscosa</i> Sierra Nevada yellow-legged frog	Candidate	CSC	Inhabits lakes, meadow streams, isolated pools, sunny riverbanks in the Sierra Nevada.	Unlikely. Outside of known range.
Fishes				
<i>Cyprinodon radiosus</i> Owens pupfish	Endangered	Endangered	Owens Pupfish thrive in shallow warm water in the Owens Valley.	None. No surface water exists at project area.
<i>Gila bicolor snyderi</i> Owens tui chub	Endangered	Endangered	Owens Tui-chubs are nocturnally active schooling fish which inhabit lakes, spring fed ponds or calm river backwaters.	None. No surface water exists at project area.
<i>Oncorhynchus clarki henschawi</i> Lahontan cutthroat trout	Threatened		Walker river drainage.	None. No surface water exists at project area.
<i>Oncorhynchus clarki seleniris</i> Paiute cutthroat trout	Threatened		Native only to Silver King Creek.	None. No surface water exists at project area.
Plants				
<i>Astragalus lentiginosus var. piscinensis</i> Fish Slough milk-vetch	Threatened	1B.1	Alkali Sink, wetland-riparian.	Unlikely. Outside of Known range. No wetland or riparian habitat.
<i>Astragalus serenoii var. shockleyi</i> Shockley's milk vetch		2.2	Chenopod Scrub, Pinyon and Juniper Woodland, Great Basin Scrub.	Possible. Preferred habitat could be available.
<i>Blepharidachne kingii</i> King's Eyelash grass		2.3	Pinyon Juniper Woodland, Mojavean Desert Scrub.	Possible. Preferred habitat could be available.
<i>Calochortus excavatus</i> Inyo County Star-tulip		1B.1	Grassy meadows in shadscale scrub. Flowers April-May.	Unlikely. Marginal to no habitat.
<i>Centaureum namophilum</i> Spring-loving centaury	Threatened		Wetland-riparian. Endemic to the Ash Meadows area.	Unlikely. Outside of known range.
<i>Grindelia fraxinopratenis</i> Ash Meadows gumplant	Threatened	1B.2	Open, strongly alkaline, moist and hard to sometimes dry and powdery clay soils in or bordering meadows and shallow drainages near springs and seeps. Endemic to the Ash Meadows area.	Unlikely. Outside of Known range
<i>Loeflingia squarrosa var. artemisiarum</i> Sagebrush loeflingia		2.2	Creosote Bush Scrub, Sagebrush Scrub, dunes.	Possible. Preferred habitat could be available.
<i>Lupinus pusillus var. intermontanus</i> Intermontaine lupine		2.3	Open sandy areas. Greater than 5000 feet elevation.	Possible. Preferred habitat could be available.

APPENDIX A
Special Status Species
OVSA Expansion Project
Biological Resources Assessment

Species	Status		Distribution and Preferred Habitat	Potential to Occur on Project Locations
	Federal	State *		
cont. Plants				
<i>Nitrophila mohavensis</i> Amargosa niterwort	Endangered	1B.1	Alkali Sink, wetland-riparian. Known only from the Carson Slough - Ash Meadows area	Unlikley. Outside of known range
<i>Oenothera californica ssp. eurekaensis</i> Eureka Valley evening-primrose	Endangered	1B.2	Creosote Bush Scrub, dunes. Restricted to the sandy dunes of the Eureka Valley.	Unlikley. Outside of known range
<i>Oryctes nevadensis</i> Nevada oryctes		2.1	Creosote bush scrub, shadscale scrub, sandy soils, dunes.	Possible. Preferred habitat available.
<i>Phacelia inyoensis</i> Inyo phacelia		1B.2	Meadows and seeps, Alkaline meadows.	Possible. Preferred habitat available.
<i>Plagiobothrys parishii</i> Parish's popcorn-flower		1B.1	Joshua Tree Woodland, wetland-riparian, wet, alkaline soil around desert springs.	Unlikley. No preferred habitat available.
<i>Potamogeton robbinsii</i> Robbins' pondweed		2.3	Freshwater-marsh, deep water, lakes, 1600–3300 m.	Unlikley. No preferred habitat available.
<i>Sidalcea covillei</i> Owens Valley checkerbloom		Endangered	Sagebrush Scrub. Flowers May-June.	Unlikley. Marginal to no habitat.
<i>Swallenia alexandrae</i> Eureka Dune Grass	Endangered		Desert Dunes.	Unlikley. Outside of Known range and no preferred habitat available.
<i>Swallenia alexandrae</i> Eureka Valley Dune grass	Endangered	1B.2	Creosote Bush Scrub, dunes.	Unlikley. No preferred habitat available, outside of known range.

* CSC = California species of special concern

CNPS: 1B = Rare or Endangered in California and elsewhere

2 = Rare and Endangered in California, more common elsewhere

3 = Need more information

0.1 = Seriously threatened in California (high degree/immediacy of threat)

0.2 = Fairly threatened in California (moderate degree/immediacy of threat)

0.3 = Not very threatened in California (low degree/immediacy of threats or no current threats known)

APPENDIX B
Plant/Animal Species Observed – May 3, 2010 and June 4, 2010
OVSA Expansion Project

PLANTS:

Abronia sp.; Sand Verbena
Achnatherum hymenoides; Indian Rice Grass
Ambrosia sp.; Ragweed
Amsinckia tessellata; Fiddleneck
Atriplex canescens; Fourwing Saltbush
Atriplex confertifolia; Spiny Saltbush
Artemisia spinescens; Budsage
Bromus sp.
Camissonia brevipes; Golden Evening Primrose
Castilleja chromosa; Desert paintbrush
Caulanthus pilosus; Hairy caulanthus
Ceratoides lanata; Winterfat
Chaenactis sp. Pincushion Flower
Chrysothamnus nauseosus; Rabbitbrush
Cryptantha sp.
Distichlis spicata; Salt grass
Ephedra nevadensis; Ephedra
Eriogonum pusillum; Wild Buckwheat
Eriophyllum wallacei; Wallace's Woolly Daisy
Eriophyllum pringlei; Woolly Sunflower
Glycyrrhiza lepidota; Wild licorice
Glyptopleura marginata;
Grayia spinosa; Spiny hopsage
Hymenoclea salsola; Burrobrush
Langloisia setosissima; Lilac sunbonnet
Layia glandulosa; White layia
Lupinus sp.; Lupin
Malacothrix glabrata; Desert dandelion
Menodora spinescens; Spiny Menodora
Mentzelia albicaulis; White-stemmed stick- leaf
Oryctes nevadensis; Nevada oryctes
Phacelia distans; Wild heliotrope
Phacelia fremontii; Yellow throats
Psorothamnus arborescens; Indigo bush
Psorothamnus polydenius; Nevada Indigo bush
Salsola tragus; Tumbleweed

TEAM

ENGINEERING & MANAGEMENT, INC.
Bishop and Mammoth Lakes, California

APPENDIX B
Plant/Animal Species Observed – May 3, 2010 and June 4, 2010
OVSA Expansion Project

Sarcobatus vermiculatus; Greasewood
Tetradymia axillaris; Cotton Thorn
Tetradymia galbrata; Little leaf horsebush
Tiquilia nuttallii; nuttall's crinklemat

ANIMALS:

Aspidoscelis tigris; Great basin whiptail
Bos Taurus; Cow
Buteo jamaicensis; Red-tailed hawk
Gambelia wislizenii; Long nosed leopard lizard
Lepus californicus; Black tailed jackrabbit
Phrynosoma platyrhinos; Desert horned lizard
Tyrannus verticalis; Western kingbird

APPENDIX C
CEQA Biological Resources Checklist Recommendations
OVSA Expansion Project

Would the Project:	Potentially Significant Impact	Less than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?			X	X
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?				X
c. Have a substantial adverse effect on federally protected wetlands as defined by section 404 of the Clean Water Act (including but not limited to, marsh, vernal pool, costal, etc.) through direct removal, filling, hydrological interruption, or other means?				X
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?				X
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				X
f. Conflict with the provisions of an adopted Habitat conservation plan, Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan?				X

CEQA Biological Resources Checklist Recommendations Discussion

a) **No Impact**– If Alternative A is used for project construction, there should be no substantial adverse effect on any other species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service. The project would entail construction near the existing Owens Valley Radio Telescope Array, a large portion of the project would occur on previously disturbed land. No trees or riparian habitat exists at the proposed project site.

Less than Significant Impact– If Alternative B is used for project construction, the proposed project could have a less than significant impact on *Oryctes nevadensis* a plant species identified on the California Native Plant Society (CNPS) inventory of Rare and Endangered plants. *Oryctes nevadensis* was observed adjacent to proposed antenna pad A8B. If construction activities can avoid this area there should not be a substantial adverse effect on this species.

b) **No Impact** – The proposed project would not have a substantial adverse effect on any riparian habitat or other sensitive natural community, identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or Fish and Wildlife Service. The proposed project would entail construction near the existing Owens Valley Radio Telescope Array. The primary California Vegetation series type present on site is chenopod or saltbush scrub. No riparian habit exists in the proposed project area.

c) **No Impact**- The proposed project would not have a substantial adverse effect on federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means. There are no designated wetlands in the proposed project area.

d) **No Impact** – The proposed project would not interfere substantially with the movement of any native resident or migratory fish or wildlife species or interfere substantially with established native resident or migratory wildlife corridors, or impede the use of wildlife nursery sites. No wildlife corridors or native wildlife nurseries are known to exist on the project site. Mule deer (*Odocoileus hemionus*) are known to use the nearby Owens River corridor; however the proposed project would be located one-quarter of a mile to one mile away from this area and should not affect this species.

e) **No Impact** – The proposed project would not conflict with any local policies or ordinances protecting biological resources. There are no trees present at the proposed project location and there are no known current ordinances or policies covering the proposed project area.

f) **No Impact** – The proposed project would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan. The Los Angeles Department of Water and Power has

created an Owens Valley Land Management Plan which covers the land on which this project is proposed to occur. There are no other known Habitat Conservation Plans or Natural Community Conservation Plans that cover the project area. Debra Hawk from the Bishop office of the California Department of Fish and Game was consulted and provided a list of laws, plans and programs relating to biological resources in this region. Hawk mentioned that LADWP was currently in the process of preparing an Habitat Conservation Plan for City of Los Angeles Owned lands in Inyo County, which could cover the proposed project area.

APPENDIX C
GEOSEARCH DATABASE REVIEW

SPECIAL STATUS SPECIES

TARGET PROPERTY SUMMARY

Owens Valley Radio Observatory
Leighton Lane
Big Pine, Inyo County, California 93514

USGS Quadrangle: **Big Pine, CA**
Target Property Geometry: **Point**

Target Property Longitude(s)/Latitude(s):
(-118.295521, 37.231487)

County/Parish Covered:
Inyo (CA)

Zipcode(s) Covered:
Bishop CA: 93514

State(s) Covered:
CA

***Target property is located in Radon Zone 2.**
Zone 2 areas have a predicted average indoor radon screening level between 2 and 4 pCi/L.

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DATABASE FINDINGS SUMMARY (SOURCE)

DATABASE	ACRONYM	LOCA- TABLE	UNLOCA- TABLE	SEARCH RADIUS (miles)
STATE (CA)				
SPECIAL STATUS SPECIES	CNDDB	12	0	1.5000
SUB-TOTAL		12	0	

TOTAL

12 0



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DATABASE FINDINGS SUMMARY (DETAIL)

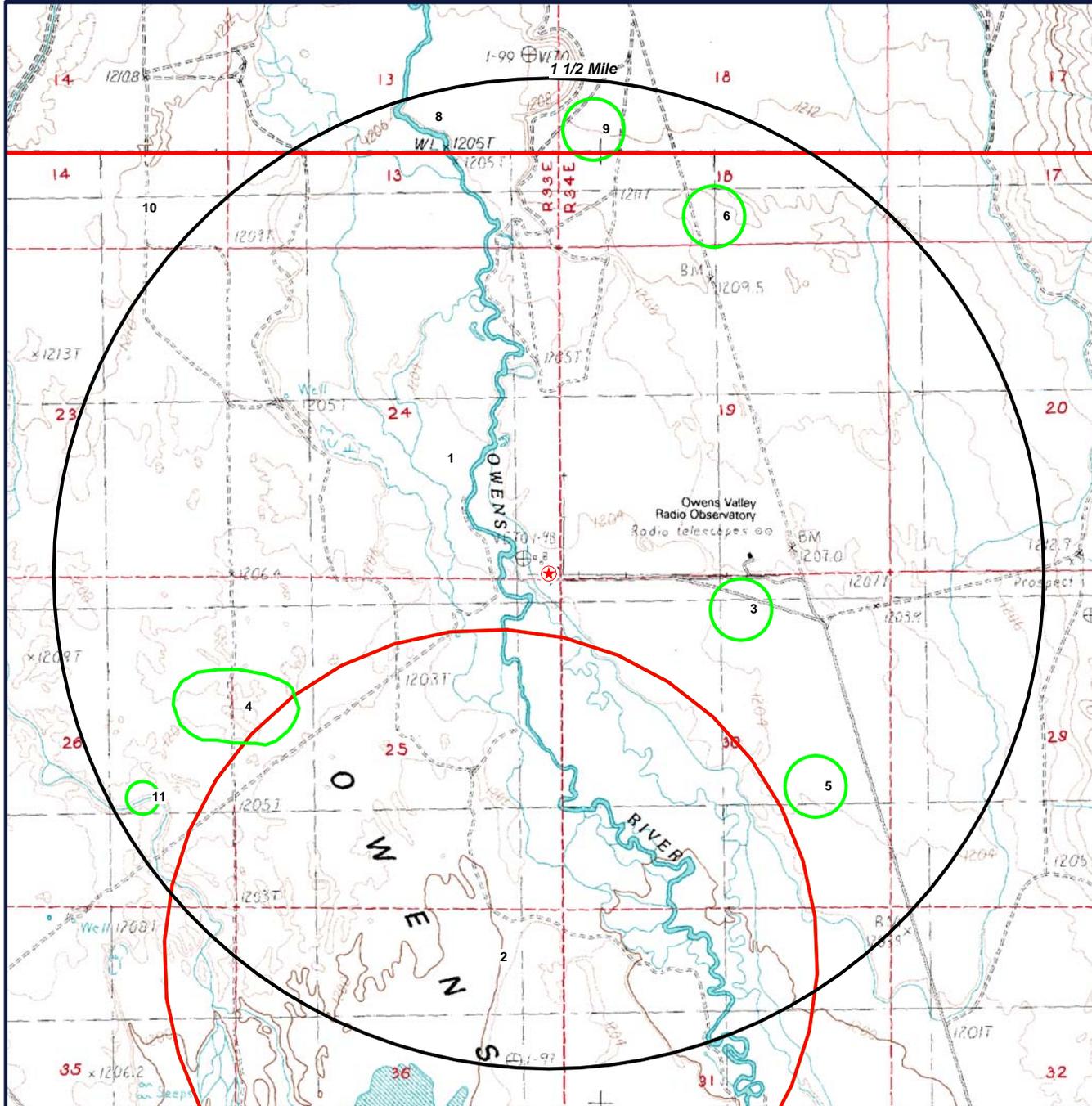
ACRONYM	Target Property	SEARCH RADIUS (miles)	1/8 Mile (> TP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
STATE (CA)								
CNDDB	1	1.500	0	2	0	3	6	12
SUB-TOTAL	1		0	2	0	3	6	12

TOTAL	1		0	2	0	3	6	12
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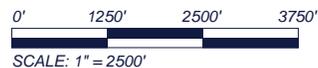
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SPECIAL STATUS SPECIES SITE MAP



-  Target Property (TP)
-  ANIMAL
-  PLANT

**Quadrangle(s): Big Pine
Owens Valley Radio Observatory
Leighton Lane
Big Pine, California
93514**



GeoSearch

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REPORT SUMMARY OF LOCATABLE SITES

MAP ID#	DATABASE NAME	SITE ID#	DISTANCE FROM SITE	SITE NAME	ADDRESS	CITY, ZIP CODE	PAGE #
1	CNDDDB	13136	0.001 X				1
2	CNDDDB	55764	0.190 S				2
2	CNDDDB	27053	0.190 S				3
3	CNDDDB	33215	0.510 E				4
4	CNDDDB	515	0.870 SW				5
5	CNDDDB	33213	0.950 SE				6
6	CNDDDB	33216	1.120 NE				7
7	CNDDDB	28587	1.280 N				8
8	CNDDDB	28586	1.280 N				9
9	CNDDDB	33232	1.280 N				10
10	CNDDDB	28585	1.280 N				11
11	CNDDDB	27203	1.380 SW				12



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SPECIAL STATUS SPECIES (CNDDDB)

MAP ID# 1

Distance from Property: 0.00 mi. X

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURRENCE INDEX: 13136
ELEMENT OCCURRENCE #: 8
SITE LAST VISITED: XX/XX/1987
DATE LAST OBSERVED AT SITE: 06/XX/1986
PRESENCE: EXTIRPATED
QUALITY OF OCCURRENCE: NONE
SENSITIVE DATA?: YES
OCC TYPE: REFUGIUM; ARTIFICIAL HABITAT/OCCURRENCE
TYPE OF OWNERSHIP:

LOCATION SPECIFIC ATTRIBUTES

MAP INDEX #:	01856	UTM ZONE #:		TOWNSHIP:
POINT/POLYGON:		UTM NORTHING (METERS):		RANGE:
SPECIFIC BOUNDED AREA?:		UTM EASTING (METERS):		SECTION:
RADIUS:		LATITUDE DMS:		QTR SECTION:
AREA:	-9999.0	LONGITUDE DMS:		MERIDIAN:
ELEVATION:	-9999			
QUAD CONTAINING MOST OR ALL OF THE OCCURRENCE:	3711823			

ELEMENT SPECIFIC ATTRIBUTES

ELEMENT CODE: AFCNB02090
SCIENTIFIC NAME-STATE LEVEL: CYPRINODON RADIOSUS
COMMON NAME STATE-LEVEL: OWENS PUPFISH
GLOBAL RANK: G1
STATE RANK: S1
FEDERAL LISTING STATUS: ENDANGERED
STATE LISTING STATUS: ENDANGERED

SPECIAL STATUS SPECIES (CNDDDB)

MAP ID# 2

Distance from Property: 0.19 mi. S

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURRENCE INDEX: 55764
ELEMENT OCCURRENCE #: 15
SITE LAST VISITED: 05/19/1978
DATE LAST OBSERVED AT SITE: 05/19/1978
PRESENCE: PRESUMED EXTANT
QUALITY OF OCCURRENCE: UNKNOWN
SENSITIVE DATA?: NO
OCC TYPE: NATURAL/NATIVE OCCURRENCE
TYPE OF OWNERSHIP: LADWP

LOCATION SPECIFIC ATTRIBUTES

MAP INDEX #:	01864	UTM ZONE #:	11	TOWNSHIP:	08S
POINT/POLYGON:	POINT	UTM NORTHING (METERS):	4119473	RANGE:	33E
SPECIFIC BOUNDED AREA?:	NON-SPECIFIC	UTM EASTING (METERS):	384767	SECTION:	36
RADIUS:	1	LATITUDE DMS:	37.21464	QTR SECTION:	NE
AREA:	0.0	LONGITUDE DMS:	-118.29872	MERIDIAN:	M
ELEVATION:	4320				
QUAD CONTAINING MOST OR ALL OF THE OCCURRENCE:	3711823				

ELEMENT SPECIFIC ATTRIBUTES

ELEMENT CODE: PDHYD0C2F0
SCIENTIFIC NAME-STATE LEVEL: PHACELIA INYOENSIS
COMMON NAME STATE-LEVEL: INYO PHACELIA
GLOBAL RANK: G3
STATE RANK: S3.2
FEDERAL LISTING STATUS: NONE
STATE LISTING STATUS: NONE

SPECIAL STATUS SPECIES (CNDDDB)

MAP ID# 2

Distance from Property: 0.19 mi. S

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURRENCE INDEX: 27053
ELEMENT OCCURRENCE #: 255
SITE LAST VISITED: XX/XX/1986
DATE LAST OBSERVED AT SITE: XX/XX/1986
PRESENCE: PRESUMED EXTANT
QUALITY OF OCCURRENCE: UNKNOWN
SENSITIVE DATA?: NO
OCC TYPE: NATURAL/NATIVE OCCURRENCE
TYPE OF OWNERSHIP: LADWP

LOCATION SPECIFIC ATTRIBUTES

MAP INDEX #:	01864	UTM ZONE #:	11	TOWNSHIP:	08S
POINT/POLYGON:	POINT	UTM NORTHING (METERS):	4119473	RANGE:	33E
SPECIFIC BOUNDED AREA?:	NON-SPECIFIC	UTM EASTING (METERS):	384767	SECTION:	36
RADIUS:	1	LATITUDE DMS:	37.21464	QTR SECTION:	NE
AREA:	0.0	LONGITUDE DMS:	-118.29872	MERIDIAN:	M
ELEVATION:	4320				
QUAD CONTAINING MOST OR ALL OF THE OCCURRENCE:	3711823				

ELEMENT SPECIFIC ATTRIBUTES

ELEMENT CODE: ABNKC19070
SCIENTIFIC NAME-STATE LEVEL: BUTEO SWAINSONI
COMMON NAME STATE-LEVEL: SWAINSON'S HAWK
GLOBAL RANK: G5
STATE RANK: S2
FEDERAL LISTING STATUS: NONE
STATE LISTING STATUS: THREATENED

SPECIAL STATUS SPECIES (CNDDDB)

MAP ID# 3

Distance from Property: 0.51 mi. E

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURRENCE INDEX: 33215
ELEMENT OCCURRENCE #: 18
SITE LAST VISITED: 05/24/1990
DATE LAST OBSERVED AT SITE: 05/24/1990
PRESENCE: PRESUMED EXTANT
QUALITY OF OCCURRENCE: GOOD
SENSITIVE DATA?: NO
OCC TYPE: NATURAL/NATIVE OCCURRENCE
TYPE OF OWNERSHIP: LADWP

LOCATION SPECIFIC ATTRIBUTES

MAP INDEX #:	38207	UTM ZONE #:	11	TOWNSHIP:	08S
POINT/POLYGON:	POINT	UTM NORTHING (METERS):	4121149	RANGE:	34E
SPECIFIC BOUNDED AREA?:	NON-SPECIFIC	UTM EASTING (METERS):	386013	SECTION:	30
RADIUS:	1/10	LATITUDE DMS:	37.22990	QTR SECTION:	NE
AREA:	0.0	LONGITUDE DMS:	-118.28494	MERIDIAN:	M
ELEVATION:	3950				
QUAD CONTAINING MOST OR ALL OF THE OCCURRENCE:	3711823				

ELEMENT SPECIFIC ATTRIBUTES

ELEMENT CODE: PDSOL0Q010
SCIENTIFIC NAME-STATE LEVEL: ORYCTES NEVADENSIS
COMMON NAME STATE-LEVEL: NEVADA ORYCTES
GLOBAL RANK: G2G3
STATE RANK: S1.1
FEDERAL LISTING STATUS: NONE
STATE LISTING STATUS: NONE

SPECIAL STATUS SPECIES (CNDDDB)

MAP ID# 4

Distance from Property: 0.87 mi. SW

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURRENCE INDEX: 515
ELEMENT OCCURRENCE #: 6
SITE LAST VISITED: 05/02/1983
DATE LAST OBSERVED AT SITE: 05/02/1983
PRESENCE: PRESUMED EXTANT
QUALITY OF OCCURRENCE: UNKNOWN
SENSITIVE DATA?: NO
OCC TYPE: NATURAL/NATIVE OCCURRENCE
TYPE OF OWNERSHIP: LADWP

LOCATION SPECIFIC ATTRIBUTES

MAP INDEX #:	35331	UTM ZONE #:	11	TOWNSHIP:	08S
POINT/POLYGON:	POLYGON	UTM NORTHING (METERS):	4120710	RANGE:	33E
SPECIFIC BOUNDED AREA?:	SPECIFIC	UTM EASTING (METERS):	383539	SECTION:	25
RADIUS:	0	LATITUDE DMS:	37.22563	QTR SECTION:	NW
AREA:	44.6	LONGITUDE DMS:	-118.31275	MERIDIAN:	M
ELEVATION:	3960				
QUAD CONTAINING MOST OR ALL OF THE OCCURRENCE:	3711823				

ELEMENT SPECIFIC ATTRIBUTES

ELEMENT CODE: PDCAR0E011
SCIENTIFIC NAME-STATE LEVEL: LOEFLINGIA SQUARROSA VAR. ARTEMISIARUM
COMMON NAME STATE-LEVEL: SAGEBRUSH LOEFLINGIA
GLOBAL RANK: G5T2T3
STATE RANK: S2.2
FEDERAL LISTING STATUS: NONE
STATE LISTING STATUS: NONE

SPECIAL STATUS SPECIES (CNDDDB)

MAP ID# 5

Distance from Property: 0.95 mi. SE

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURRENCE INDEX: 33213
ELEMENT OCCURRENCE #: 17
SITE LAST VISITED: 05/24/1990
DATE LAST OBSERVED AT SITE: 05/24/1990
PRESENCE: PRESUMED EXTANT
QUALITY OF OCCURRENCE: UNKNOWN
SENSITIVE DATA?: NO
OCC TYPE: NATURAL/NATIVE OCCURRENCE
TYPE OF OWNERSHIP: LADWP

LOCATION SPECIFIC ATTRIBUTES

MAP INDEX #:	38206	UTM ZONE #:	11	TOWNSHIP:	08S
POINT/POLYGON:	POINT	UTM NORTHING (METERS):	4120284	RANGE:	34E
SPECIFIC BOUNDED AREA?:	NON-SPECIFIC	UTM EASTING (METERS):	386368	SECTION:	30
RADIUS:	1/10	LATITUDE DMS:	37.22214	QTR SECTION:	SE
AREA:	0.0	LONGITUDE DMS:	-118.28081	MERIDIAN:	M
ELEVATION:	3950				
QUAD CONTAINING MOST OR ALL OF THE OCCURRENCE:	3711823				

ELEMENT SPECIFIC ATTRIBUTES

ELEMENT CODE: PDSOL0Q010
SCIENTIFIC NAME-STATE LEVEL: ORYCTES NEVADENSIS
COMMON NAME STATE-LEVEL: NEVADA ORYCTES
GLOBAL RANK: G2G3
STATE RANK: S1.1
FEDERAL LISTING STATUS: NONE
STATE LISTING STATUS: NONE

SPECIAL STATUS SPECIES (CNDDDB)

MAP ID# 6

Distance from Property: 1.12 mi. NE

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURRENCE INDEX: 33216
ELEMENT OCCURRENCE #: 19
SITE LAST VISITED: 04/14/1992
DATE LAST OBSERVED AT SITE: 04/14/1992
PRESENCE: PRESUMED EXTANT
QUALITY OF OCCURRENCE: GOOD
SENSITIVE DATA?: NO
OCC TYPE: NATURAL/NATIVE OCCURRENCE
TYPE OF OWNERSHIP: LADWP

LOCATION SPECIFIC ATTRIBUTES

MAP INDEX #:	38209	UTM ZONE #:	11	TOWNSHIP:	08S
POINT/POLYGON:	POINT	UTM NORTHING (METERS):	4123062	RANGE:	34E
SPECIFIC BOUNDED AREA?:	NON-SPECIFIC	UTM EASTING (METERS):	385909	SECTION:	18
RADIUS:	1/10	LATITUDE DMS:	37.24712	QTR SECTION:	SW
AREA:	0.0	LONGITUDE DMS:	-118.28641	MERIDIAN:	M
ELEVATION:	3970				
QUAD CONTAINING MOST OR ALL OF THE OCCURRENCE:	3711823				

ELEMENT SPECIFIC ATTRIBUTES

ELEMENT CODE: PDSOL0Q010
SCIENTIFIC NAME-STATE LEVEL: ORYCTES NEVADENSIS
COMMON NAME STATE-LEVEL: NEVADA ORYCTES
GLOBAL RANK: G2G3
STATE RANK: S1.1
FEDERAL LISTING STATUS: NONE
STATE LISTING STATUS: NONE

SPECIAL STATUS SPECIES (CNDDDB)

MAP ID# 7

Distance from Property: 1.28 mi. N

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURRENCE INDEX: 28587
ELEMENT OCCURRENCE #: 6
SITE LAST VISITED: XX/XX/1987
DATE LAST OBSERVED AT SITE: 12/09/1986
PRESENCE: EXTIRPATED
QUALITY OF OCCURRENCE: NONE
SENSITIVE DATA?: YES
OCC TYPE: REFUGIUM; ARTIFICIAL HABITAT/OCCURRENCE
TYPE OF OWNERSHIP:

LOCATION SPECIFIC ATTRIBUTES

MAP INDEX #:	01759	UTM ZONE #:		TOWNSHIP:
POINT/POLYGON:		UTM NORTHING (METERS):		RANGE:
SPECIFIC BOUNDED AREA?:		UTM EASTING (METERS):		SECTION:
RADIUS:		LATITUDE DMS:		QTR SECTION:
AREA:	-9999.0	LONGITUDE DMS:		MERIDIAN:
ELEVATION:	-9999			
QUAD CONTAINING MOST OR ALL OF THE OCCURRENCE:	3711833			

ELEMENT SPECIFIC ATTRIBUTES

ELEMENT CODE: AFCNB02090
SCIENTIFIC NAME-STATE LEVEL: CYPRINODON RADIOSUS
COMMON NAME STATE-LEVEL: OWENS PUPFISH
GLOBAL RANK: G1
STATE RANK: S1
FEDERAL LISTING STATUS: ENDANGERED
STATE LISTING STATUS: ENDANGERED

SPECIAL STATUS SPECIES (CNDDDB)

MAP ID# 8

Distance from Property: 1.28 mi. N

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURRENCE INDEX: 28586
ELEMENT OCCURRENCE #: 7
SITE LAST VISITED: 06/XX/1986
DATE LAST OBSERVED AT SITE: 06/XX/1986
PRESENCE: PRESUMED EXTANT
QUALITY OF OCCURRENCE: UNKNOWN
SENSITIVE DATA?: YES
OCC TYPE: REFUGIUM; ARTIFICIAL HABITAT/OCCURRENCE
TYPE OF OWNERSHIP:

LOCATION SPECIFIC ATTRIBUTES

MAP INDEX #:	01847	UTM ZONE #:		TOWNSHIP:
POINT/POLYGON:		UTM NORTHING (METERS):		RANGE:
SPECIFIC BOUNDED AREA?:		UTM EASTING (METERS):		SECTION:
RADIUS:		LATITUDE DMS:		QTR SECTION:
AREA:	-9999.0	LONGITUDE DMS:		MERIDIAN:
ELEVATION:	-9999			
QUAD CONTAINING MOST OR ALL OF THE OCCURRENCE:	3711833			

ELEMENT SPECIFIC ATTRIBUTES

ELEMENT CODE: AFCNB02090
SCIENTIFIC NAME-STATE LEVEL: CYPRINODON RADIOSUS
COMMON NAME STATE-LEVEL: OWENS PUPFISH
GLOBAL RANK: G1
STATE RANK: S1
FEDERAL LISTING STATUS: ENDANGERED
STATE LISTING STATUS: ENDANGERED

SPECIAL STATUS SPECIES (CNDDDB)

MAP ID# 9

Distance from Property: 1.28 mi. N

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURRENCE INDEX: 33232
ELEMENT OCCURRENCE #: 32
SITE LAST VISITED: 05/15/1990
DATE LAST OBSERVED AT SITE: 05/15/1990
PRESENCE: PRESUMED EXTANT
QUALITY OF OCCURRENCE: GOOD
SENSITIVE DATA?: NO
OCC TYPE: NATURAL/NATIVE OCCURRENCE
TYPE OF OWNERSHIP: LADWP

LOCATION SPECIFIC ATTRIBUTES

MAP INDEX #:	38225	UTM ZONE #:	11	TOWNSHIP:	08S
POINT/POLYGON:	POINT	UTM NORTHING (METERS):	4123493	RANGE:	34E
SPECIFIC BOUNDED AREA?:	NON-SPECIFIC	UTM EASTING (METERS):	385325	SECTION:	18
RADIUS:	1/10	LATITUDE DMS:	37.25094	QTR SECTION:	SW
AREA:	0.0	LONGITUDE DMS:	-118.29306	MERIDIAN:	M
ELEVATION:	3975				
QUAD CONTAINING MOST OR ALL OF THE OCCURRENCE:	3711833				

ELEMENT SPECIFIC ATTRIBUTES

ELEMENT CODE: PDSOL0Q010
SCIENTIFIC NAME-STATE LEVEL: ORYCTES NEVADENSIS
COMMON NAME STATE-LEVEL: NEVADA ORYCTES
GLOBAL RANK: G2G3
STATE RANK: S1.1
FEDERAL LISTING STATUS: NONE
STATE LISTING STATUS: NONE

SPECIAL STATUS SPECIES (CNDDDB)

MAP ID# 10

Distance from Property: 1.28 mi. N

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURRENCE INDEX: **28585**
ELEMENT OCCURRENCE #: **9**
SITE LAST VISITED: **XX/XX/2000**
DATE LAST OBSERVED AT SITE: **XX/XX/1987**
PRESENCE: **EXTIRPATED**
QUALITY OF OCCURRENCE: **NONE**
SENSITIVE DATA?: **YES**
OCC TYPE: **REFUGIUM; ARTIFICIAL HABITAT/OCCURRENCE**
TYPE OF OWNERSHIP:

LOCATION SPECIFIC ATTRIBUTES

MAP INDEX #:	01658	UTM ZONE #:		TOWNSHIP:
POINT/POLYGON:		UTM NORTHING (METERS):		RANGE:
SPECIFIC BOUNDED AREA?:		UTM EASTING (METERS):		SECTION:
RADIUS:		LATITUDE DMS:		QTR SECTION:
AREA:	-9999.0	LONGITUDE DMS:		MERIDIAN:
ELEVATION:	-9999			
QUAD CONTAINING MOST OR ALL OF THE OCCURRENCE:	3711834			

ELEMENT SPECIFIC ATTRIBUTES

ELEMENT CODE: **AFCNB02090**
SCIENTIFIC NAME-STATE LEVEL: **CYPRINODON RADIOSUS**
COMMON NAME STATE-LEVEL: **OWENS PUPFISH**
GLOBAL RANK: **G1**
STATE RANK: **S1**
FEDERAL LISTING STATUS: **ENDANGERED**
STATE LISTING STATUS: **ENDANGERED**

SPECIAL STATUS SPECIES (CNDDDB)

MAP ID# 11

Distance from Property: 1.38 mi. SW

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURRENCE INDEX: 27203
ELEMENT OCCURRENCE #: 27
SITE LAST VISITED: 06/02/1995
DATE LAST OBSERVED AT SITE: 06/02/1995
PRESENCE: PRESUMED EXTANT
QUALITY OF OCCURRENCE: GOOD
SENSITIVE DATA?: NO
OCC TYPE: NATURAL/NATIVE OCCURRENCE
TYPE OF OWNERSHIP: LADWP

LOCATION SPECIFIC ATTRIBUTES

MAP INDEX #:	01826	UTM ZONE #:	11	TOWNSHIP:	08S
POINT/POLYGON:	POINT	UTM NORTHING (METERS):	4120274	RANGE:	33E
SPECIFIC BOUNDED AREA?:	SPECIFIC	UTM EASTING (METERS):	383078	SECTION:	26
RADIUS:	80M	LATITUDE DMS:	37.22165	QTR SECTION:	SE
AREA:	0.0	LONGITUDE DMS:	-118.31789	MERIDIAN:	M
ELEVATION:	3960				
QUAD CONTAINING MOST OR ALL OF THE OCCURRENCE:	3711823				

ELEMENT SPECIFIC ATTRIBUTES

ELEMENT CODE: PMLIL0D0F0
SCIENTIFIC NAME-STATE LEVEL: CALOCHORTUS EXCAVATUS
COMMON NAME STATE-LEVEL: INYO COUNTY STAR-TULIP
GLOBAL RANK: G3
STATE RANK: S3.1
FEDERAL LISTING STATUS: NONE
STATE LISTING STATUS: NONE

ENVIRONMENTAL RECORDS DEFINITIONS - STATE (CA)

CNDDDB Special Status Species

VERSION DATE: 3/2010

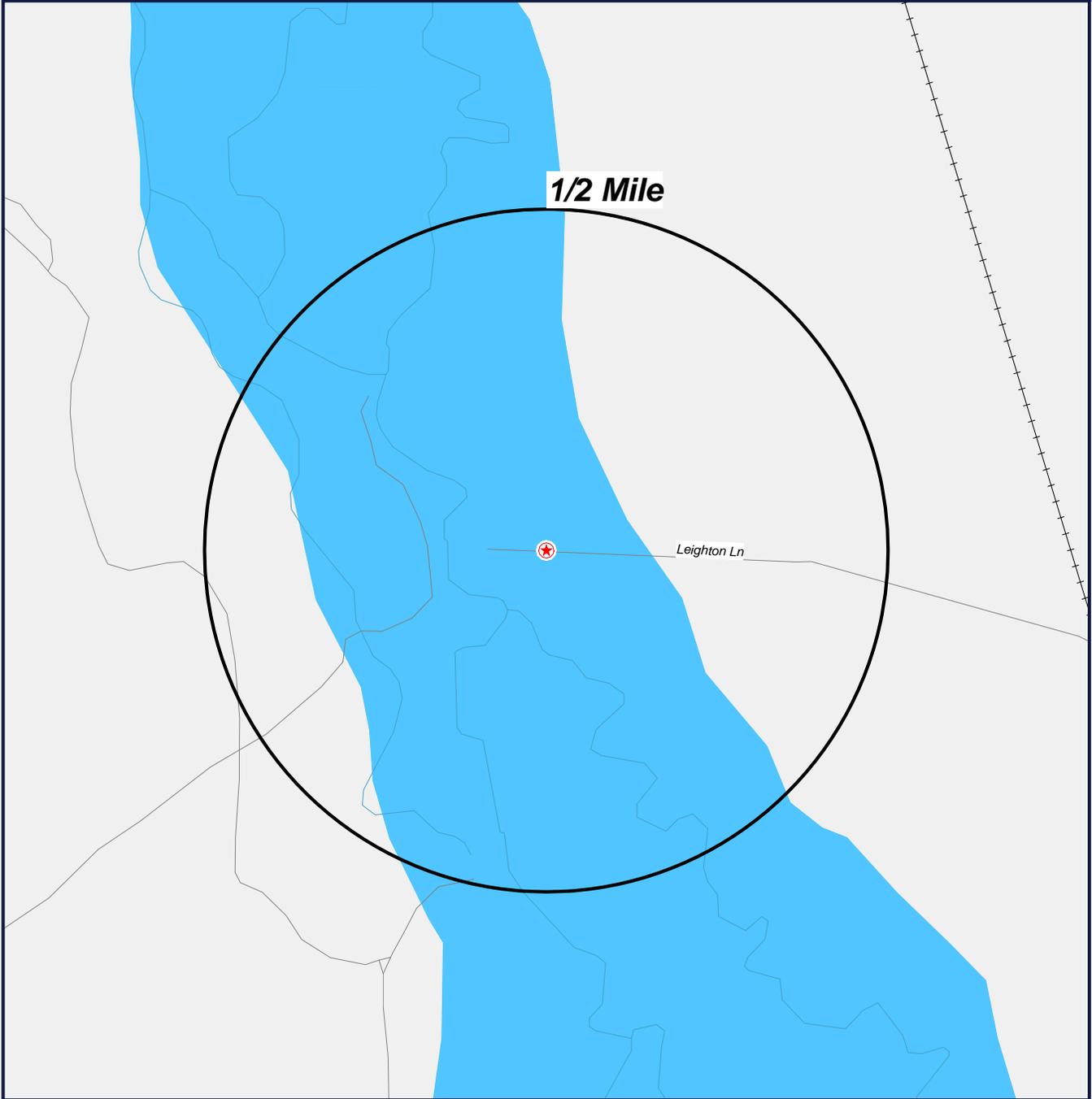
The California Natural Diversity Database (CNDDDB) is a program that inventories the status and locations of rare plants and animals in California. The CNDDDB is part of a nationwide network of natural heritage programs that is overseen by NatureServe. This data helps drive conservation decisions, aid in the environmental review of projects and land use changes, and provide baseline data helpful in recovering endangered species and for research projects. The goal of the CNDDDB is to provide the most current information available on the state's most imperiled elements of natural diversity and to provide tools to analyze the data. The Department of Fish and Game Biogeographic Data Branch cannot and does not portray the CNDDDB as an exhaustive and comprehensive inventory of all rare species and natural communities statewide. Therefore, field verification is recommended to establish a definite presence or absence of sensitive species.



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FEMA

FEMA MAP



★ Target Property (TP)

Owens Valley Radio Observatory
Leighton Lane
Big Pine, California
93514

Panel #: 0600730375B

- | | | | |
|---|------------|---|-----------|
|  | ZONE A |  | ZONE X |
|  | ZONE AE |  | ZONE X500 |
|  | ZONE AH | | |
|  | ZONE ANI | | |
|  | ZONE D | | |
|  | ZONE UNDES | | |
|  | ZONE V | | |
|  | ZONE VE | | |



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FEDERAL EMERGENCY MANAGEMENT AGENCY REPORT

FEMA - Federal Emergency Management Agency

The information used in this report is derived from the Federal Emergency Management Agency (FEMA). The Q3 Flood Data is developed by electronically scanning the current effective map panels of existing paper Flood Insurance Rate Maps (FIRMs). Certain key features are digitally captured and then converted into area features, such as floodplain boundaries. Q3 Flood Data captures certain key features from the existing paper FIRMs, including:

- 100-year and 500-year (1% and 0.2% annual chance) floodplain areas, including Zone V areas, certain floodway areas (when present on the FIRM), and zone designations
- Coastal Barrier Resources Act (COBRA) areas
- FIRM panel areas, including panel number and suffix

This data was last updated between 1996 and 2000 and is available in select counties throughout the United States.

FEMA Flood Zone Definitions Relevant to Map

A Zone A

An area inundated by 100 year flooding. No BFEs (base flood elevations) determined.

X Zone X

An area that is determined to be outside the 100 and 500 year floodplains.



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TARGET PROPERTY SUMMARY

Owens Valley Radio Observatory
Leighton Lane
Big Pine, Inyo County, California 93514

USGS Quadrangle: **Big Pine, CA**
Target Property Geometry: **Point**

Target Property Longitude(s)/Latitude(s):
(-118.295521, 37.231487)

County/Parish Covered:
Inyo (CA)

Zipcode(s) Covered:
Bishop CA: 93514

State(s) Covered:
CA

***Target property is located in Radon Zone 2.**
Zone 2 areas have a predicted average indoor radon screening level between 2 and 4 pCi/L.

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HISTORICAL SITES

TARGET PROPERTY SUMMARY

Owens Valley Radio Observatory
Leighton Lane
Big Pine, Inyo County, California 93514

USGS Quadrangle: **Big Pine, CA**
Target Property Geometry: **Point**

Target Property Longitude(s)/Latitude(s):
(-118.295521, 37.231487)

County/Parish Covered:
Inyo (CA)

Zipcode(s) Covered:
Bishop CA: 93514

State(s) Covered:
CA

***Target property is located in Radon Zone 2.**
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DATABASE FINDINGS SUMMARY (SOURCE)

DATABASE	ACRONYM	LOCA- TABLE	UNLOCA- TABLE	SEARCH RADIUS (miles)
<u>FEDERAL</u>				
HISTORIC BUILDINGS (HABS/HAER)	HSTBLDGS	0	0	0.5000
NATIONAL HISTORIC LANDMARKS	HSTLNDMKS	0	0	0.5000
NATIONAL REGISTER OF HISTORIC PLACES	HSTPLACES	0	0	0.5000
SUB-TOTAL		0	0	
<u>STATE (CA)</u>				
CALIFORNIA HISTORICAL LANDMARKS	CALNDMKS	0	0	0.5000
SUB-TOTAL		0	0	
<u>TRIBAL</u>				
INDIAN RESERVATIONS	INDIANRES	0	0	0.5000
SUB-TOTAL		0	0	
TOTAL		0	0	



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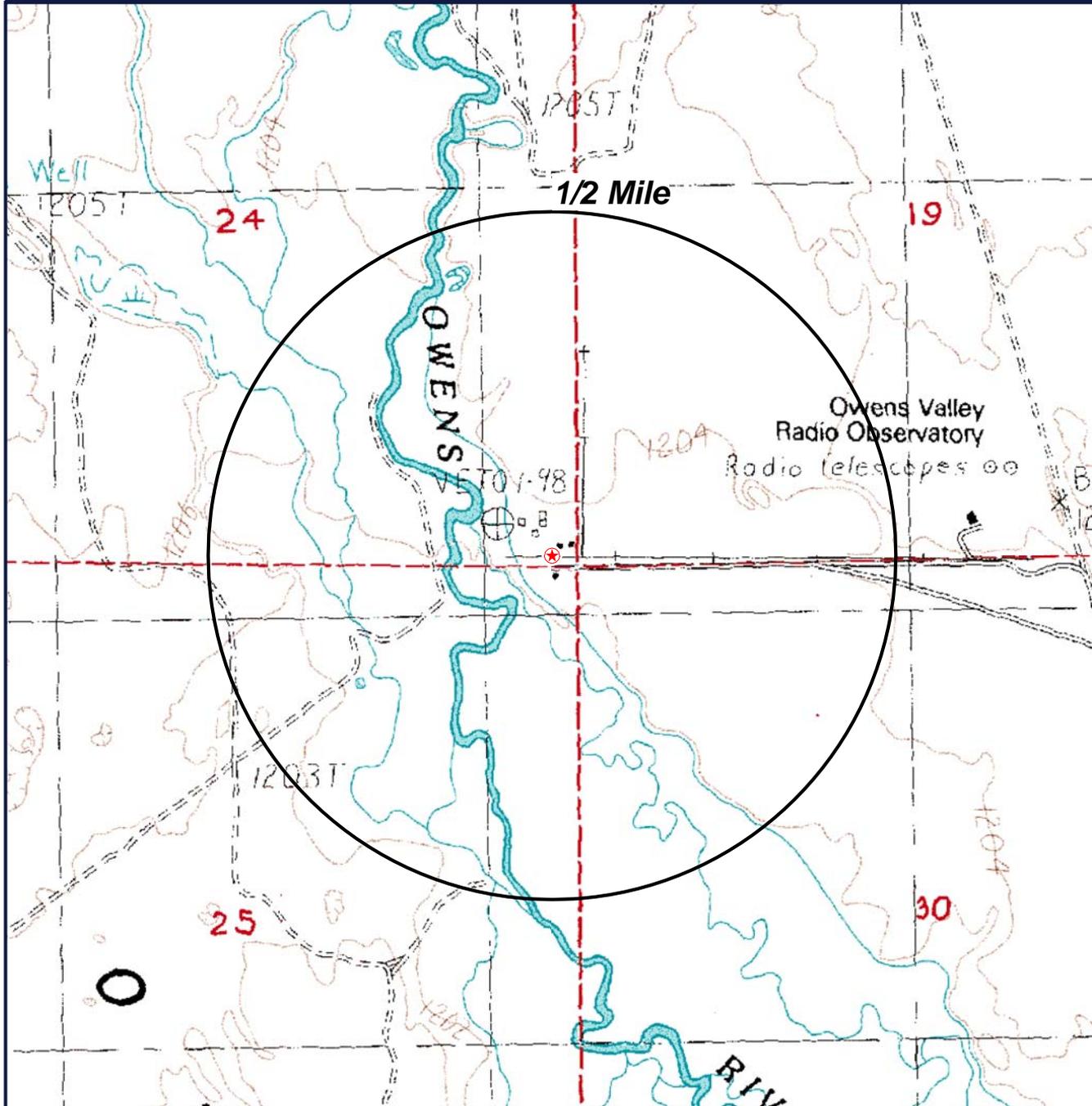
DATABASE FINDINGS SUMMARY (DETAIL)

ACRONYM	Target Property	SEARCH RADIUS (miles)	1/8 Mile (> TP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
<u>FEDERAL</u>								
HSTBLDGS		.5000	0	0	0	0	0	0
HSTLNDMKS		.5000	0	0	0	0	0	0
HSTPLACES		.5000	0	0	0	0	0	0
SUB-TOTAL			0	0	0	0	0	0
<u>STATE (CA)</u>								
CALNDMKS		.5000	0	0	0	0	0	0
SUB-TOTAL			0	0	0	0	0	0
<u>TRIBAL</u>								
INDIANRES		.5000	0	0	0	0	0	0
SUB-TOTAL			0	0	0	0	0	0
TOTAL			0	0	0	0	0	0



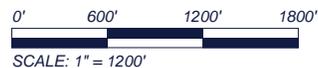
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CULTURAL AND HISTORICAL SITE MAP



★ Target Property (TP)

**Quadrangle(s): Big Pine
Owens Valley Radio Observatory
Leighton Lane
Big Pine, California
93514**



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ENVIRONMENTAL RECORDS DEFINITIONS - FEDERAL

HSTBLDGS Historic Buildings (HABS/HAER)

VERSION DATE: NR

This database includes buildings that are significant examples of the history of American engineering and architecture. Information is collected and entered into the National Historic American Building inventory, this database is maintained by the National Park Service (NPS).

HSTLNDMKS National Historic Landmarks

VERSION DATE: 3/2009

This National Park Service (NPS) database is a list of historic places that have tremendous importance in maintaining the heritage of the United States. The Secretary of the Interior decides on designation if the site possesses national significance.

HSTPLACES National Register of Historic Places

VERSION DATE: 3/2009

This database maintained by the National Park Service (NPS) contains a variety of places including districts, sites, building, structures and objects. These places are chosen because they are significant in American history. Information is collected for each of the sites and is compiled into the National Register of Historic Places.



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ENVIRONMENTAL RECORDS DEFINITIONS - STATE (CA)

CALNDMKS California Historical Landmarks

VERSION DATE: NR

The State Historical Resources Commission and the Office of Historic Preservation maintains this database of California Historical Landmarks. California Historical Landmarks are buildings, structures, sites, or places that have been determined to have statewide historical significance. The resource also must be approved for designation by the County Board of Supervisors or the City/Town Council in whose jurisdiction it is located; be recommended by the State Historical Resources Commission; and be officially designated by the Director of California State Parks.



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ENVIRONMENTAL RECORDS DEFINITIONS - TRIBAL

INDIANRES Indian Reservations

VERSION DATE: 1/2000

The Department of Interior and Bureau of Indian Affairs maintains this database that includes American Indian Reservations, off-reservation trust lands, public domain allotments, Alaska Native Regional Corporations and Recognized State Reservations.



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NATURAL AREAS

TARGET PROPERTY SUMMARY

Owens Valley Radio Observatory
Leighton Lane
Big Pine, Inyo County, California 93514

USGS Quadrangle: **Big Pine, CA**
Target Property Geometry: **Point**

Target Property Longitude(s)/Latitude(s):
(-118.295521, 37.231487)

County/Parish Covered:
Inyo (CA)

Zipcode(s) Covered:
Bishop CA: 93514

State(s) Covered:
CA

***Target property is located in Radon Zone 2.**
Zone 2 areas have a predicted average indoor radon screening level between 2 and 4 pCi/L.

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DATABASE FINDINGS SUMMARY (SOURCE)

DATABASE	ACRONYM	LOCA- TABLE	UNLOCA- TABLE	SEARCH RADIUS (miles)
<u>FEDERAL</u>				
COASTAL BARRIER RESOURCE SYSTEM	COASTAL	0	0	0.5000
NATURAL LANDMARKS	NTRLNDMKS	0	0	0.5000
WILDERNESS PRESERVATIONS	PRESRVTNS	0	0	0.5000
NATIONAL WILDLIFE REFUGE SYSTEM	REFUGES	0	0	0.5000
NATIONAL WILD AND SCENIC RIVERS SYSTEM	RIVERS	0	0	0.5000
SUB-TOTAL		0	0	
<u>STATE (CA)</u>				
CALIFORNIA STATE PARKS	PARKS	0	0	0.5000
SUB-TOTAL		0	0	

TOTAL	0	0
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DATABASE FINDINGS SUMMARY (DETAIL)

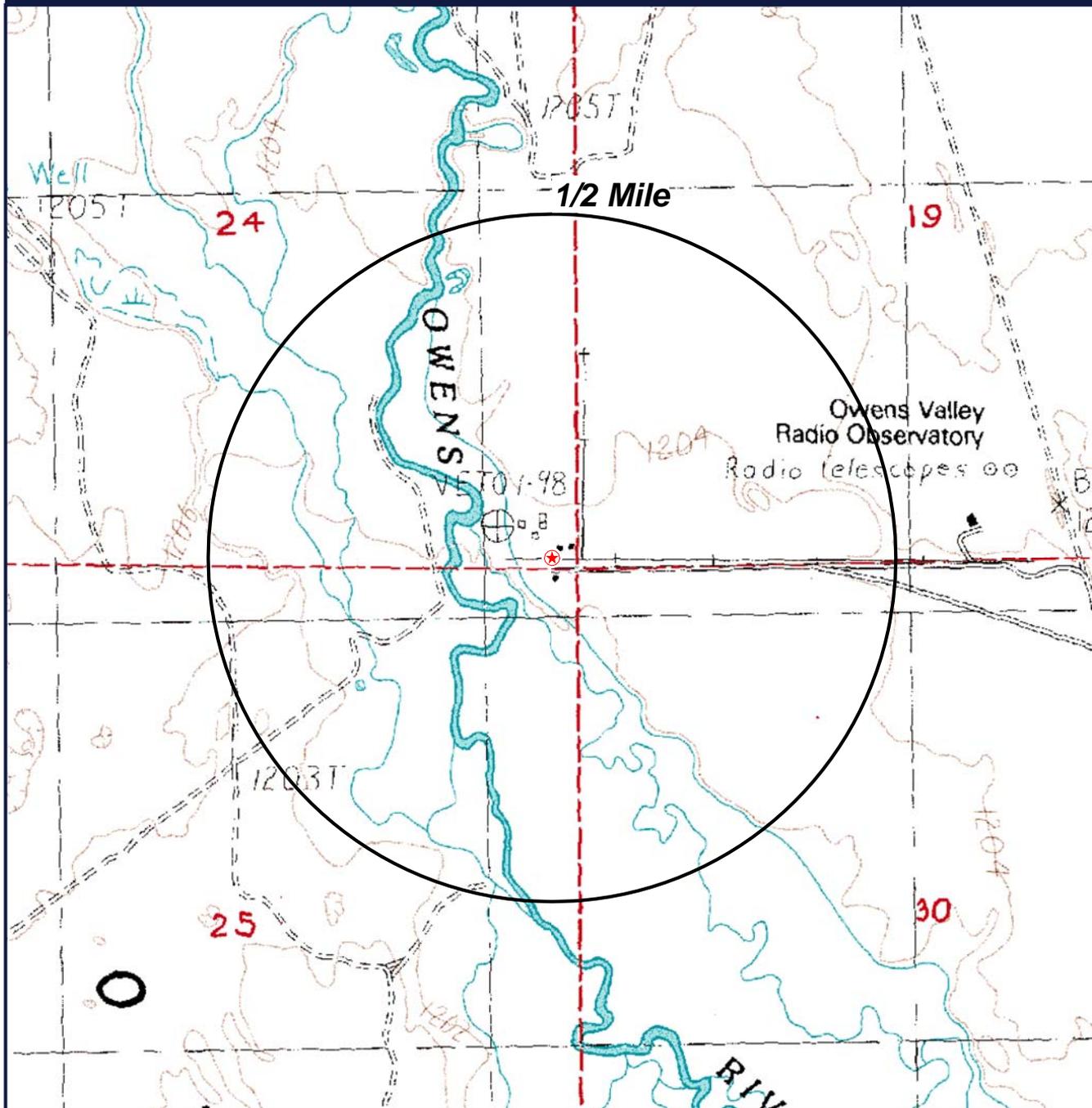
ACRONYM	Target Property	SEARCH RADIUS (miles)	1/8 Mile (> TP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
<u>FEDERAL</u>								
COASTAL		.5000	0	0	0	0	0	0
NTRLNDMKS		.5000	0	0	0	0	0	0
PRESRVNTNS		.5000	0	0	0	0	0	0
REFUGES		.5000	0	0	0	0	0	0
RIVERS		.5000	0	0	0	0	0	0
SUB-TOTAL			0	0	0	0	0	0
<u>STATE (CA)</u>								
PARKS		.5000	0	0	0	0	0	0
SUB-TOTAL			0	0	0	0	0	0

TOTAL			0	0	0	0	0	0
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NATURAL AREAS SITE MAP



★ Target Property (TP)

**Quadrangle(s): Big Pine
Owens Valley Radio Observatory
Leighton Lane
Big Pine, California
93514**



0' 600' 1200' 1800'
SCALE: 1" = 1200'

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ENVIRONMENTAL RECORDS DEFINITIONS - FEDERAL

COASTAL Coastal Barrier Resource System

VERSION DATE: NR

Coastal barriers are landforms that protect the mainland from the full impact from wind, wave and tidal energies. The Coastal Barrier Resources System (CBRS) database is maintained by the Federal Emergency Management Agency (FEMA). The CBRS laws are defined based on maps drawn by the Department of Interior (DOI) that depict the boundaries of the individual coastal areas. The purpose of these laws were to minimize loss of human life by discouraging development in high risk areas, reduce wasteful expenditure of Federal resources, and to protect the natural resources associated with coastal barriers. The U.S. Fish and Wildlife Services are responsible for maintaining the official maps of the CBRS and should be contacted if further information is needed.

NTRLNDMKS Natural Landmarks

VERSION DATE: NR

This database contains the best remaining examples of natural beauty in the nation both ecologically and geologically. Sites meeting the standards for designation as Natural Landmarks are entered into the National Registry of Natural Landmarks, which is maintained by the National Park Service (NPS).

PRESRVTNS Wilderness Preservations

VERSION DATE: NR

This National Park Service (NPS) database includes National Wilderness Preservations. These are areas of underdeveloped Federal land that retain their natural character and are aesthetically pleasing. These wilderness areas are free from permanent human influence and therefore protected and managed to maintain their natural integrity.

REFUGES National Wildlife Refuge System

VERSION DATE: NR

The National Wildlife Refuge System Inventory is a database that is maintained by the U.S. Fish and Wildlife Services. Refuges are a system of Federal lands and waters chosen specifically for their value to the wildlife. These refuges are managed to protect the wildlife and habitat resources.

RIVERS National Wild And Scenic Rivers System

VERSION DATE: NR

In accordance to the National Wild and Scenic Rivers Act, the Nationwide Rivers Inventory was designed to provide a listing of wild and scenic rivers located in the United States and Puerto Rico. These rivers are free-flowing, have remarkable outdoor value, and are in need of environmental protection. This database was prepared for the National Park Service by the USGS with additional support from various agencies.



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ENVIRONMENTAL RECORDS DEFINITIONS - STATE (CA)

PARKS California State Parks

VERSION DATE: 8/2009

This database is maintained by the California Park and Recreation Department's Acquisition and Development Division.

Disclaimer: Parcel boundaries are approximate and should not be considered legal descriptions. State Park boundaries are approximate and should not be considered legal descriptions. Maps are intended for study purposes only.



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NATIONAL WETLAND INVENTORY

TARGET PROPERTY SUMMARY

Owens Valley Radio Observatory
Leighton Lane
Big Pine, Inyo County, California 93514

USGS Quadrangle: **Big Pine, CA**
Target Property Geometry: **Point**

Target Property Longitude(s)/Latitude(s):
(-118.295521, 37.231487)

County/Parish Covered:
Inyo (CA)

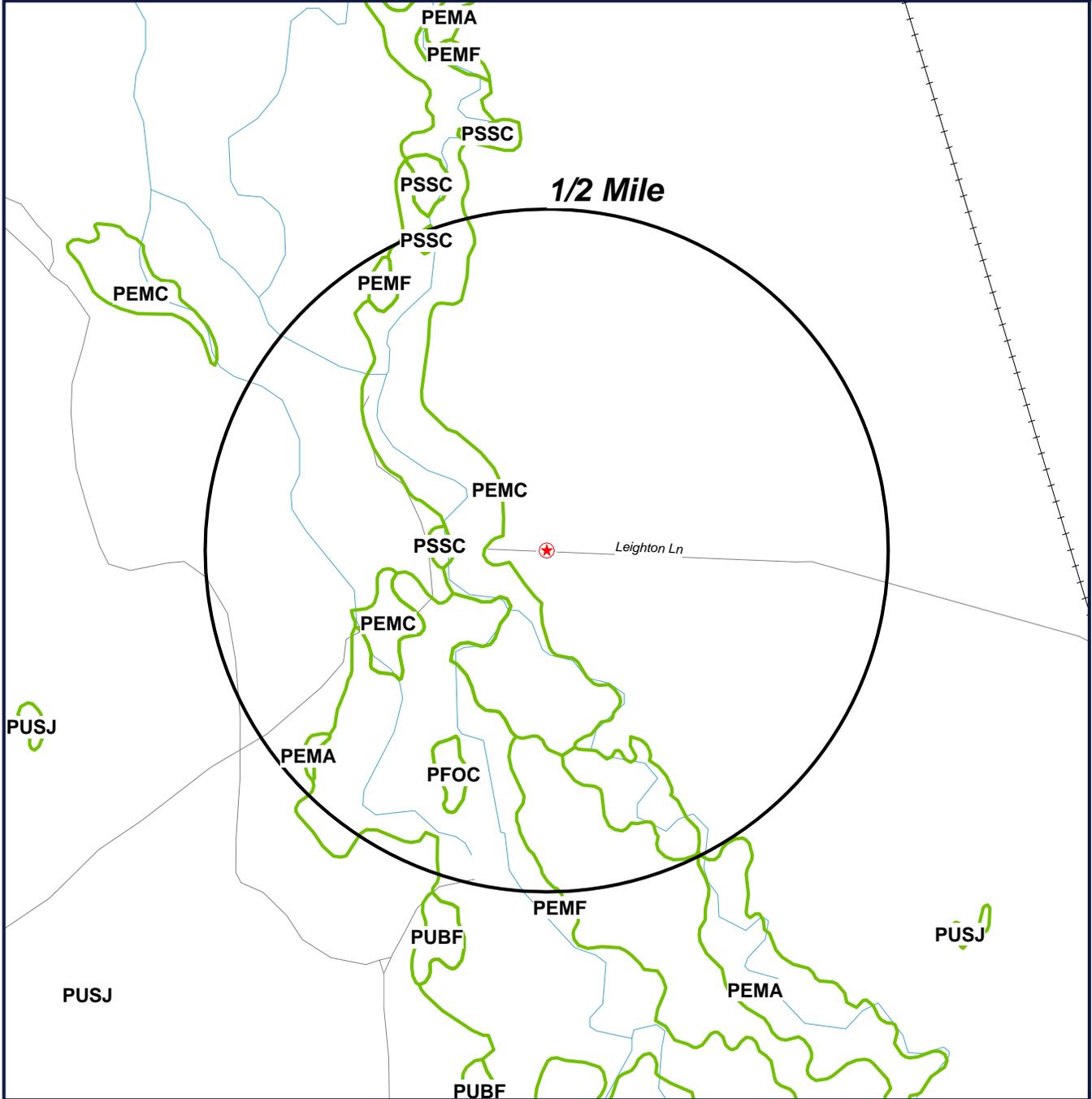
Zipcode(s) Covered:
Bishop CA: 93514

State(s) Covered:
CA

***Target property is located in Radon Zone 2.**
Zone 2 areas have a predicted average indoor radon screening level between 2 and 4 pCi/L.

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NWI MAP



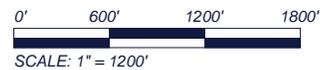
1/2 Mile

Leighton Ln

★ Target Property (TP)

□ NWI BOUNDARY

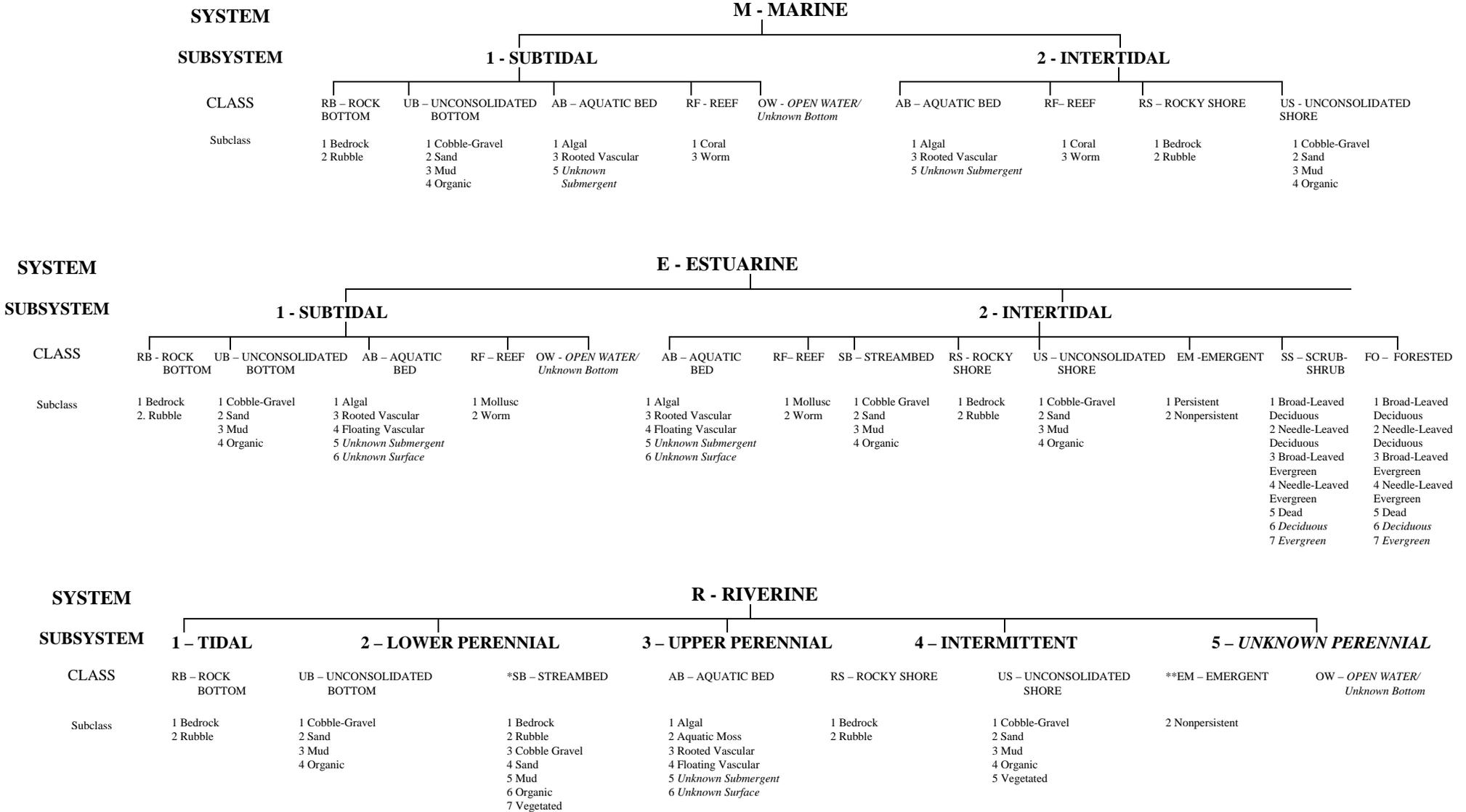
Owens Valley Radio Observatory
Leighton Lane
Big Pine, California
93514



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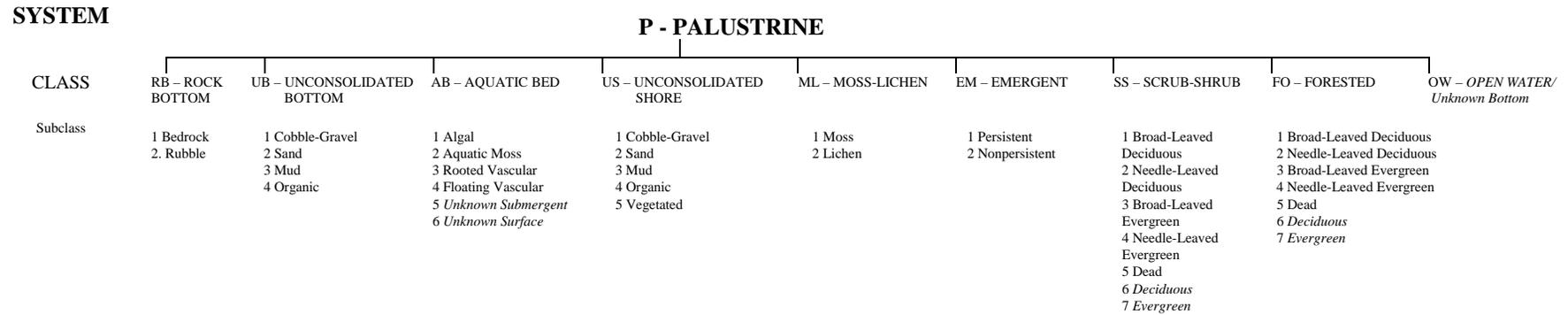
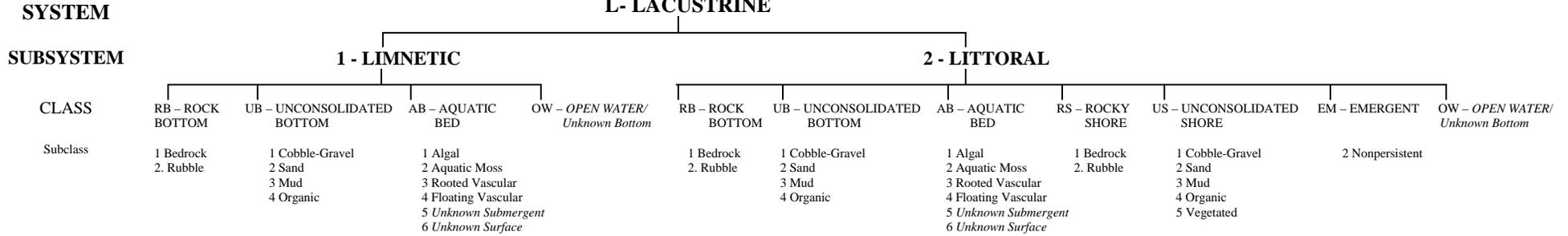
WETLANDS AND DEEPWATER HABITATS CLASSIFICATION



* STREAMBED is limited to TIDAL and INTERMITTENT SUBSYSTEMS, and comprises the only CLASS in the INTERMITTENT SUBSYSTEM.

** EMERGENT is limited to TIDAL and LOWER PERENNIAL SUBSYSTEMS.

WETLANDS AND DEEPWATER HABITATS CLASSIFICATION



MODIFIERS										
In order to more adequately describe the wetland and deepwater habitats one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system.										
WATER REGIME				WATER CHEMISTRY			SOIL	SPECIAL MODIFIERS		
Non-Tidal		Tidal		Coastal Salinity	Inland Salinity	pH Modifiers for all Fresh Water				
A Temporarily Flooded	H Permanently Flooded	K <i>Artificially Flooded</i>	*S Temporary-Tidal	1 Hyperhaline	7 Hypersaline		g Organic	b <i>Beaver</i>		h <i>Diked/Impounded</i>
B Saturated	J Intermittently Flooded	L Subtidal	*R Seasonal-Tidal	2 Euthaline	8 Eusaline	a Acid	n Mineral	d <i>Partially Drained/Ditched</i>		r Artificial Substrate
C Seasonally Flooded	K Artificially Flooded	M Irregularly Exposed	*T Semipermanent-Tidal	3 Mixohaline (<i>Brackish</i>)	9 Mixosaline	t Circumneutral		f Farmed		s <i>Spoil</i>
D <i>Seasonally Flooded/Well Drained</i>	W Intermittently Flooded/Temporary	N Regularly Exposed	*V Permanent-Tidal	4 Polyhaline	0 Fresh	i Alkaline				x Excavated
E <i>Seasonally Flooded/Saturated</i>	Y Saturated/Semipermanent/Seasonal	P Irregularly Flooded	U <i>Unknown</i>	5 Mesohaline						
F Semipermanently Flooded	Z Intermittently Exposed/Permanent			6 Oligohaline						
G Intermittently Exposed	U <i>Unknown</i>			0 Fresh						
				*These water regimes are only used in tidally influenced, freshwater systems.						

NOTE: Italicized terms were added for mapping by the National Wetlands Inventory program.

FCC & FAA

TARGET PROPERTY SUMMARY

Owens Valley Radio Observatory
Leighton Lane
Big Pine, Inyo County, California 93514

USGS Quadrangle: **Big Pine, CA**
Target Property Geometry: **Point**

Target Property Longitude(s)/Latitude(s):
(-118.295521, 37.231487)

County/Parish Covered:
Inyo (CA)

Zipcode(s) Covered:
Bishop CA: 93514

State(s) Covered:
CA

***Target property is located in Radon Zone 2.**
Zone 2 areas have a predicted average indoor radon screening level between 2 and 4 pCi/L.

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DATABASE FINDINGS SUMMARY (SOURCE)

DATABASE	ACRONYM	LOCA- TABLE	UNLOCA- TABLE	SEARCH RADIUS (miles)
FEDERAL				
AM RADIO STRUCTURES	AMTOWERS	0	0	0.5000
ANTENNA STRUCTURE REGISTRATION	ASR	0	0	0.5000
CELLULAR TOWERS	CELLTOWERS	0	0	0.5000
DIGITAL OBSTACLE FILE	DOF	0	0	0.5000
SUB-TOTAL		0	0	

TOTAL

0

0



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DATABASE FINDINGS SUMMARY (DETAIL)

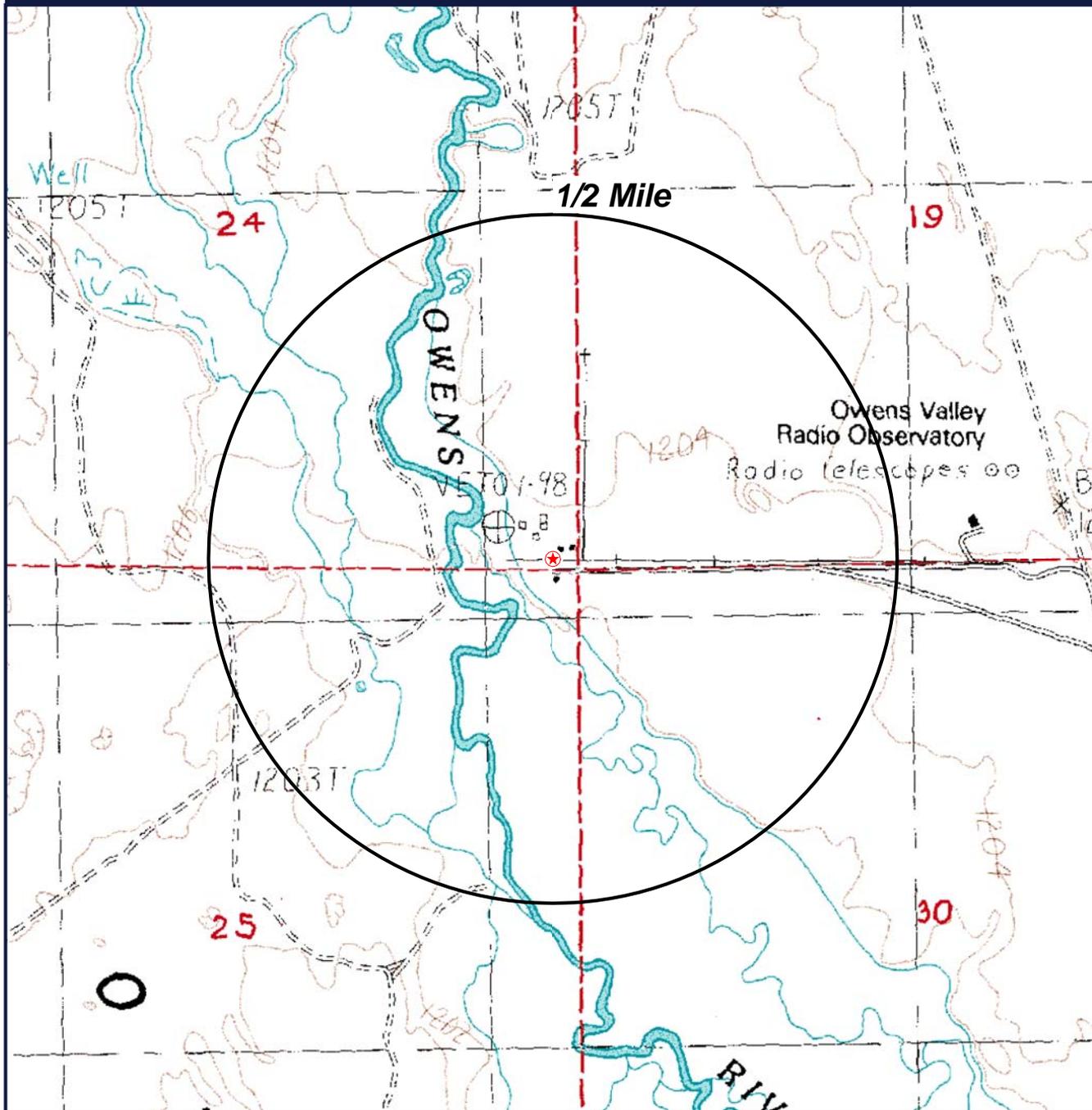
ACRONYM	Target Property	SEARCH RADIUS (miles)	1/8 Mile (> TP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
<u>FEDERAL</u>								
AMTOWERS		.5000	0	0	0	0	0	0
ASR		.5000	0	0	0	0	0	0
CELLTOWERS		.5000	0	0	0	0	0	0
DOF		.5000	0	0	0	0	0	0
SUB-TOTAL			0	0	0	0	0	0

TOTAL	0						
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FCC & FAA SITE MAP



★ Target Property (TP)

Quadrangle(s): Big Pine
Owens Valley Radio Observatory
Leighton Lane
Big Pine, California
93514



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ENVIRONMENTAL RECORDS DEFINITIONS - FEDERAL

AMTOWERS AM Radio Structures

VERSION DATE: 2/2010

The FCC maintains a database of the AM Radio Structures. The AM Broadcast Stations database contains stations that are full time stations using a non-directional antenna.

ASR Antenna Structure Registration

VERSION DATE: 2/2010

The ASR database is maintained by the FCC and includes new and existing towers that pose a flight hazard to aircraft, either by location or height.

CELLTOWERS Cellular Towers

VERSION DATE: 7/2009

The Cellular database is maintained by the FCC. Licensees use cellular radiotelephone service (commonly referred to as cellular) spectrum to provide a mobile telecommunications service for hire to the general public using cellular systems. Currently, cellular licensees must provide analog service, but may also provide digital service as well. Cellular licensees that operate digital networks may also offer advanced two-way data services. The Commission and other wireless industry representatives often refer to these services as "Mobile Telephone Services" and "Mobile Data Services."

DOF Digital Obstacle File

VERSION DATE: 4/2010

The FAA Digital Obstacle File is maintained by the FAA and National Oceanic and Atmospheric Administration. These man-made structures may affect air navigation therefore both the verified and unverified data is recorded in this database.



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