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OFFICE OF
INTEGRATIVE
ACTIVITIES

FINDING OF NO SIGNIFICANT IMPACT

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. The proposed Owens Valley Solar Array 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 expansion would be funded by the National Science Foundation (NSF) through monies made available from the American Recovery and Reinvestment Act (ARRA). The proposed project will collect scientific information on the causes and impacts of solar magnetic storms which will ultimately lead to improved forecasting and prediction of these disruptive phenomena. The purpose of the proposed project is to extend the useful life of the existing solar array by at least 10 years and, thus, allow for additional scientific study to be conducted on radio wave sources.

The NSF prepared an Environmental Assessment (EA) to analyze potential environmental impacts of the proposed project. In support of its Draft EA, NSF ensured that biological and cultural resources surveys were carried out at the proposed site. A Draft EA was prepared and made available to the public on August 18, 2010. In order to meet the deadline for being able to expend ARRA funds, NSF's NEPA review process was expedited, and the public comment period ended on September 7, 2010. During the comment period, only one comment was received, which was from the Big Pine Tribe of the Owens Valley (Tribe). The comment clarified the terms of the agreement that NSF made with the Tribe during consultations that took place between early July, 2010 and late August, 2010. In response to the Tribe's comment letter, NSF modified the language in the EA to more clearly reflect the terms of the agreement reached with the Tribe. The Final EA was issued on September 21, 2010.

The proposed project is in conformance with the Inyo County General Plan and also is in conformance with LADWP's proposed Owens Valley Land Management Plan. The proposed project will have no significant impact on federally or state-listed threatened, endangered or special status plant, wildlife or invertebrate species. The proposed project would also have no significant impact on relevant environmental resources, including topographic, geologic, soil, visual, noise, and air quality. The proposed project will not induce significant cumulative impacts and will have no significant impact on natural hazards.

Based on efforts undertaken to identify and avoid project impacts related to cultural resources during the project design period, the proposed project will have no significant impact on cultural resources.

The NSF has reviewed the Environmental Assessment entitled "Owens Valley Solar Array Expansion Project Final Environmental Assessment, Inyo County, California" including the Draft EA Public Review Comments and Responses. The NSF has determined that the proposed project will not have a significant impact on the environment and that an EIS will not be required.

Dr. W. Lance Haworth — Date: 09/21/2010

Director, Office of Integrative Activities

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

PREPARED FOR
NEW JERSEY INSTITUTE OF TECHNOLOGY

ON BEHALF OF THE
NATIONAL SCIENCE FOUNDATION

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September 21, 2010

OWENS VALLEY SOLAR ARRAY EXPANSION
FINAL ENVIRONMENTAL ASSESSMENT
INYO COUNTY, CALIFORNIA

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

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 Final Environmental Assessment (Final 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 sites were potentially recommended as eligible for NRHP listing: OVSA-1, OVSA-2, OVSA-3 and OVSA-4. OVSA-2 was determined to be a disturbed, secondary deposit and was not considered to be eligible for the NRHP. Therefore, three sites from the May TSAR survey (OVSA-1, OVSA-3, OVSA-4) were recommended as NRHP eligible. Of these three NRHP-eligible sites it was determined 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 (Figure 6). 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 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: OVSA-5 and OVSA-6. Both of these sites were located outside of the proposed project's area.

Based on comments by the California Historic Preservation Office (CHPO) received during the Draft EA's public review period (Appendix D, pages 5, 11 and 12), an additional Cultural Resource survey was performed by TSAR on September 13-14, 2010 (Appendix D, pages 15-34). A total of 15 shovel test pits were excavated at the proposed trenching route in an existing road bed which crosses cultural deposits OVSA-3 and OVSA-4. These test pits, dug between 30 and 80 centimeters, were performed to confirm that the proposed trenching route was located below the OVSA-3 and OVSA-4 cultural deposits. Two additional test pits, one at OVSA-3 and another at OVSA-4, were excavated to compare the roadside test pits to the intact areas of these cultural deposits.

Based on comments by the CHPO received during the Draft EA's public review period (Appendix D, pages 5, 11 and 12), additional research was conducted on the historical significance of the existing Owens Valley Radio Observatory (OVRO). Construction of the OVRO/OVSA began in the late 1950s; therefore, parts of the array meet the 50-year minimum age requirement for a site to be eligible for listing on the NRHP. In September 2010, TSAR conducted research on whether listing the OVRO/OVSA facility as eligible in the NHRP is appropriate (Appendix D, pages 15-31). TSAR determined that parts of the OVRO/OVSA facility were potentially recommended as eligible for NRHP listing based on criteria A and C: for the OVRO/OVSA's association with events important in the development of radio observatory and since aspects of its design embody distinctive and creative engineering. The essential physical features would include the two 27-meter antennas, the trackways, the four oldest buildings on site, and the setting.

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 PM_{10} 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 15 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 proposed 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. A supplemental survey was conducted by TSAR in June 2010 to evaluate these alternative locations and to perform shovel testing at selected sites. Based on the original and supplemental surveys, OVSA-1, OVSA-3, OVSA-4, OVSA-5 and OVSA-6 are recommended as NRHP eligible.

According to the June 2010 TSAR survey, no adverse impacts would occur for OVSA Expansion Project 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. This alternative cable trenching route was selected as the trenching route in NJIT's final plan for the proposed project.

Based on comments by the CHPO received during the Draft EA's public review period (Appendix D, pages 5, 11 and 12), an additional Cultural Resource survey was performed by TSAR on September 13-14, 2010 (Appendix D, pages 15-31). A total of 15 shovel test pits were excavated at the OVSA Expansion Project's proposed cable-trenching route in an existing road bed which crosses OVSA-3 and OVSA-4. These test pits were performed to confirm that the proposed trenching route was located below the OVSA-3 and OVSA-4 cultural deposits. Based on results from the September 2010 shovel test pits at OVSA-3 and OVSA-4, TSAR confirms that the construction for the existing roadbed, in which the cable trenching would occur, entailed grading through and below the OVSA-3 and OVSA-4 cultural deposits. The road bed through both sites is considered to be non-contributing.

Therefore, the proposed OVSA cable trenching would have no adverse effect on OVSA-3 and OVSA-4.

Both OVSA-5 and OVSA-6 lie outside the proposed OVSA Expansion Project's area and would not be impacted by the OVSA Expansion Project's Alternative 1.

Based on consultations with the Big Pine Paiute Tribe of the Owens Valley, as a precautionary measure, NSF and NJIT have committed to having an archaeologist and a Tribal Cultural Monitor on site during ground disturbing activities, which, if the proposed project is approved, may occur at the following locations: OVSA 1-6, the area where the new modular building would be emplaced, and the new trenching and antenna installation at the northern most arm of the solar array.

Based on comments by the CHPO received during the Draft EA's public review period (Appendix D, pages 5, 11 and 12), additional research was conducted on the historical significance of the existing OVRO/OVSA facility by TSAR on September 13-14, 2010 (Appendix D, pages 15-31).

Due to its association with events important in the development of radio astronomy and because aspects of its design embody distinctive and creative engineering, NSF determined that the OVRO/OVSA facility should be considered eligible for listing on the NRHP under criteria A and C.

The proposed OVSA Expansion Project would refurbish and modernize the drive control systems for the two existing 27-meter antennas on site, but these modifications would be internal only and would not affect the outward appearance of the dishes. During refurbishment, the 27-meter antennas would be repainted and any rusty or defective structural members would receive reinforcement to maintain structural integrity. Such reinforcement is expected to be minor in nature and will be done to modern mechanical standards in a way that will not change the visual appearance of the antennas. The planned upgrade and refurbishment of antennas is standard operation for an active scientific instrument and is necessary to maintain the scientific usefulness and mechanical integrity of these two antennas. Also, the proposed project would not alter any existing buildings on site.

The proposed changes to the existing OVRO/OVSA site would not affect the historical integrity of the essential physical features of the existing site, including the 27-meter antennas, the trackways, the older buildings and the setting. The proposed changes to the site would be consistent with the scientific purpose of the array and its ongoing function. Therefore, the proposed project would have no adverse effect on the historical value of the OVRO/OVSA facility.

Based on efforts undertaken to identify, avoid and minimize project impacts related to cultural resources, the proposed project will have a negligible, 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 (CNDDB, 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 PM_{10} 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 Final 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 Final 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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FIGURES

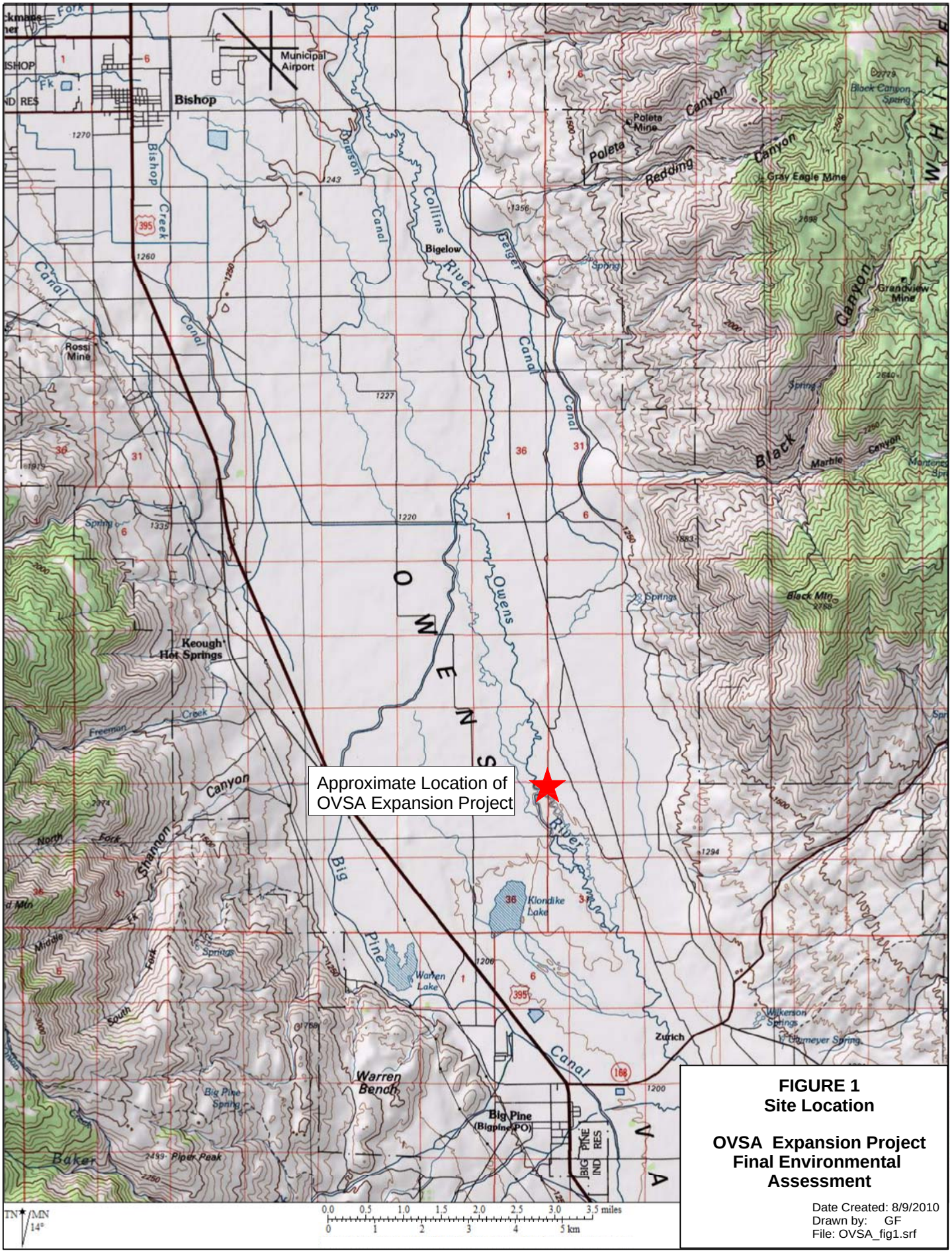

FIGURE 1
Site Location

OVSA Expansion Project
Final Environmental Assessment

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Bishop • Mammoth Lakes

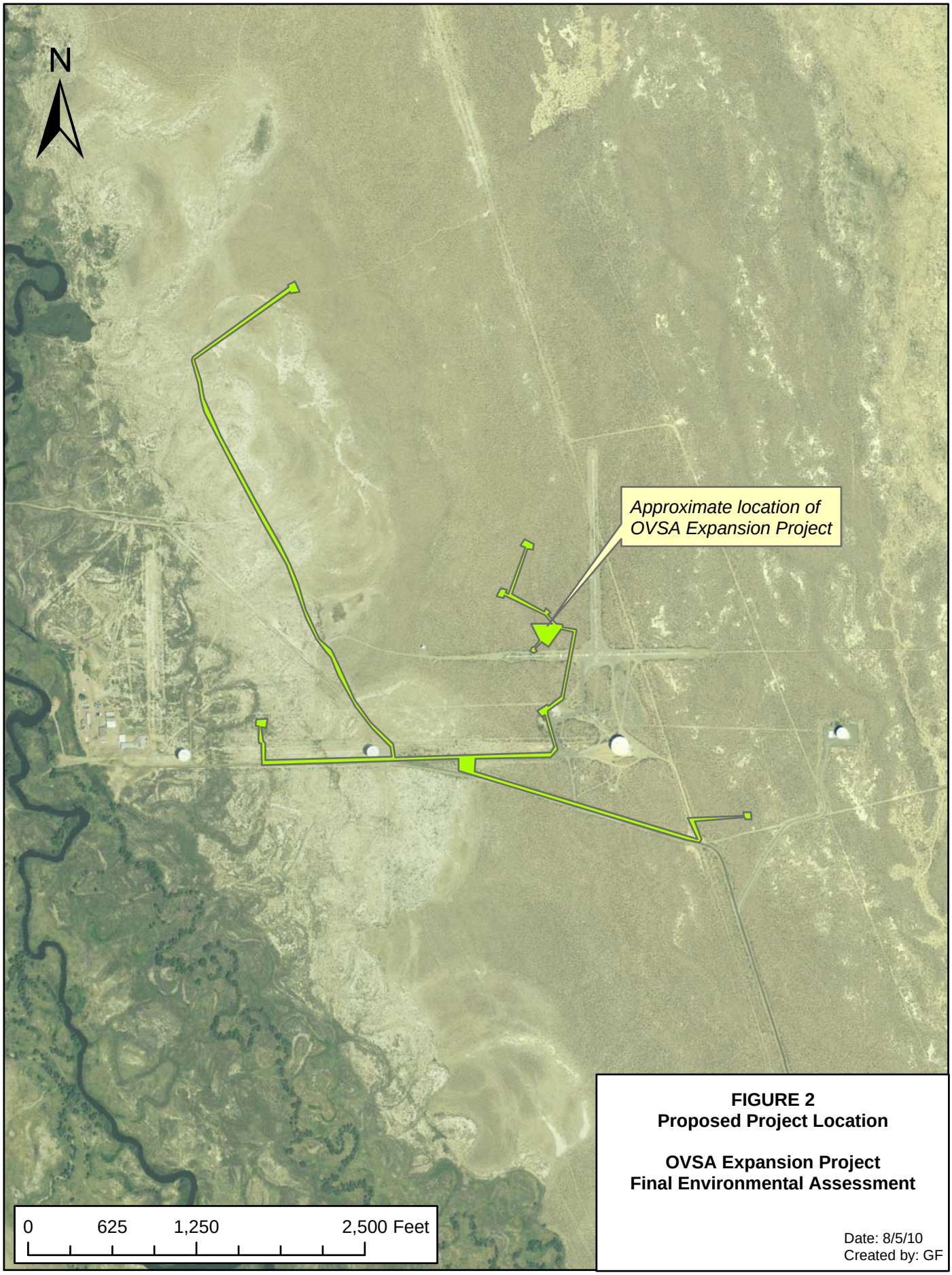

FIGURE 2
Proposed Project Location

OVSA Expansion Project
Final Environmental Assessment

Date: 8/5/10
Created by: GF

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Bishop and Mammoth Lakes, California

FIGURE 3
Aerial Photos of Existing Site
OVSA Expansion Project Final 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 Final 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).

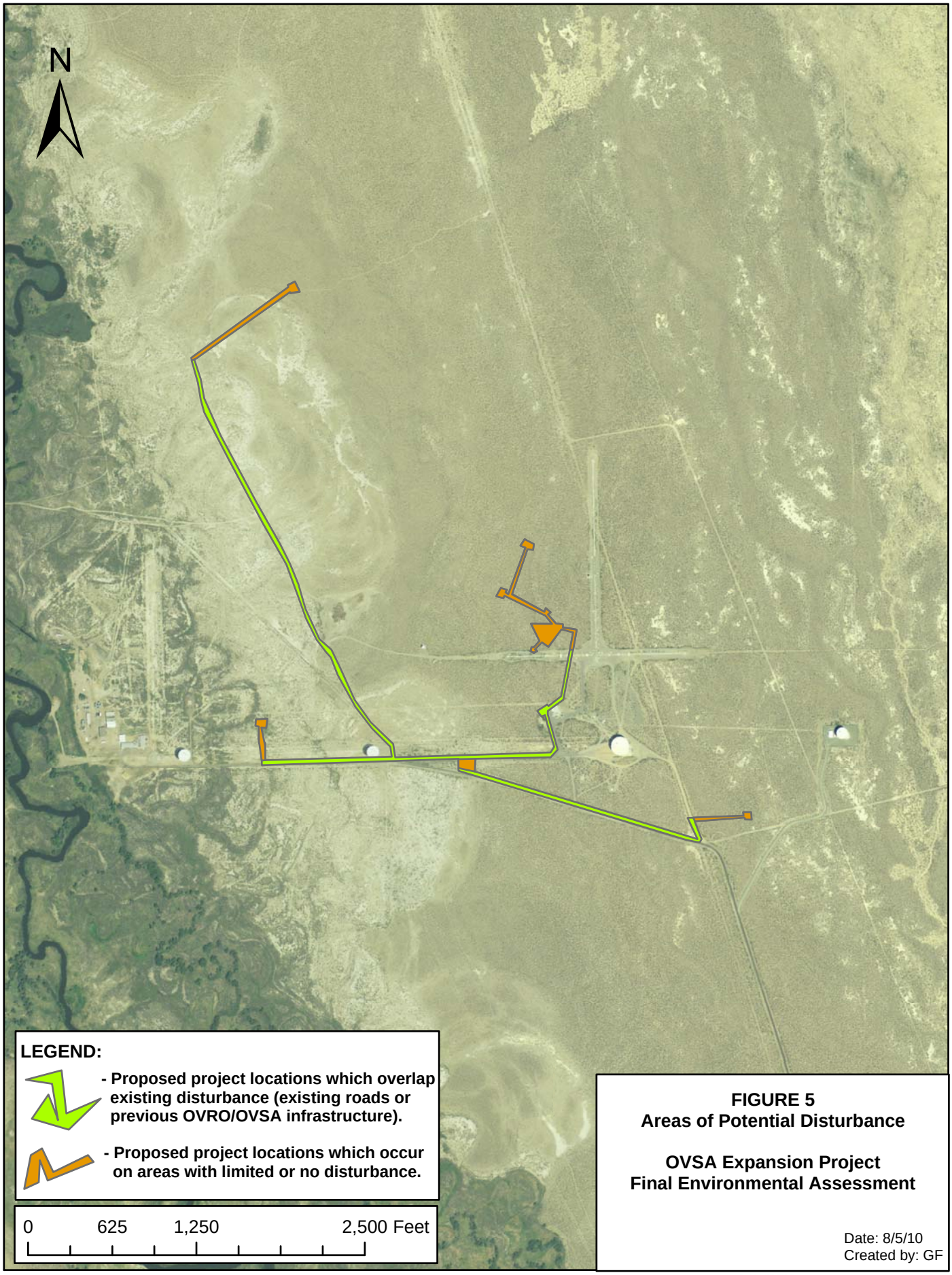

FIGURE 5
Areas of Potential Disturbance

OVSA Expansion Project
Final Environmental Assessment

Date: 8/5/10
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FIGURE 6

Proposed Project Location and Cultural Resource Areas

OVSA Expansion Project
Final Environmental Assessment

Date drawn: 08/9/10
Drawn by: KR
File: NJIT.PEA.Fig6

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(Not For Public Distribution)

LEGEND:

Black lines are areas with access roads or cable installation. These areas are primarily along existing roads.
Blue tear drops are proposed two-meter telescope pad locations.
Red areas are Cultural Resources Areas identified during the May and June 2010 TSAR surveys.

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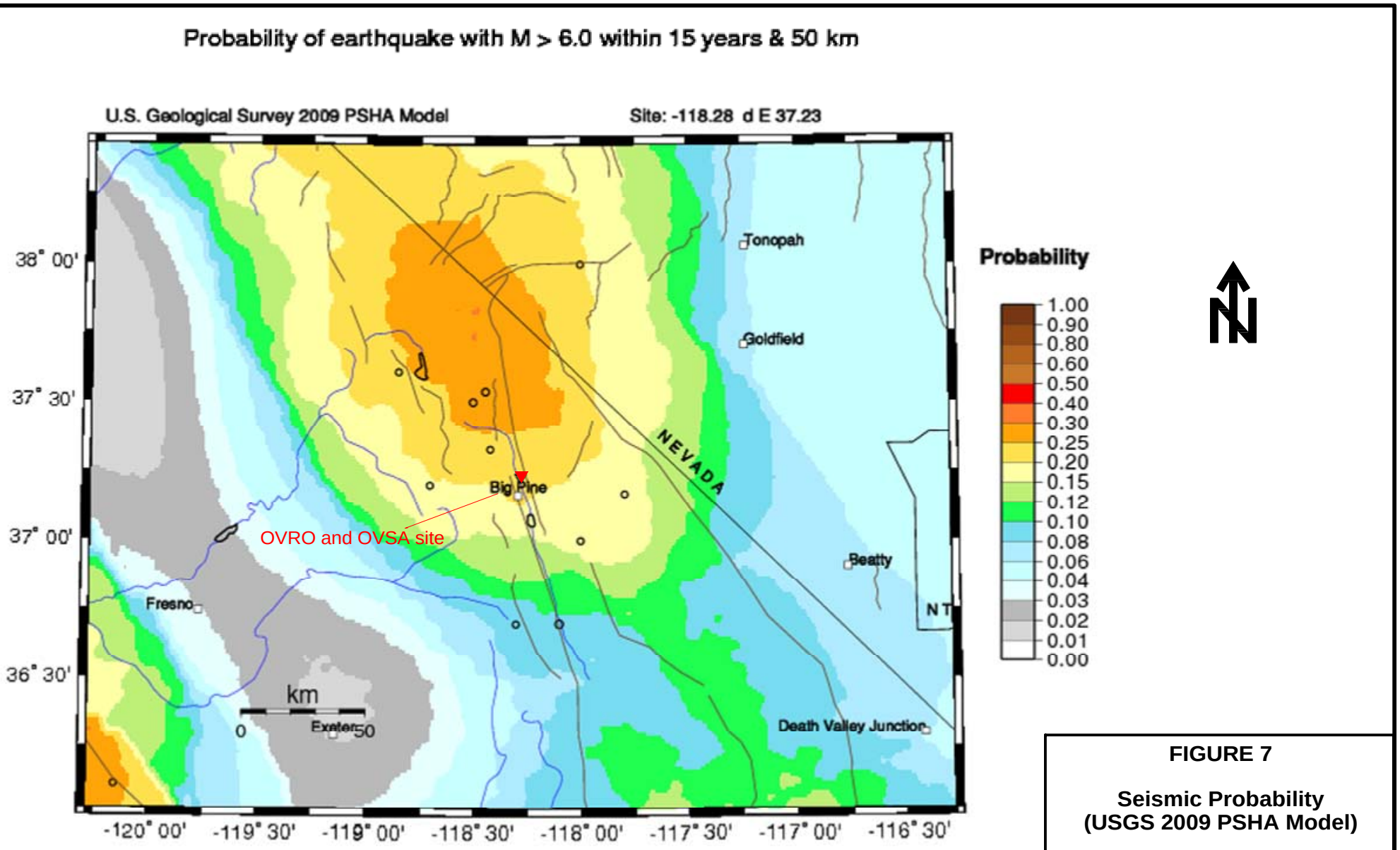

LEGEND:

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 Final Environmental Assessment

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

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APPENDICES

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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Prepared for:

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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).

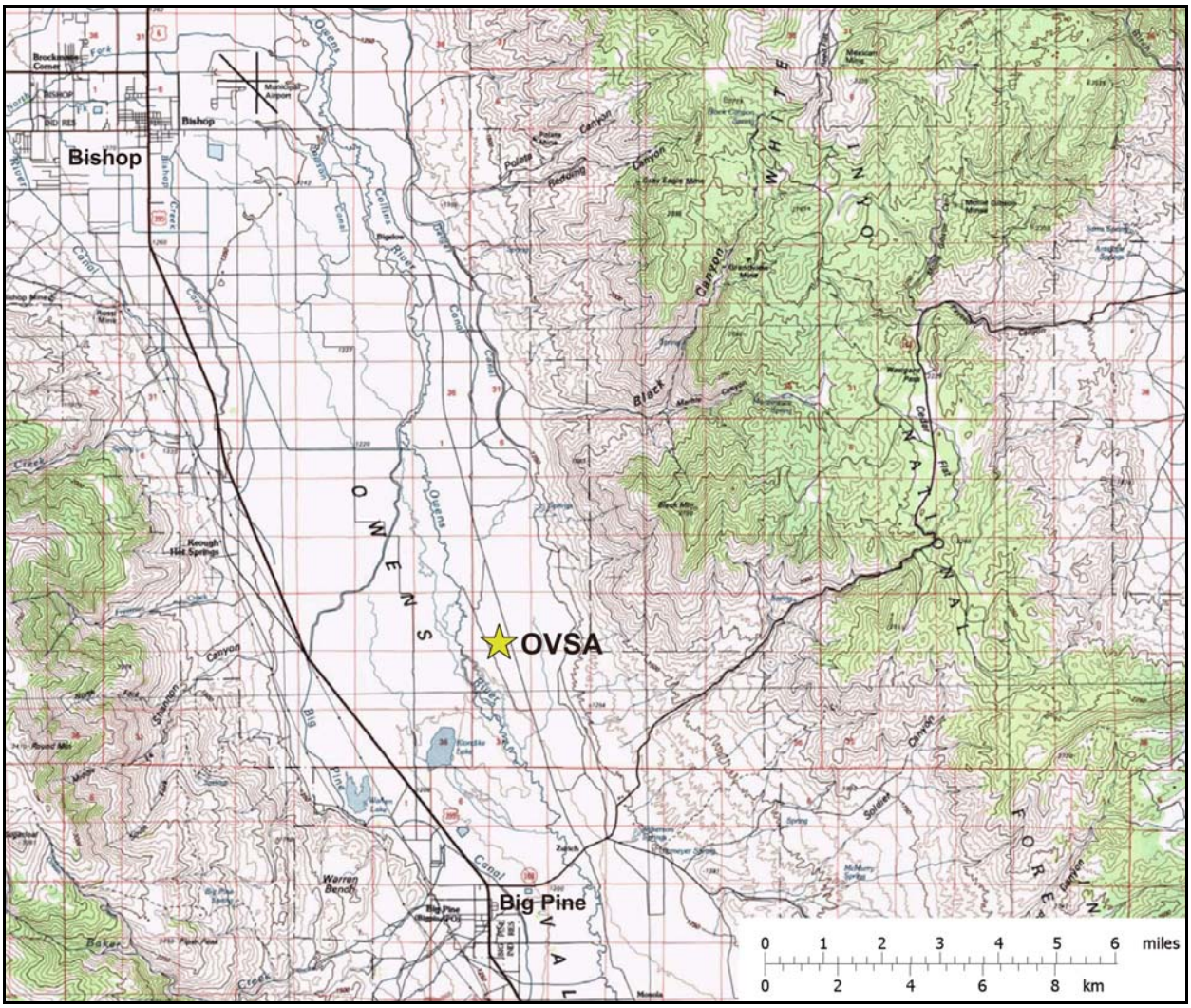

Figure 1. OVSA Project location.


Figure 2. 2-m radio telescope.

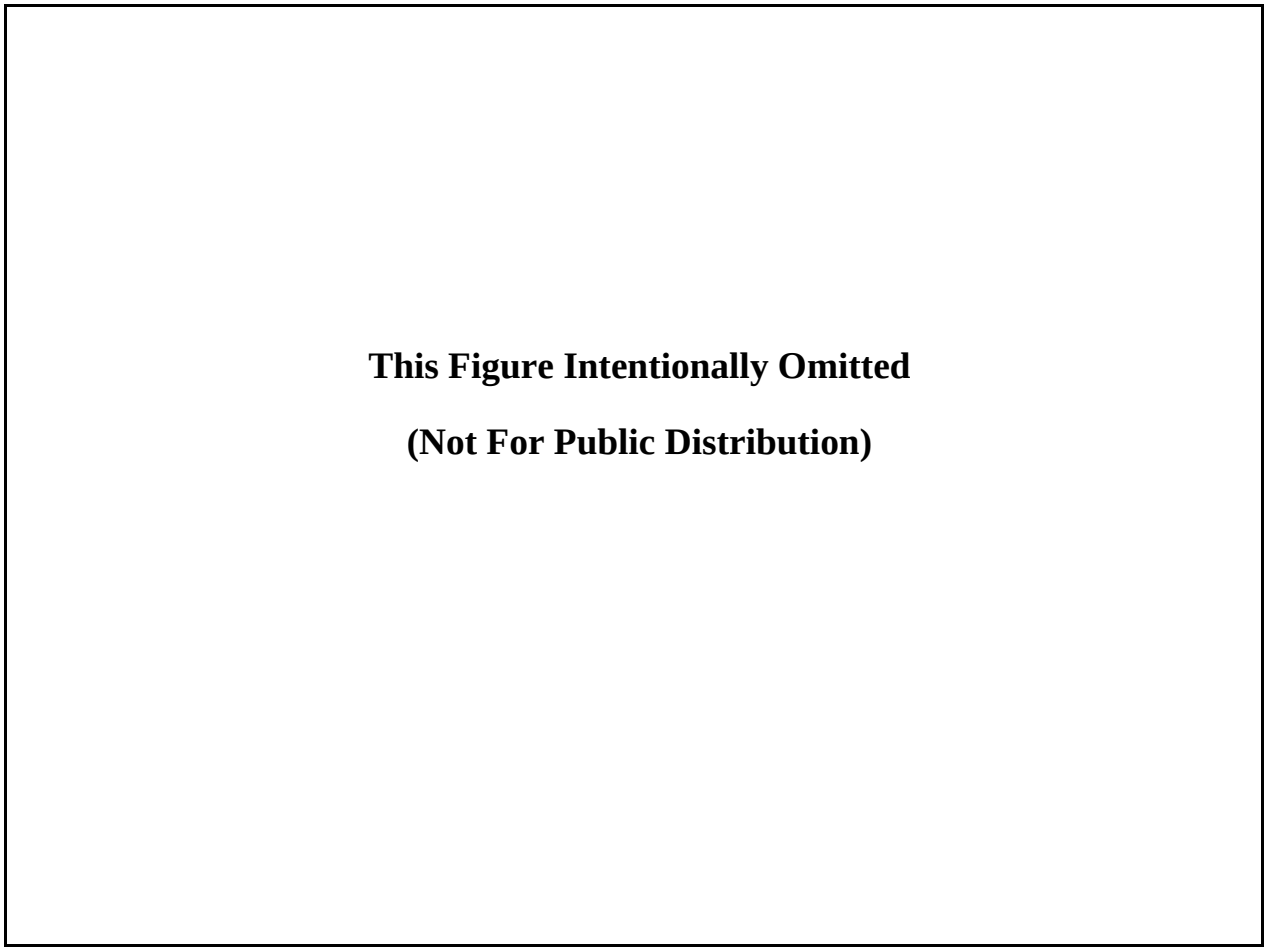

Figure 3. OVSA project alternatives.

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 (*Psorothamnus 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-Medithermal

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

Medithermal

> 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 millingstones. 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; Zennah 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,

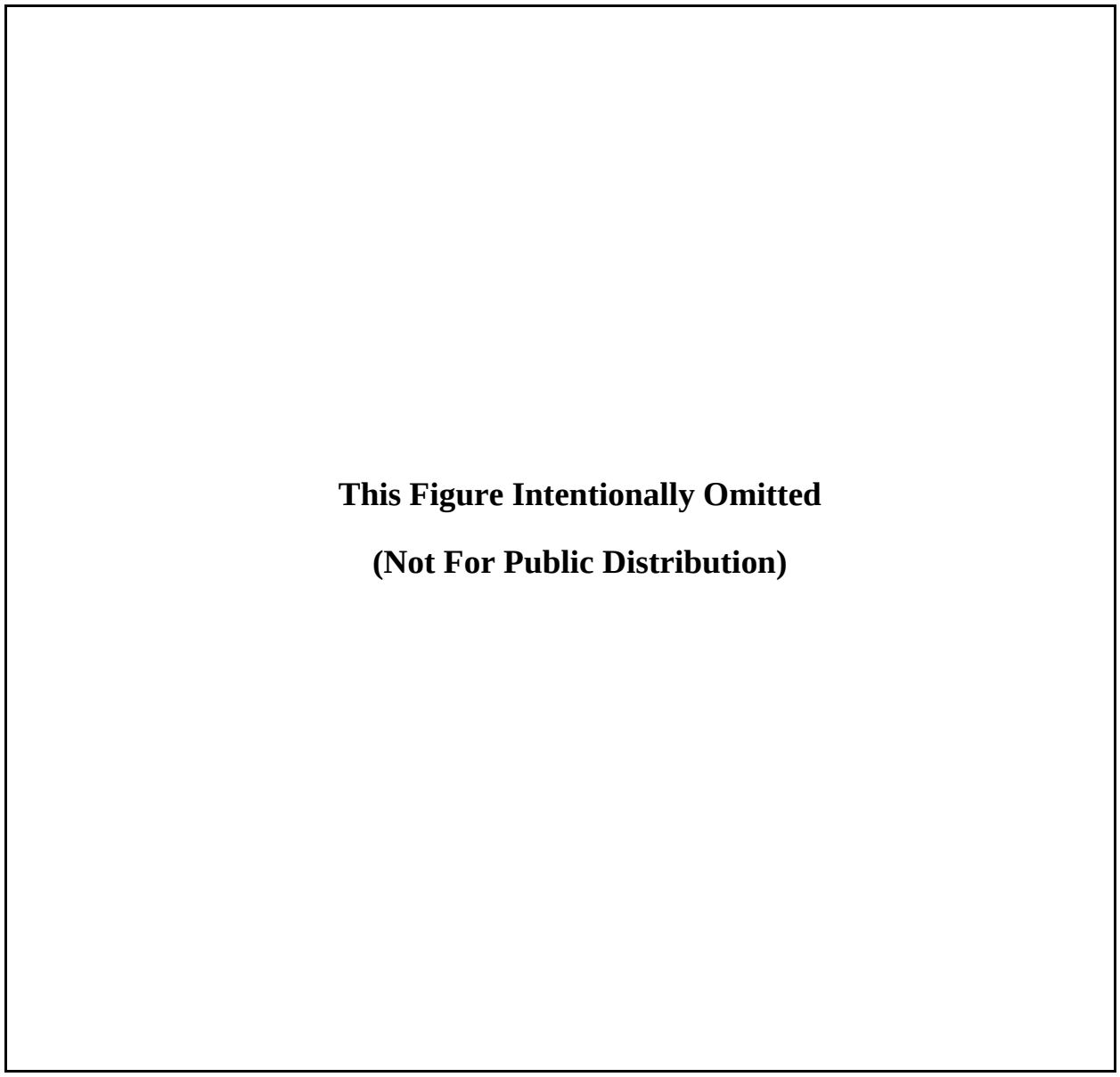

Figure 5. Survey coverage, site, and isolate locations.

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.

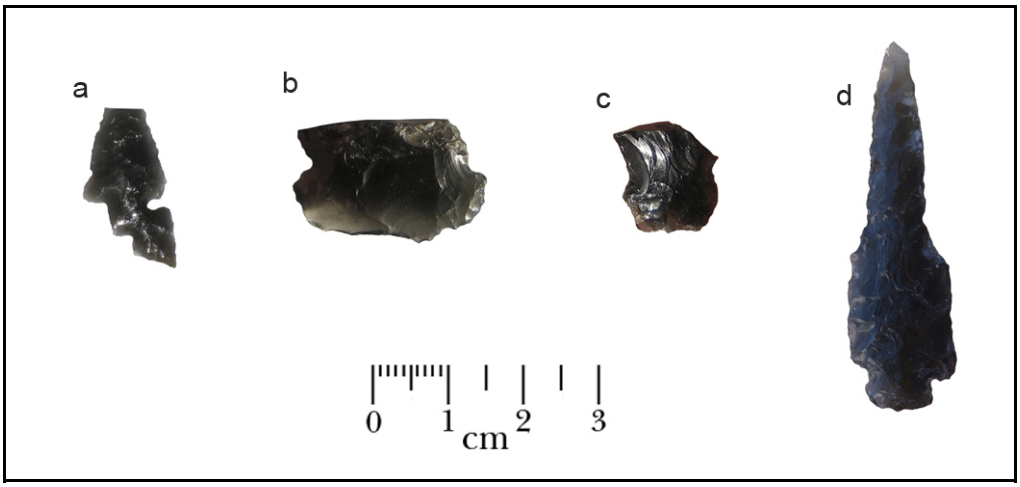

Figure 6. Projectile points found during the OVSA survey, a. Desert Side Notched (OVSA-1), b. large side notched (OVSA-1), c. stem fragment (OVSA-1), d. Rose Spring Corner Notched reworked into drill (OVSA-4).

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).

Table 2. Isolates Found During the OVSA Survey.

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.

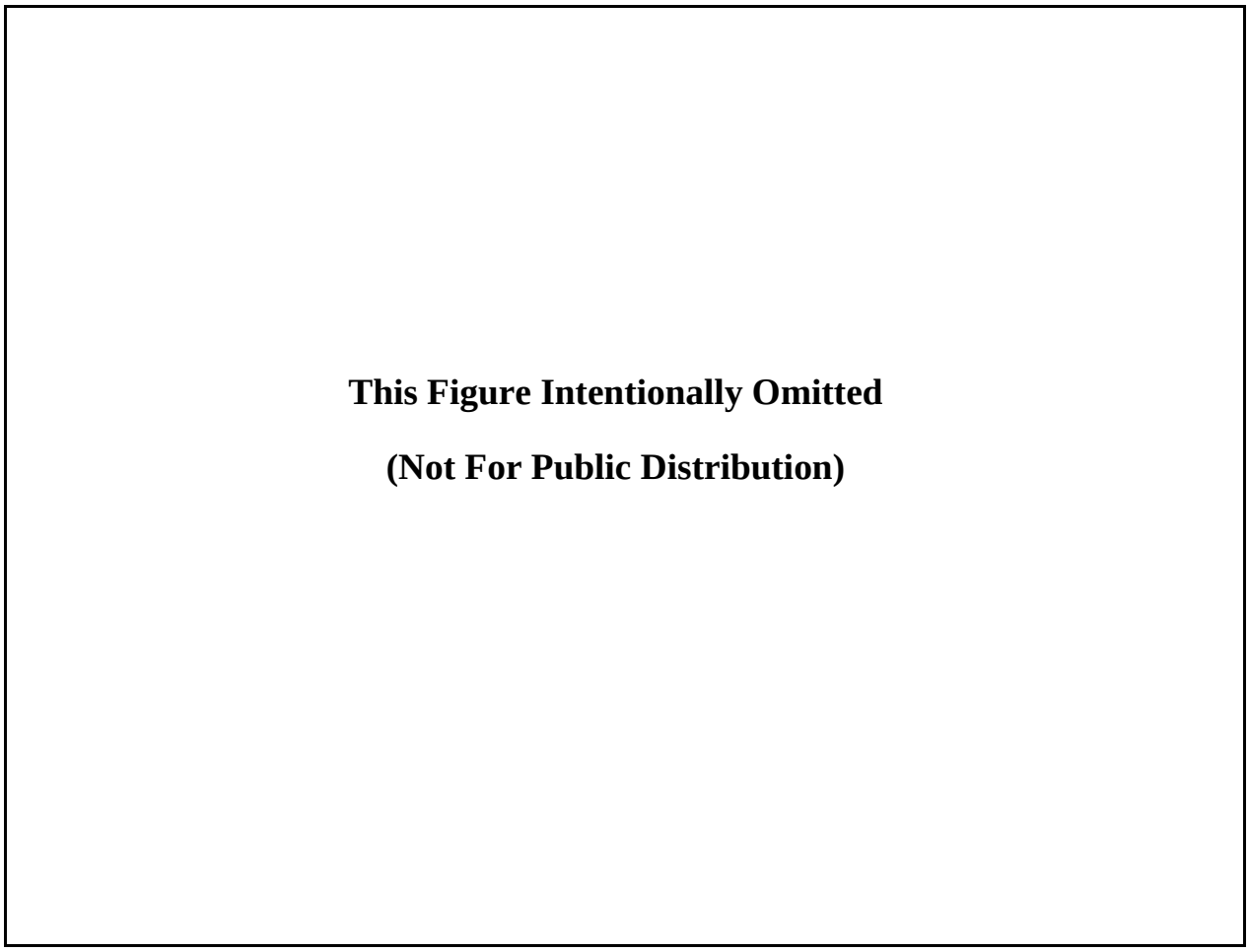

Figure 7. Archaeological site OVSA-1 showing project as originally proposed (in blue).

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 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

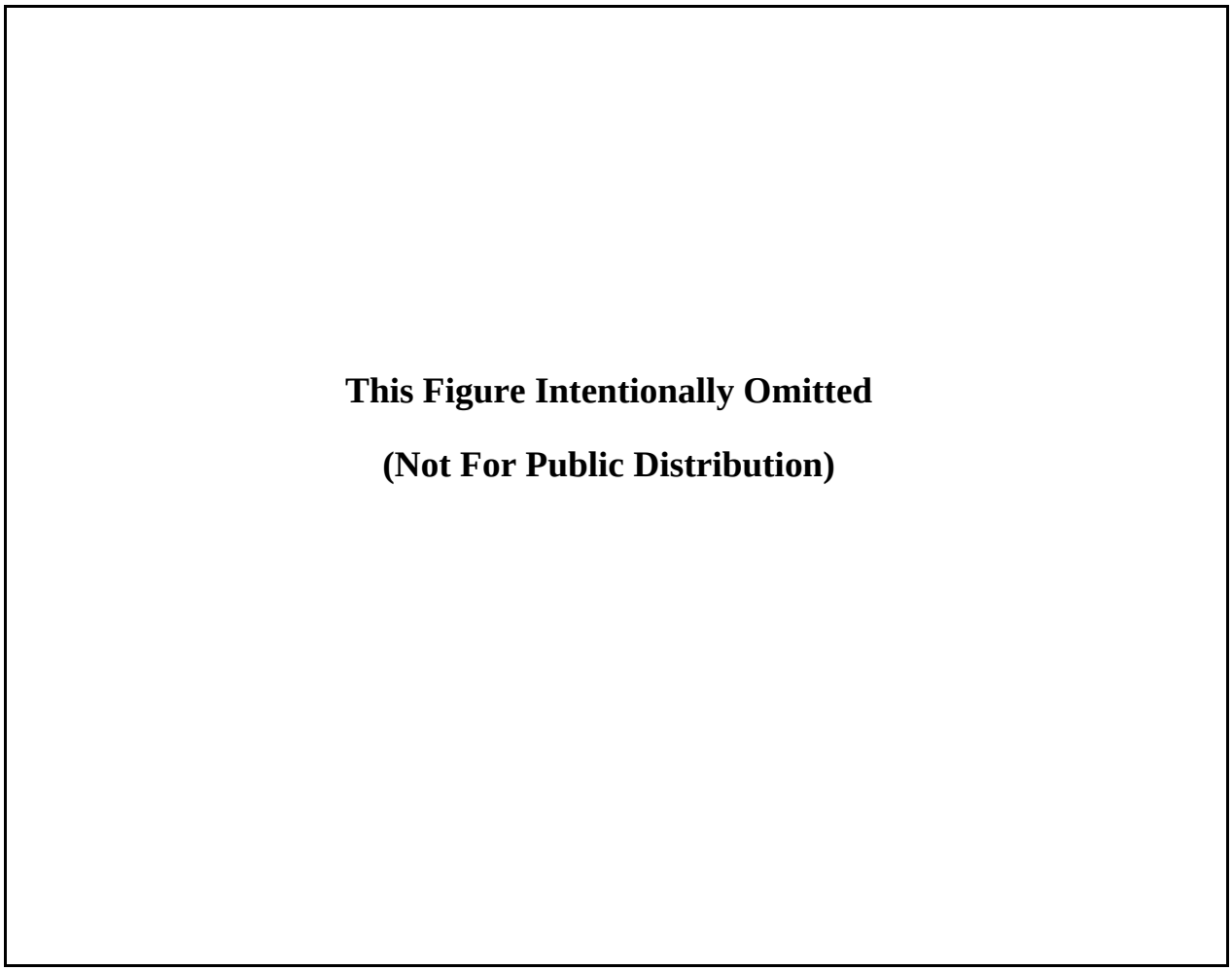

Figure 8. Archaeological site OVSA-1 showing Alternative 1 (in blue).

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

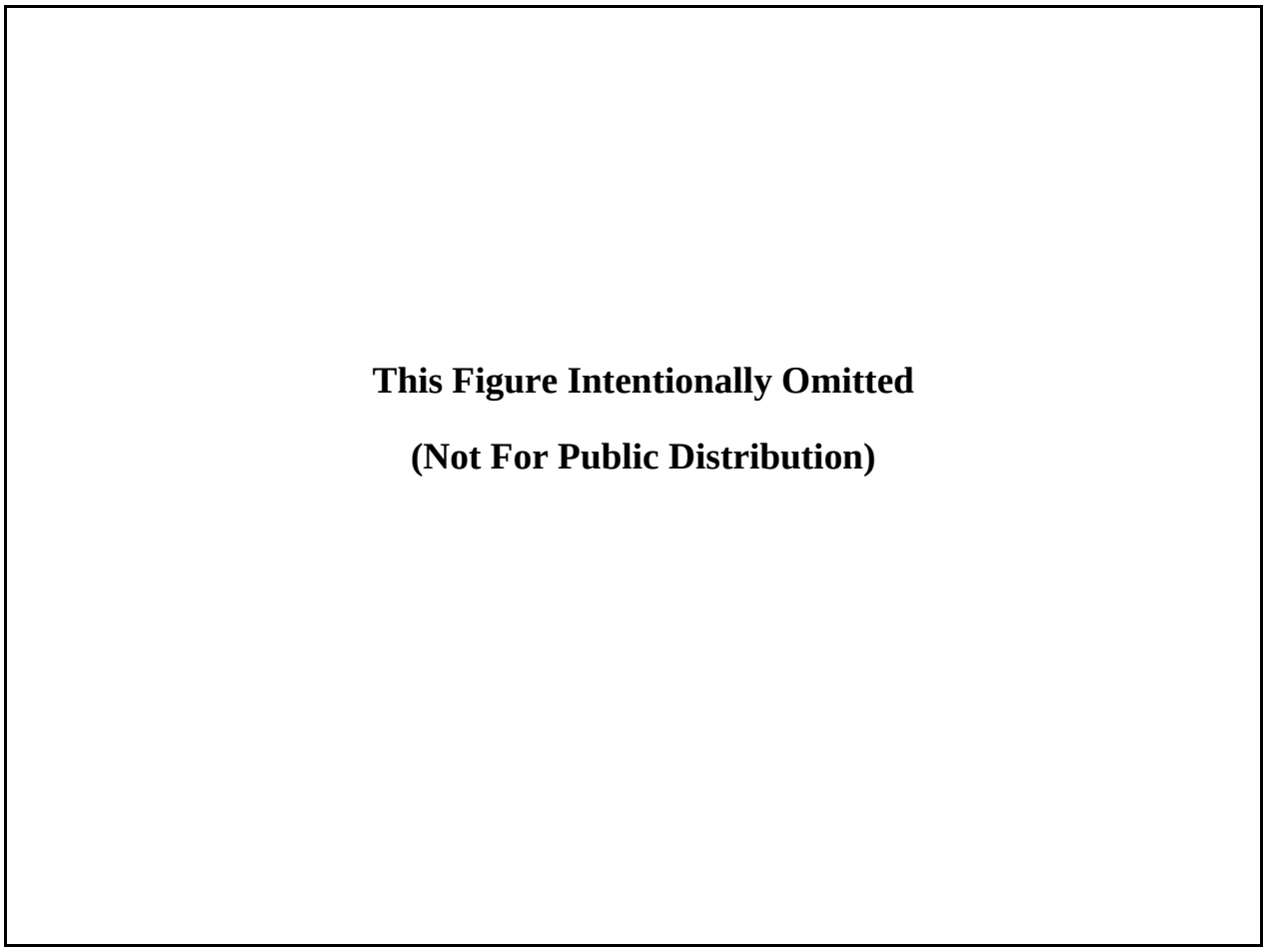

Figure 9. Archaeological sites OVSA-2 and OVSA-3 showing project as originally proposed (in blue).

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.

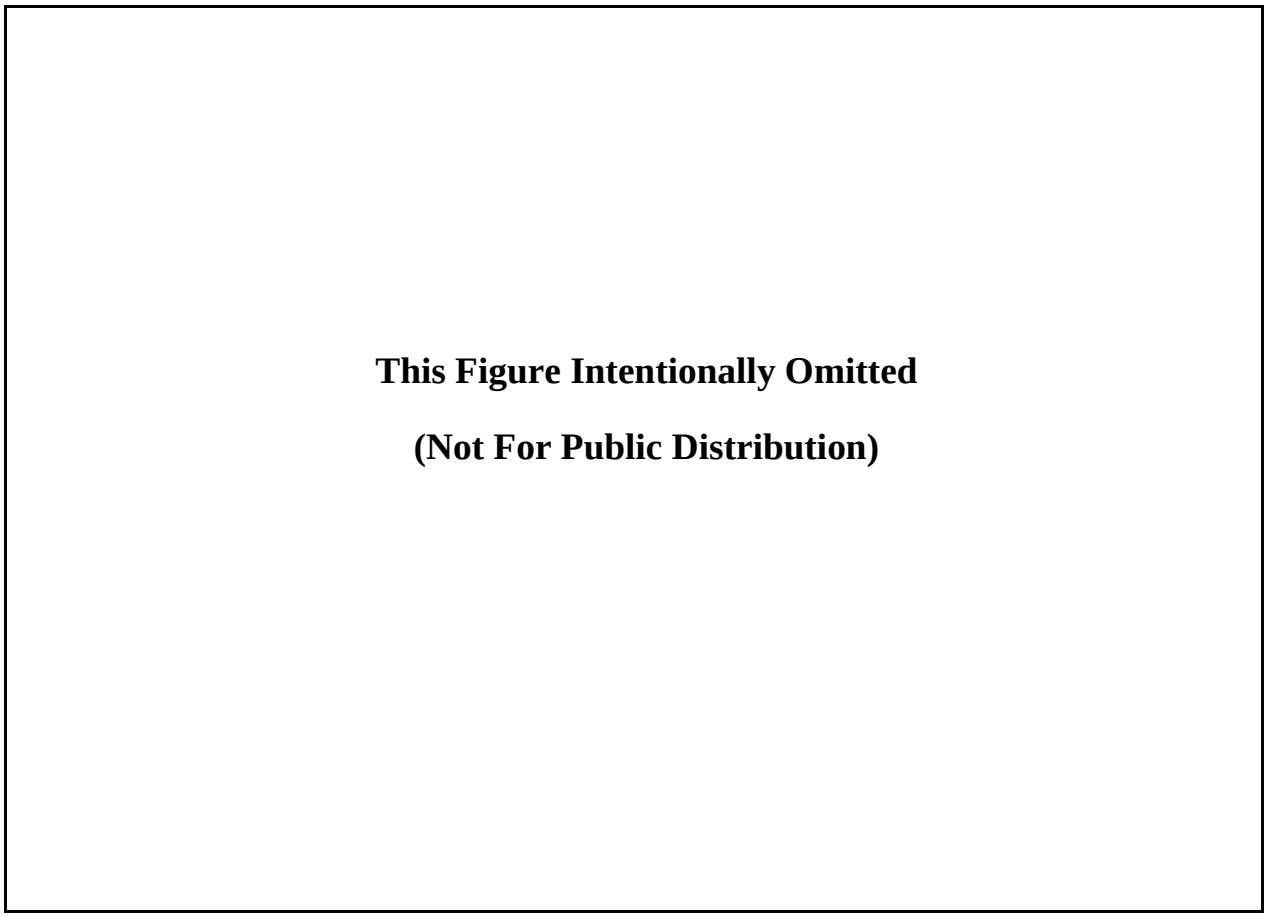

Figure 10. Archaeological sites OVSA-2 and OVSA-3 showing Alternatives 1 and 2 (in blue).

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

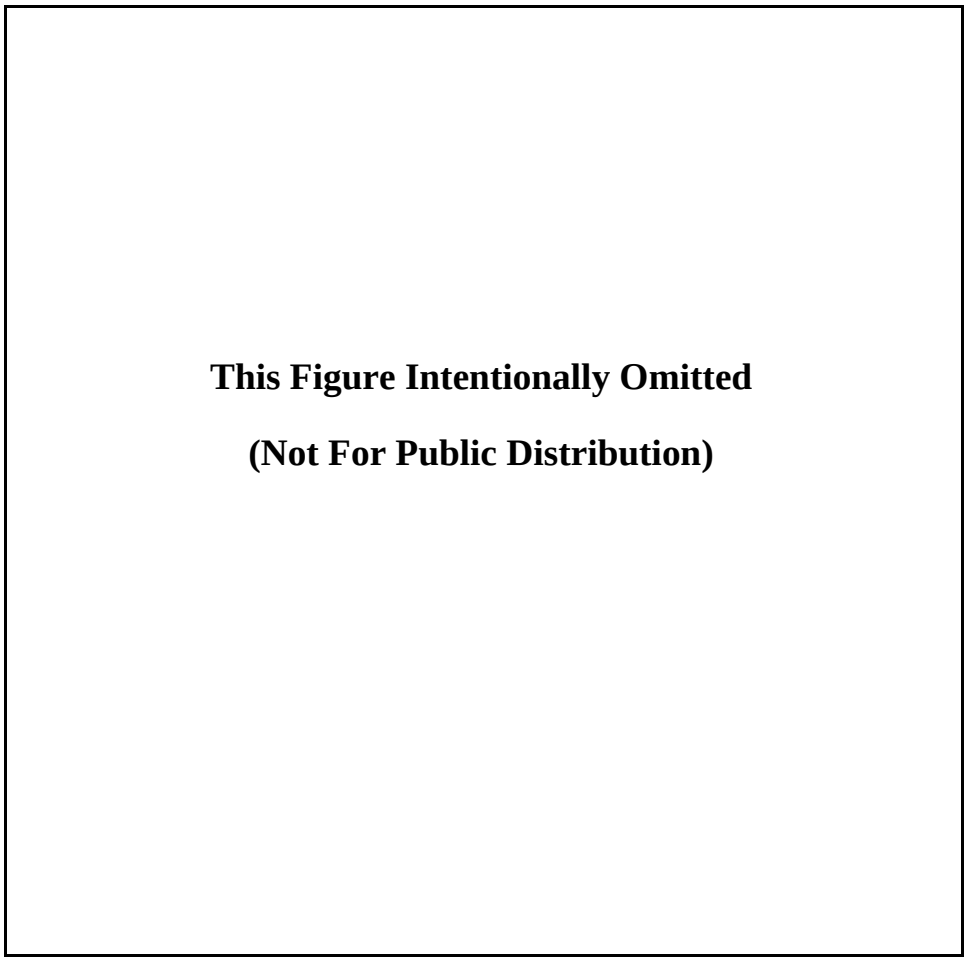

Figure 11. Archaeological site OVSA-4 showing project as originally proposed and for Alternatives 1 and 2.

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 (CNDDB). 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 or 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 (CNDDB) (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 CNDDB 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 CNDDB 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 (CNDDB, 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 (L*epus californicus*), Great basin whiptail lizard (*Aspidoscelis tigris*), Desert horned lizard (*Phyrnosoma 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.

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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

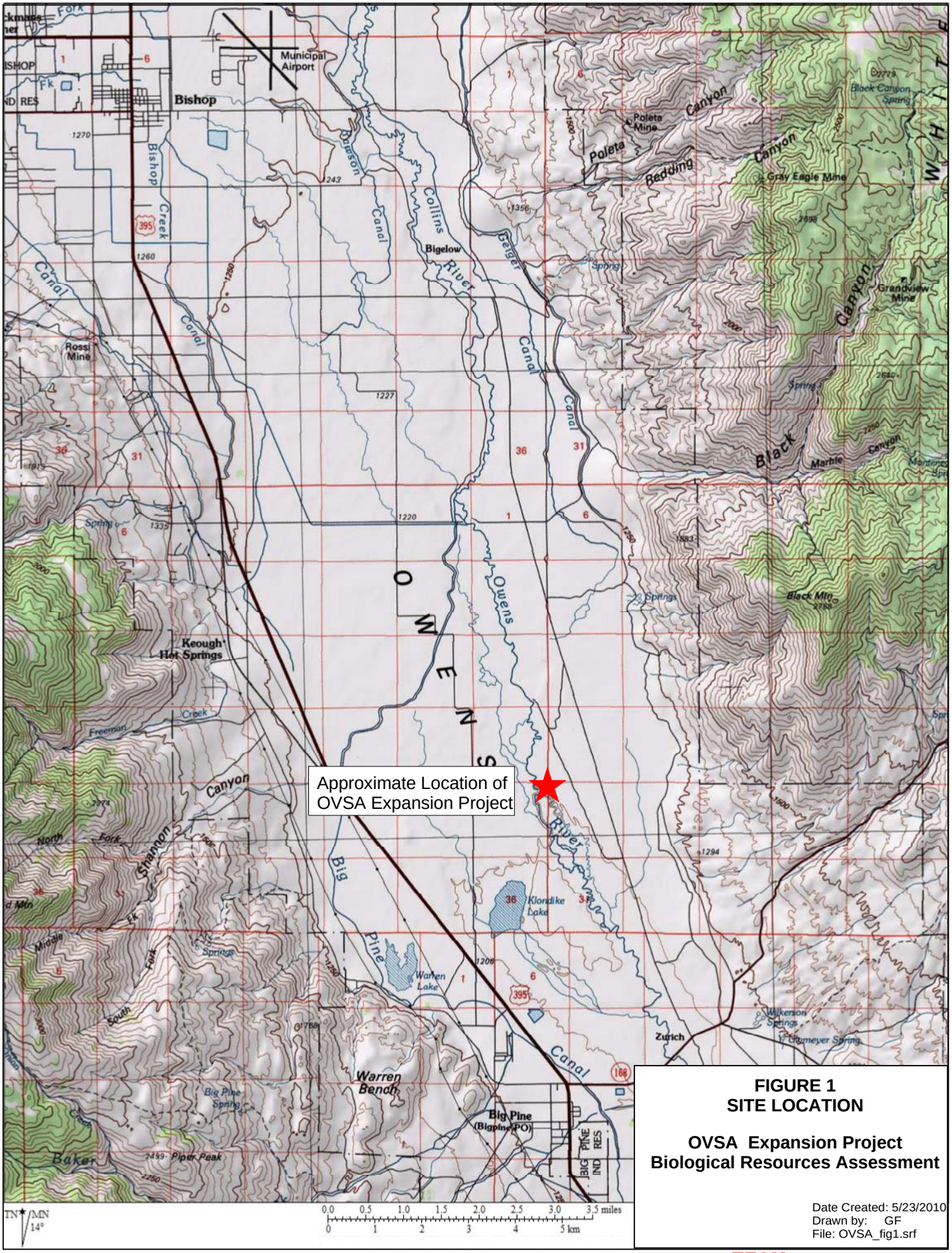

FIGURE 1
SITE LOCATION

OVSA Expansion Project
Biological Resources Assessment

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

TEAM
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Bishop · Mammoth Lakes

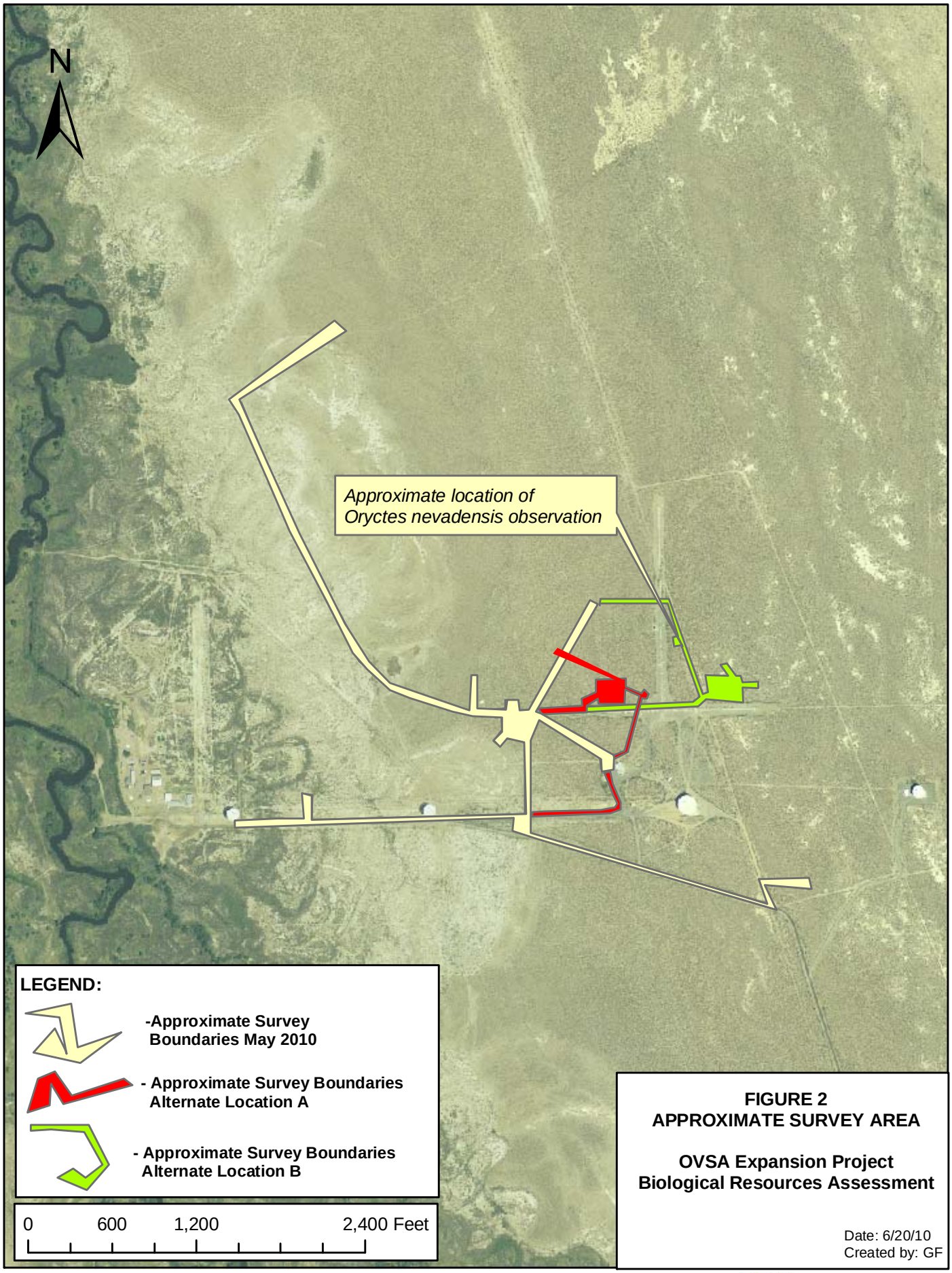
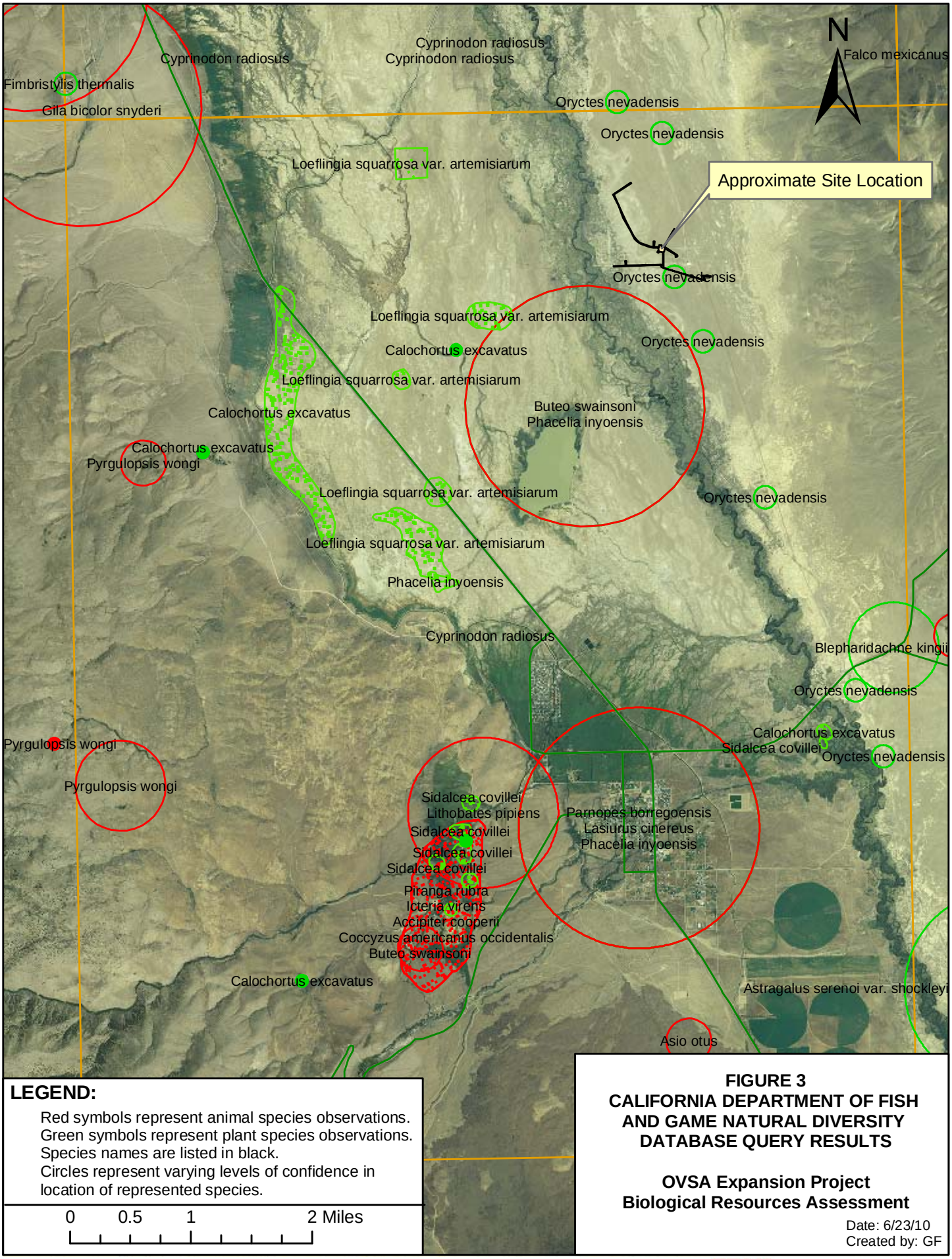


FIGURE 2
APPROXIMATE SURVEY AREA

OVSA Expansion Project
Biological Resources Assessment

Date: 6/20/10
Created by: GF

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



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.

0 0.5 1 2 Miles

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

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

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 *		
Mammals				
Martes pennanti Fisher	Candidate		Fishers are associated with large blocks of mid- and late-successional conifer and mixed conifer hardwood forests.	Unlikely. No preferred habitat nearby.
Microtus californicus scirpensis Amargosa vole	Endangered		Occurs in association with Olney bullrush (*Scirpus olneyi*) marshes along the Amargosa River, California.	Unlikely. No preferred habitat nearby. Outside of known range.
Ovis canadensis californiana Sierra nevada bighorn sheep	Endangered	CSC	Southern facing slopes in the Sierra Nevada Mountains.	Unlikely. No preferred habitat nearby. Outside of known range.
Birds				
Accipiter cooperii Cooper's hawk			Found in woods and edges of woods, nests in tall trees.	Unlikely. No preferred habitat in project area.
Asio otus 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.
Buteo swainsoni 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.
Coccyzus americanus occidentalis 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.
Empidonax traillii extimus 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.
Icteria virens 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.
Pipilo crissalis eremophilus 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.
Piranga rubra 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.
Vireo bellii pusillus 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				
Gopherus agassizii Desert tortoise	Threatened	Threatened	Desert scrub and desert wash habitats.	Unlikely. No preferred habitat nearby. Outside of known range.
Amphibians				
Anaxyrus canorus Yosemite toad	Candidate		High elevation, open, montane meadows, willow thickets, and adjoining forests.	Unlikely . Outside of known range.
Lithobates pipiens 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.
Rana muscosa 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				
Cyprinodon radiosus Owens pupfish	Endangered	Endangered	Owens Pupfish thrive in shallow warm water in the Owens Valley.	None. No surface water exixts at project area.
Gila bicolor snyderi 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 exixts at project area.
Oncorhynchus clarki henshawi Lahontan cutthroat trout	Threatened		Walker river drainage.	None. No surface water exixts at project area.
Oncorhynchus clarki seleniris Paiute cutthroat trout	Threatened		Native only to Silver King Creek.	None. No surface water exixts at project area.
Plants				
Astragalus lentiginosus var. piscinensis Fish Slough milk-vetch	Threatened	1B.1	Alkali Sink, wetland-riparian.	Unlikely. Outside of Known range. No wetland or riparian habitat.
Astragalus serenoi var. shockleyi Shockley's milk vetch		2.2	Chenopod Scrub, Pinyon and Juniper Woodland, Great Basin Scrub.	Possible. Preferred habitat could be available.
Blepharidachne kingii King's Eyelash grass		2.3	Pinyon Juniper Woodland, Mojavean Desert Scrub.	Possible. Preferred habitat could be available.
Calochortus excavatus Inyo County Star-tulip		1B.1	Grassy meadows in shadscale scrub. Flowers April-May.	Unlikely. Marginal to no habitat.
Centaurium namophilum Spring-loving centaury	Threatened		Wetland-riparian. Endemic to the Ash Meadows area.	Unlikely. Outside of known range.
Grindelia fraxinopratensis 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.	Unlikley. Outside of Known range
Loeflingia squarrosa var. artemisiarum Sagebrush loeflingia		2.2	Creosote Bush Scrub, Sagebrush Scrub, dunes.	Possible. Preferred habitat could be available.
Lupinus pusillus var. intermontanus 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				
Nitrophila mohavensis Amargosa niterwort	Endangered	1B.1	Alkali Sink, wetland-riparian. Known only from the Carson Slough - Ash Meadows area	Unlikley. Outside of known range
Oenothera californica ssp. eurekensis 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
Oryctes nevadensis Nevada oryctes		2.1	Creosote bush scrub, shadscale scrub, sandy soils, dunes.	Possible. Preferred habitat available.
Phacelia inyoensis Inyo phacelia		1B.2	Meadows and seeps, Alkaline meadows.	Possible. Preferred habitat available.
Plagiobothrys parishii Parish's popcorn-flower		1B.1	Joshua Tree Woodland, wetland-riparian, wet, alkaline soil around desert springs.	Unlikely. No preferred habitat available.
Potamogeton robbinsii Robbins' pondweed		2.3	Freshwater-marsh, deep water, lakes, 1600–3300 m.	Unlikely. No preferred habitat available.
Sidalcea covillei Owens Valley checkerbloom		Endangered	Sagebrush Scrub. Flowers May-June.	Unlikely. Marginal to no habitat.
Swallenia alexandrae Eureka Dune Grass	Endangered		Desert Dunes.	Unlikley. Outside of Known range and no preferred habitat available.
Swallenia alexandrae Eureka Valley Dune grass	Endangered	1B.2	Creosote Bush Scrub, dunes.	Unlikely. 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; Wooly Sunflower
Glycyrrhiza lepidota; Wild licorice
Glyptopleura marginata;
Grayia spinosa; Spiny hopsage
Hymenoclea salsola; Burrobrush
Langloisia setosissima; Lilac sunbonnet
Layia glandulosa; White layia
Lupinis 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

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
Phyrnosoma 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, **t**he 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.

DATABASE FINDINGS SUMMARY (SOURCE)

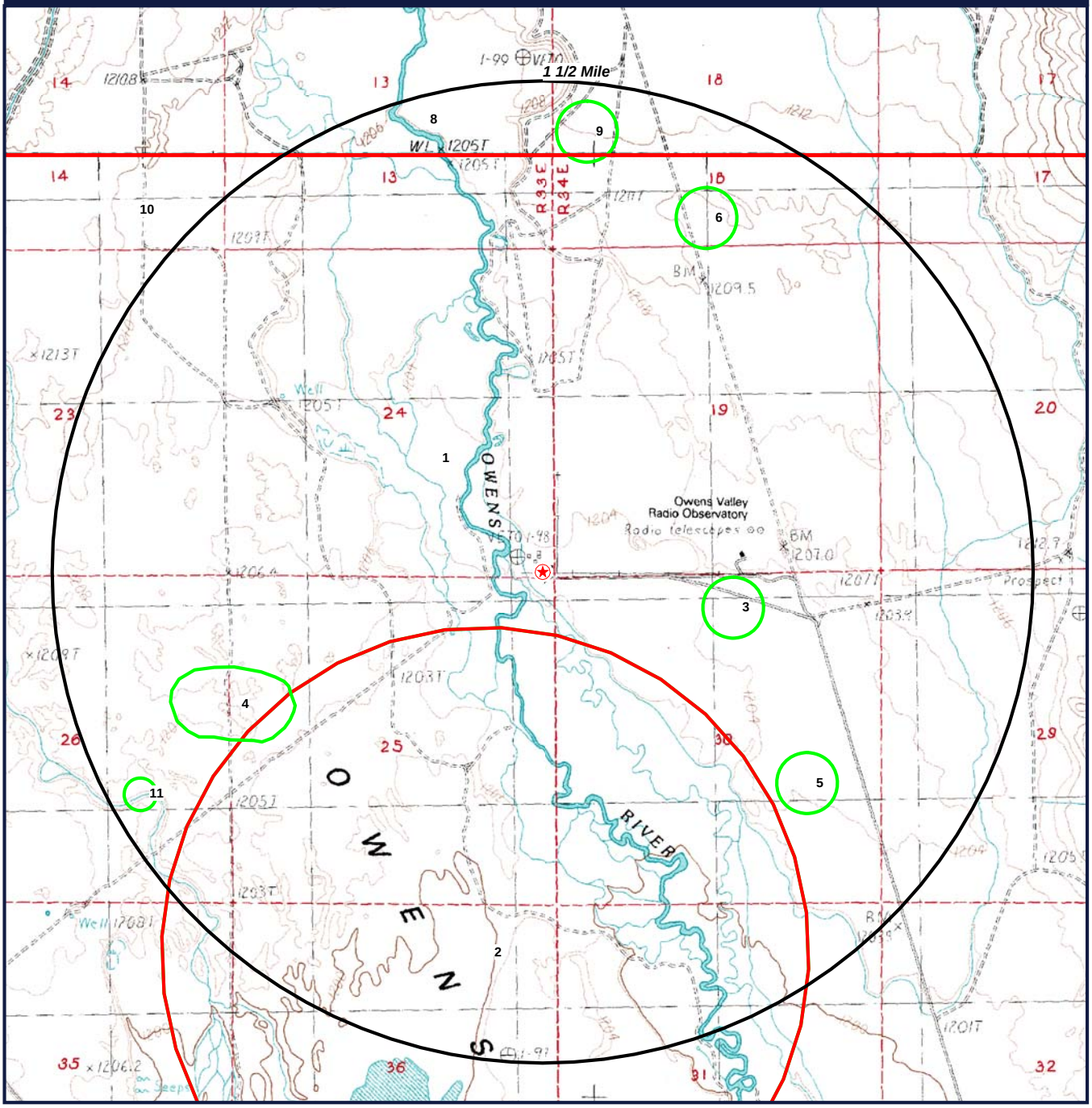
DATABASE	ACRONYM	LOCA-TABLE	UNLOCA-TABLE	SEARCH RADIUS (miles)
STATE (CA)				
SPECIAL STATUS SPECIES	CNDDB	12	0	1.5000
SUB-TOTAL		**12**	**0**	
TOTAL		**12**	**0**	

GeoSearch *2705 Bee Caves Rd, Suite 330 · Austin, Texas 78746 · phone: 888-396-0042 · fax: 512-472-9967*

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**

SPECIAL STATUS SPECIES SITE MAP



Target Property (TP)
ANIMAL
PLANT

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

N
W E
S

0' 1250' 2500' 3750'
SCALE: 1" = 2500'

GeoSearch *2705 Bee Caves Rd, Suite 330 - Austin, Texas 78746 - phone: 866-396-0042 - fax: 512-472-9967*

JOB #: 17618 - 5/10/2010

REPORT SUMMARY OF LOCATABLE SITES

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

GeoSearch *2705 Bee Caves Rd, Suite 330 · Austin, Texas 78746 · phone: 888-396-0042 · fax: 512-472-9967*

SPECIAL STATUS SPECIES (CNDDB)

MAP ID# 1 **Distance from Property: 0.00 mi. X**

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURENCE 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 (CNDDB)

MAP ID# 2 **Distance from Property: 0.19 mi. S**

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURENCE 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 (CNDDB)

MAP ID# 2 **Distance from Property: 0.19 mi. S**

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURENCE 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 (CNDDB)

MAP ID# 3 **Distance from Property: 0.51 mi. E**

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURENCE 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 (CNDDB)

MAP ID# 4 **Distance from Property: 0.87 mi. SW**

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURENCE 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 (CNDDB)

MAP ID# 5 **Distance from Property: 0.95 mi. SE**

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURENCE 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 (CNDDB)

MAP ID# 6 **Distance from Property: 1.12 mi. NE**

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURENCE 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**

MAP ID# 7 **Distance from Property: 1.28 mi. N**

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURENCE 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**

MAP ID# 8 **Distance from Property: 1.28 mi. N**

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURENCE 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**

MAP ID# 9 **Distance from Property: 1.28 mi. N**

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURENCE 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**

MAP ID# 10 **Distance from Property: 1.28 mi. N**

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURENCE 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**

MAP ID# 11 **Distance from Property: 1.38 mi. SW**

ELEMENT OCCURRENCE SPECIFIC ATTRIBUTES

ELEMENT OCCURENCE 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)

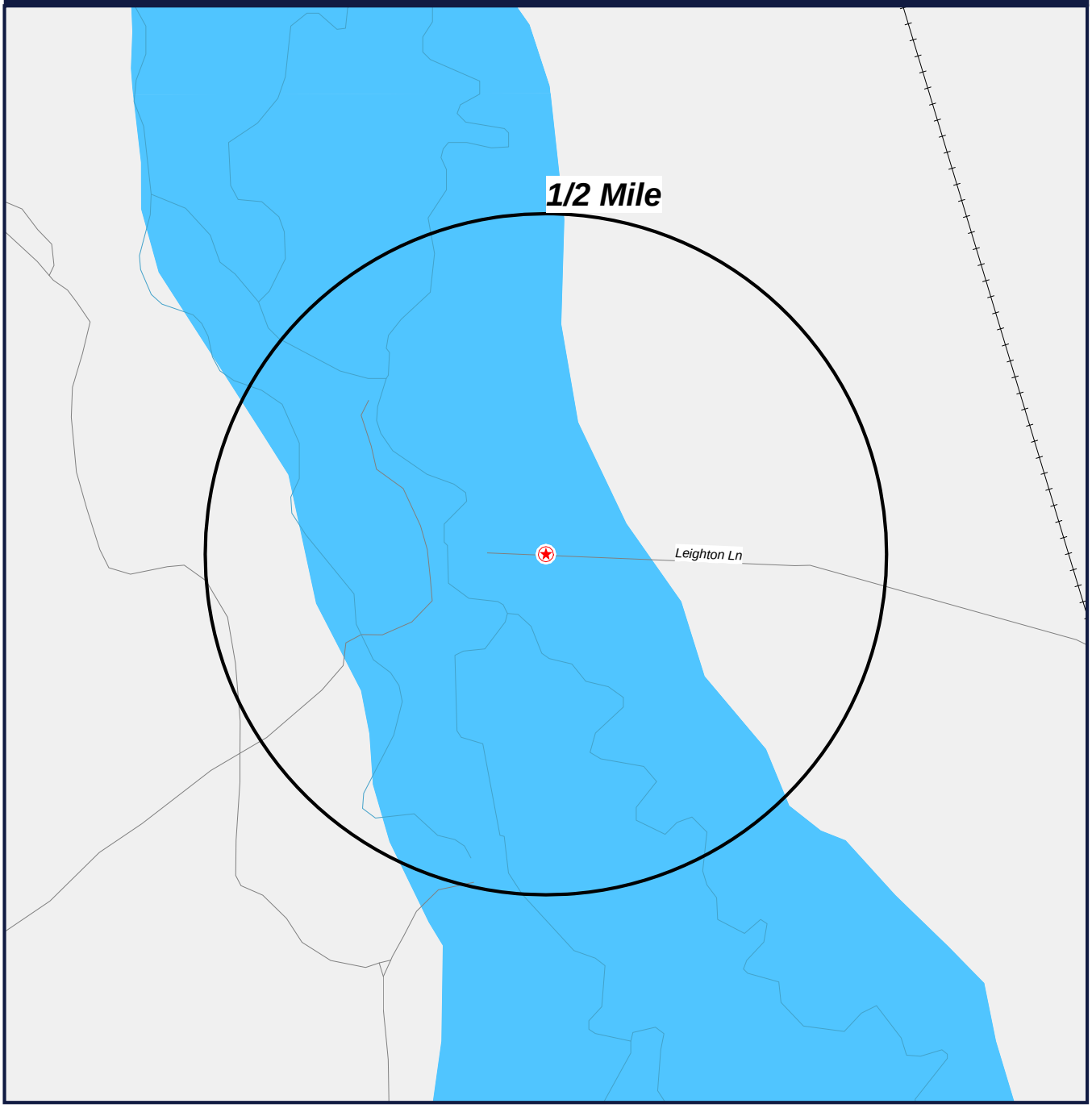
CNDDB Special Status Species

VERSION DATE: 3/2010

The California Natural Diversity Database (CNDDB) is a program that inventories the status and locations of rare plants and animals in California. The CNDDB 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 CNDDB 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 CNDDB 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.

FEMA

FEMA MAP



Target Property (TP)

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

Owens Valley Radio Observatory
Leighton Lane
Big Pine, California
93514

Panel #: 0600730375B

N
W E
S

0' 600' 1200' 1800'

SCALE: 1" = 1200'

GeoSearch 2705 Bee Caves Rd, Suite 330 - Austin, Texas 78746 - phone: 866-396-0042 - fax: 512-472-9967

JOB #: 17615 - 5/10/2010

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.

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.

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.***
Zone 2 areas have a predicted average indoor radon screening level between 2 and 4 pCi/L.

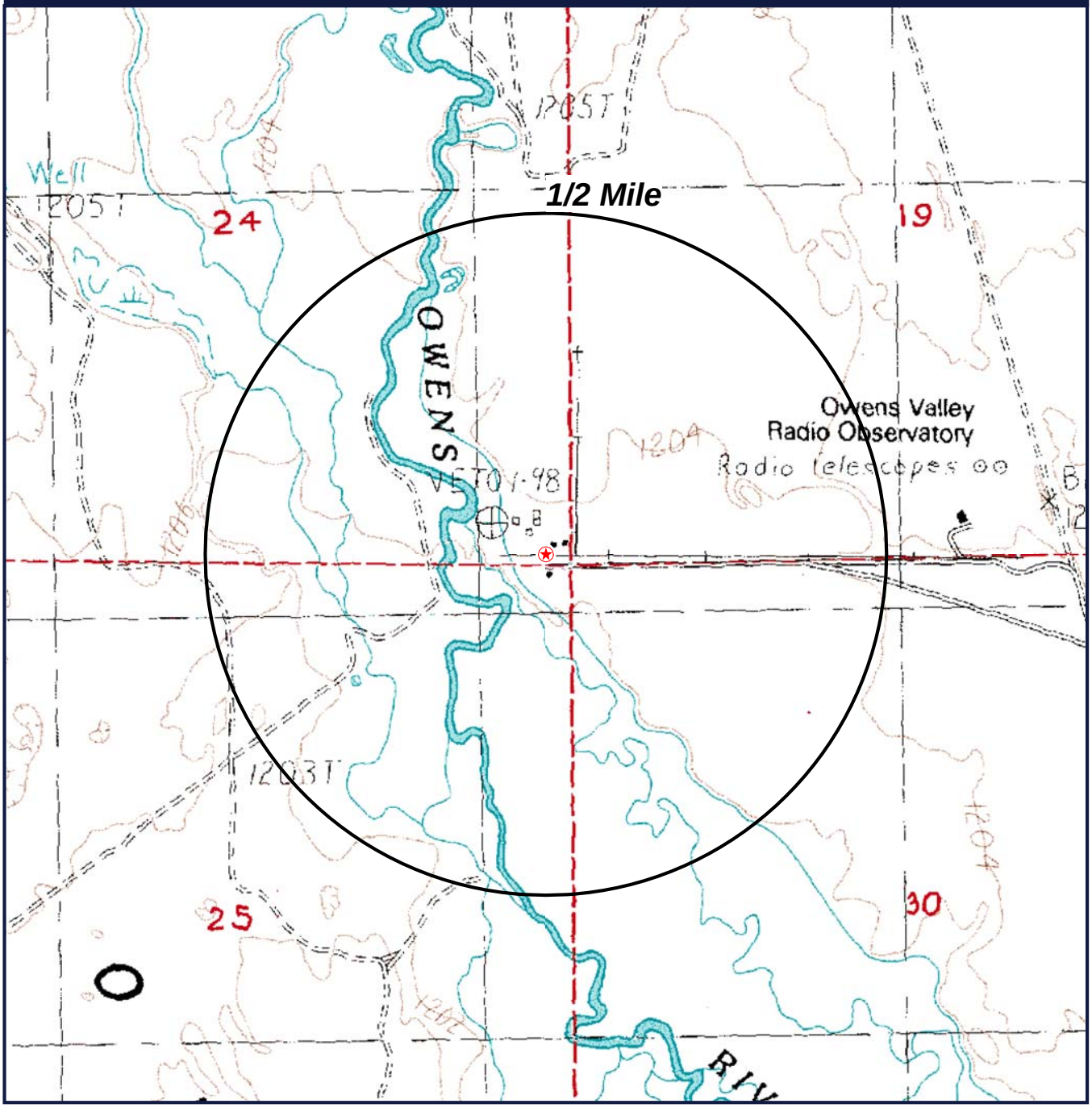
DATABASE FINDINGS SUMMARY (SOURCE)

DATABASE	ACRONYM	LOCA-TABLE	UNLOCA-TABLE	SEARCH RADIUS (miles)
FEDERAL				
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**	
STATE (CA)				
CALIFORNIA HISTORICAL LANDMARKS	CALNDMKS	0	0	0.5000
SUB-TOTAL		**0**	**0**	
TRIBAL				
INDIAN RESERVATIONS	INDIANRES	0	0	0.5000
SUB-TOTAL		**0**	**0**	
TOTAL		**0**	**0**	

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
FEDERAL								
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**
STATE (CA)								
CALNDMKS		.5000	0	0	0	0	0	0
SUB-TOTAL			**0**	**0**	**0**	**0**	**0**	**0**
TRIBAL								
INDIANRES		.5000	0	0	0	0	0	0
SUB-TOTAL			**0**	**0**	**0**	**0**	**0**	**0**
TOTAL			**0**	**0**	**0**	**0**	**0**	**0**

CULTURAL AND HISTORICAL SITE MAP



Target Property (TP)

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

N
W E
S

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

GeoSearch *2705 Bee Caves Rd, Suite 330 - Austin, Texas 78746 - phone: 866-396-0042 - fax: 512-472-9967*

JOB #: 17620 - 5/10/2010

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.

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.

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.

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.

DATABASE FINDINGS SUMMARY (SOURCE)

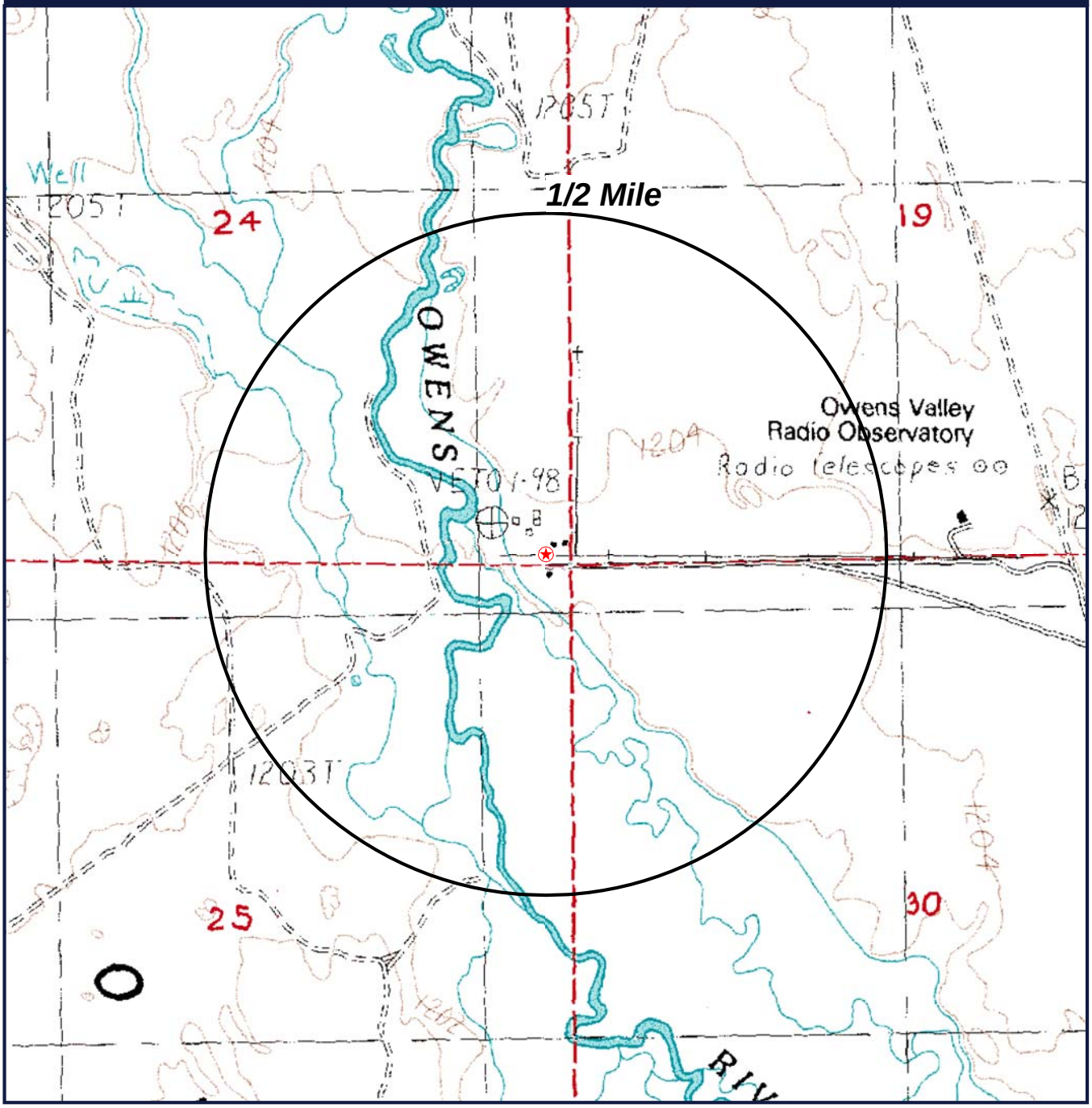
DATABASE	ACRONYM	LOCA-TABLE	UNLOCA-TABLE	SEARCH RADIUS (miles)
FEDERAL				
COASTAL BARRIER RESOURCE SYSTEM	COASTAL	0	0	0.5000
NATURAL LANDMARKS	NTRLNDMKS	0	0	0.5000
WILDERNESS PRESERVATIONS	PRESRVTNS	0	0	0.5000
NATIONAL WILDLIFE REFUGE SYSTEM	REFUGES	0	0	0.5000
NATIONAL WILD AND SCENIC RIVERS SYSTEM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

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
FEDERAL								
COASTAL		.5000	0	0	0	0	0	0
NTRLNDMKS		.5000	0	0	0	0	0	0
PRESRVTNS		.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**
STATE (CA)								
PARKS		.5000	0	0	0	0	0	0
SUB-TOTAL			**0**	**0**	**0**	**0**	**0**	**0**
TOTAL			**0**	**0**	**0**	**0**	**0**	**0**

GeoSearch *2705 Bee Caves Rd, Suite 330 · Austin, Texas 78746 · phone: 888-396-0042 · fax: 512-472-9967*

NATURAL AREAS SITE MAP



Target Property (TP)

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

N
W E
S

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

GeoSearch *2705 Bee Caves Rd, Suite 330 - Austin, Texas 78746 - phone: 866-396-0042 - fax: 512-472-9967*

JOB #: 17617 - 5/10/2010

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.

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.

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)

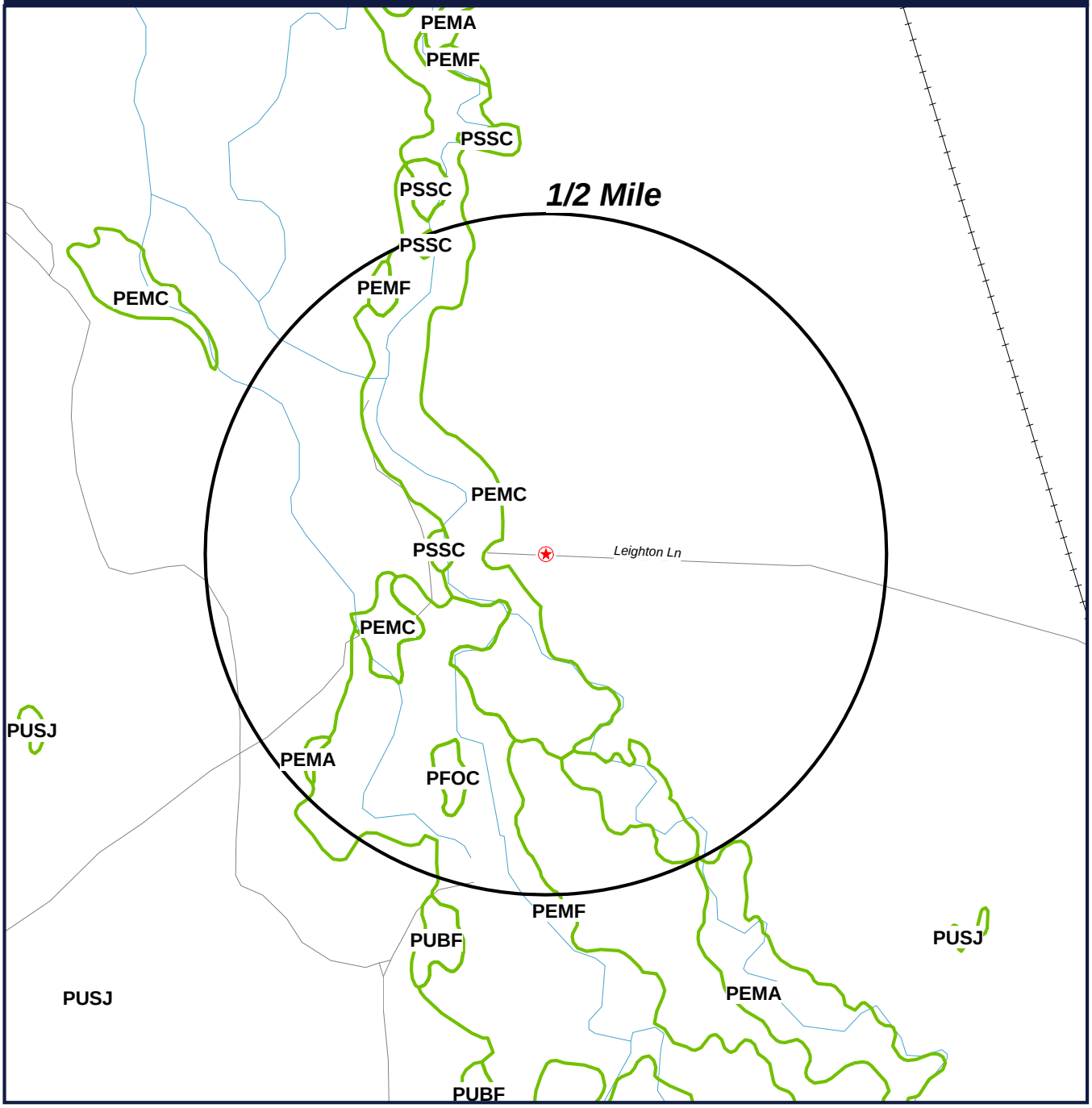
County/Parish Covered:
Inyo (CA)

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.

NWI MAP



Target Property (TP)

NWI BOUNDARY

Owens Valley Radio Observatory
Leighton Lane
Big Pine, California
93514

N
W E
S

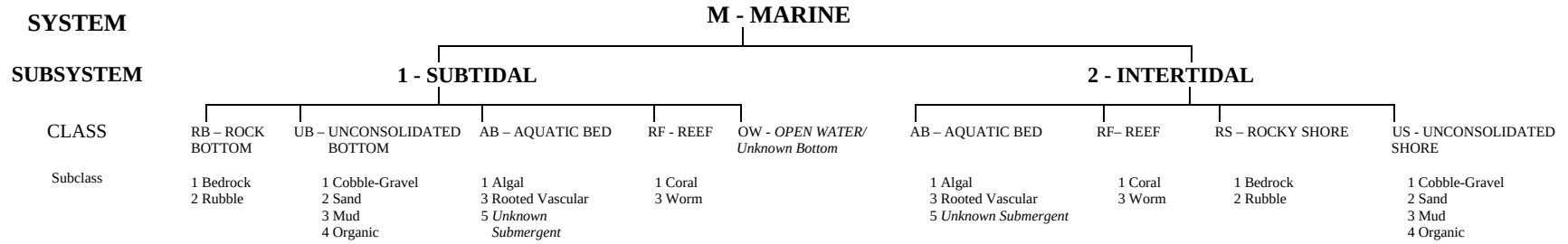
0' 600' 1200' 1800'

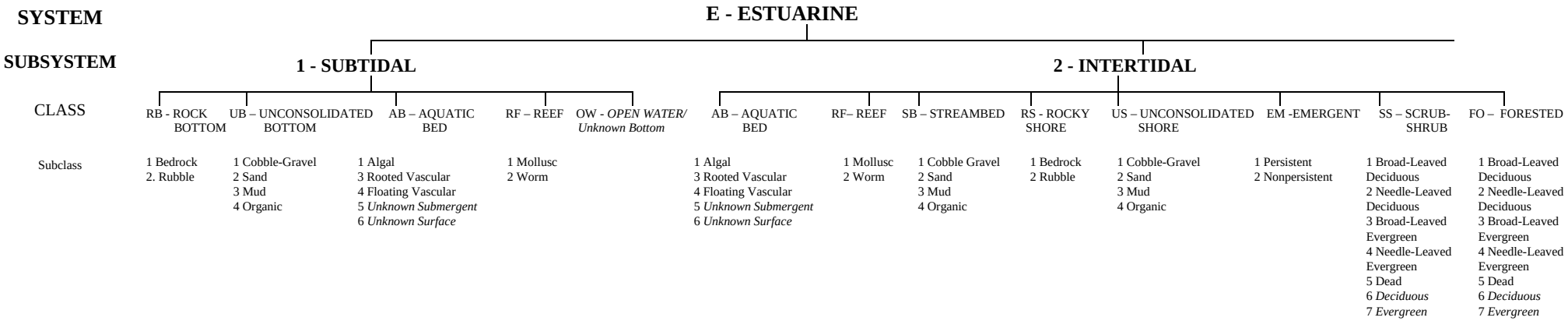
SCALE: 1" = 1200'

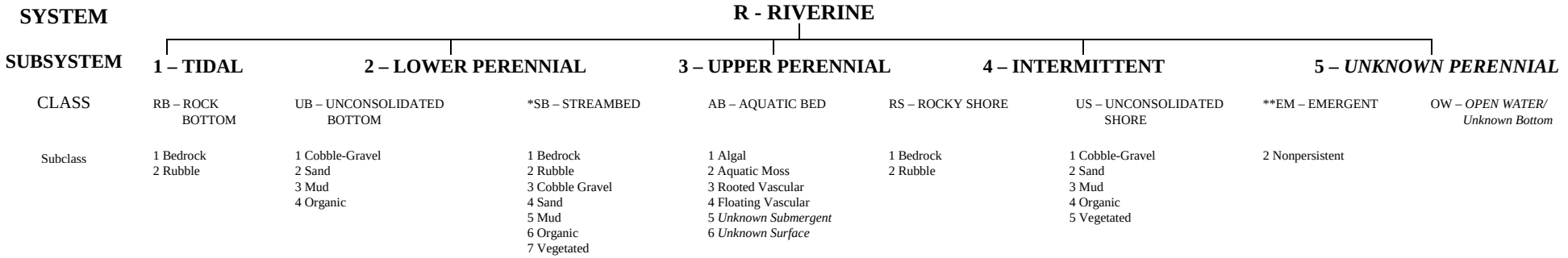
GeoSearch *2705 Bee Caves Rd, Suite 330 - Austin, Texas 78746 - phone: 866-396-0042 - fax: 512-472-9967*

JOB #: 17614 - 5/11/2010

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.

Classification of Wetlands and Deepwater Habitats of the United States
Cowardin ET AL. 1979 as modified for National Wetland Inventory Mapping Convention

WETLANDS AND DEEPWATER HABITATS CLASSIFICATION

SYSTEM: L- LACUSTRINE

SUBSYSTEM: 1 - LIMNETIC

CLASS	Subclass
RB – ROCK BOTTOM	1 Bedrock 2. Rubble
UB – UNCONSOLIDATED BOTTOM	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic
AB – AQUATIC BED	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*
OW – *OPEN WATER/ Unknown Bottom*	

SUBSYSTEM: 2 - LITTORAL

CLASS	Subclass
RB – ROCK BOTTOM	1 Bedrock 2. Rubble
UB – UNCONSOLIDATED BOTTOM	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic
AB – AQUATIC BED	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*
RS – ROCKY SHORE	1 Bedrock 2. Rubble
US – UNCONSOLIDATED SHORE	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated
EM – EMERGENT	2 Nonpersistent
OW – *OPEN WATER/ Unknown Bottom*	

SYSTEM: P - PALUSTRINE

CLASS	Subclass
RB – ROCK BOTTOM	1 Bedrock 2. Rubble
UB – UNCONSOLIDATED BOTTOM	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic
AB – AQUATIC BED	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*
US – UNCONSOLIDATED SHORE	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated
ML – MOSS-LICHEN	1 Moss 2 Lichen
EM – EMERGENT	1 Persistent 2 Nonpersistent
SS – SCRUB-SHRUB	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*
FO – FORESTED	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*
OW – *OPEN WATER/ Unknown Bottom*	

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

Non-Tidal

A Temporarily Flooded
B Saturated
C Seasonally Flooded
D *Seasonally Flooded/ Well Drained*
E *Seasonally Flooded/ Saturated*
F Semipermanently Flooded
G Intermittently Exposed
H Permanently Flooded
J Intermittently Flooded
K Artificially Flooded
W Intermittently Flooded/Temporary
Y Saturated/Semipermanent/ Seasonal
Z Intermittently Exposed/Permanent
U *Unknown*

Tidal

K *Artificially Flooded*
L Subtidal
M Irregularly Exposed
N Regularly Exposed
P Irregularly Flooded
*S Temporary-Tidal
*R Seasonal-Tidal
*T Semipermanent-Tidal
*V Permanent-Tidal
U *Unknown*

*These water regimes are only used in tidally influenced, freshwater systems.

WATER CHEMISTRY

Coastal Halinity

1 Hyperhaline
2 Euthaline
3 Mixohaline *(Brackish)*
4 Polyhaline
5 Mesohaline
6 Oligohaline
0 Fresh

Inland Salinity

7 Hypersaline
8 Eusaline
9 Mixosaline
0 Fresh

pH Modifiers for all Fresh Water

a Acid
t Circumneutral
i Alkaline

SOIL

g Organic
n Mineral

SPECIAL MODIFIERS

b *Beaver*
d *Partially Drained/Ditched*
f Farmed
h *Diked/Impounded*
r Artificial Substrate
s *Spoil*
x Excavated

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

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Target Property Geometry: ***Point***

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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.

DATABASE FINDINGS SUMMARY (SOURCE)

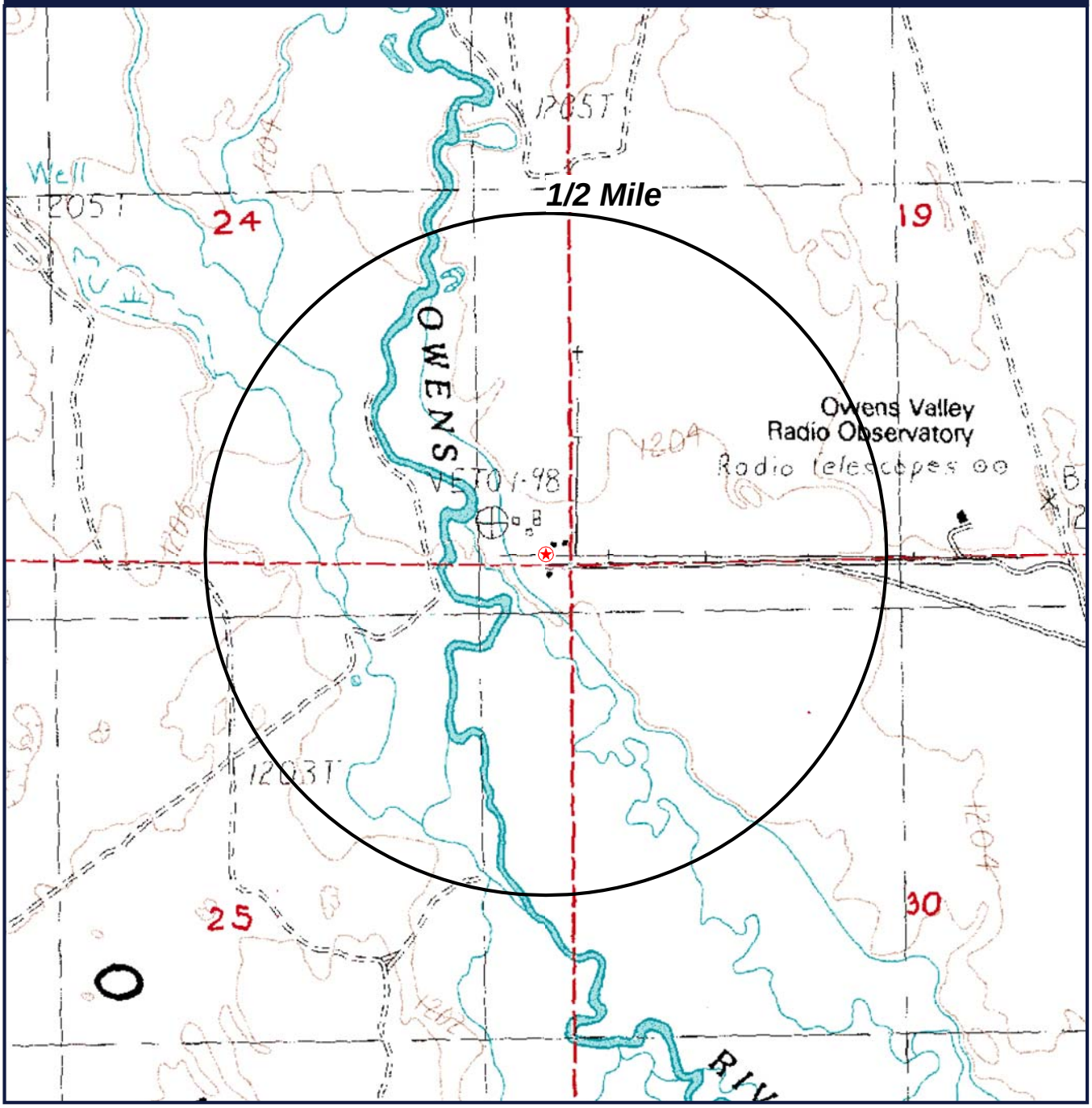
DATABASE	ACRONYM	LOCA-TABLE	UNLOCA-TABLE	SEARCH RADIUS (miles)
FEDERAL				
AM RADIO STRUCTURES	AMTOWERS	0	0	0.5000
ANTENNA STRUCTURE REGISTRATION	ASR	0	0	0.5000
CELLULAR TOWERS	CELLTOWERS	0	0	0.5000
DIGITAL OBSTACLE FILE	DOF	0	0	0.5000
SUB-TOTAL		**0**	**0**	
TOTAL		**0**	**0**	

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
FEDERAL								
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**	**0**	**0**	**0**	**0**	**0**

GeoSearch *2705 Bee Caves Rd, Suite 330 · Austin, Texas 78746 · phone: 888-396-0042 · fax: 512-472-9967*

FCC & FAA SITE MAP



Target Property (TP)

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

N
W E
S

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

GeoSearch *2705 Bee Caves Rd, Suite 330 - Austin, Texas 78746 - phone: 866-396-0042 - fax: 512-472-9967*

JOB #: 17616 - 5/10/2010

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.

APPENDIX D

DRAFT EA PUBLIC REVIEW COMMENTS AND RESPONSES

Appendix D

Draft EA Public Review Comments and Responses

The OVSA Expansion Project Draft Environmental Assessment (Draft EA) was available for public comment beginning August 18, 2010, through September 7, 2010. A Notice of Availability for the Draft EA was advertised in the Inyo Register and on the National Science Foundation (NSF) website. Electronic or hard-copy versions of the Draft EA were provided to parties upon request. In addition, an electronic copy of the Draft EA was available at http://www.nsf.gov/od/oia/programs/mri/ for the public to access. The comments received by the National Science Foundation on the contents of the Draft EA are provided in this appendix.

Comments from the Big Pine Paiute Tribe of the Owens Valley

BIG PINE PAIUTE TRIBE OF THE OWENS VALLEY
Big Pine Indian Reservation

September 7, 2010

Dr. Randy L. Phelps
Staff Associate
Office of Integrative Activities (OIA), Suite 1270
4201 Wilson Boulevard, Room 1045
Arlington, VA 22230

RE: Comments on the Draft Environmental Assessment for the Proposed Owens Valley Solar Array Expansion Project

Dear Dr. Phelps:

The following comments address the Draft Environmental Assessment (draft EA) and consultation with the National Science Foundation for the Proposed Owens Valley Solar Array Expansion Project north of Big Pine, CA.

The Big Pine Paiute Tribe would like to thank the involved staff of the National Science Foundation (NSF), the New Jersey Institute of Technology (NJIT), and the Owens Valley Radio Observatory for their proactive cooperation in consulting with the Tribe for this project.

The "Proposed Action" section of the Final Environmental Assessment should include language which reflects the letter from Randy Phelps of the NSF to Milford Wayne Donaldson, the California State Historic Preservation Officer, dated August 25, 2010. The Proposed Action section should also reflect the results of a teleconference on August 20, 2010, between the Big Pine Paiute Tribal Historic Preservation Officer and the Environmental Director and yourself, Caroline Blanco, Federal Preservation Officer for the NSF, and Dale Gary of NJIT. In the letter to Mr. Donaldson, Alternative 1 was chosen as the preferred alternative. Alternative 1 avoids placing telescope pad locations in archaeological site OVSA-1, and avoids trenching through this site.

Based upon the recommendations of the archaeologist who performed the archaeological survey for the project, the proposed trenching will have no adverse effects on sites OVSA-2, OVSA-2, and OVSA-3 because the cut would be along the edge of a paved road and "the road cut through the sites is already below the cultural deposit." Although the archaeologist only recommended archaeological monitoring for OVSA-1, Big Pine staff saw the precautionary need for an archaeologist and a Cultural Monitor to be present during any ground disturbing activity through or near sites OVSA-1, OVSA-2, OVSA-3, OVSA-4, OVSA-5, and OVSA-6. In addition, an archaeologist and a Cultural Monitor should be present during ground disturbing activity at the

P.O. Box 700 • 825 South Main Street • Big Pine, CA 93513 • Office: (760) 938-2003 • Fax: (760) 938-2942

northern end of the access road shown in Figure 5 because of the possibility of finding cultural material in this area. As Chairperson, I concurred with the above suggestions of the Big Pine staff which were accepted by the NSF during the teleconference on August 20, 2010.

For site location confidentiality reasons, the Final Environmental Assessment should not include the site maps in Appendix A of the draft *Appendix A, An Archaeological Survey Of The Proposed Owens Valley Solar Array Expansion, Inyo County, California*. The site records of this survey are not included for public distribution, but the site maps from the site records are included for all to see. Appendix A should have been excluded for public distribution, and the results should have been summarized in the draft EA.

Sincerely,

Virgil Moose
Chairperson
Big Pine Paiute Tribe of the Owens Valley

Response to the Big Pine Paiute Tribe of the Owens Valley

Thank you for your input. Your comments and concerns have been reviewed and incorporated into Section 4.1.2 and Appendix A of the OVSA Expansion Project Final EA.

Comments and Responses from the California Office of Historic Preservation and the National Science Foundation

Comment from California Office of Historic Preservation, September 1, 2010:

From: Pratt, Trevor [mailto:TPratt@parks.ca.gov]
Sent: Wednesday, September 01, 2010 4:55 PM
To: Phelps, Randy L.
Cc: Henderson, Craig C.
Subject: RE: National Science Foundation Owens Valley Solar Array review

Dr. Phelps and Mr. Henderson,

My name is Trevor Pratt with the California Office of Historic Preservation (California's SHPO). I had a few questions (as specific as I can possibly be) to aid you in giving me enough information to complete my review of your project.

1. When working within site boundaries trenching is considered an adverse effect, unless the part of the site has been determined a non-contributor. The best, and fastest way to resolve this would be to perform testing along the planned trench route within site boundaries (OVSA-3 and OVSA-4). Otherwise the appropriate finding as of now, under NHPA would be a Finding of Adverse Effects, which requires an MOA to resolve. Monitoring is not a mitigation to an adverse effect. If you have previously performed trenching within these portions of the test route, please provide me with documentation and results of the testing.
2. What are the dimensions of the cable trenching required for the undertaking (depth, width, and length)?
3. What extent of ground disturbance (depth of excavation) required for the concrete pads for the telescopes?
4. What extent of ground disturbance (depth of excavation) will be caused by the clearing for the Modular Building and the temporary construction trailer?
5. Are all the roads marked on the maps new, or are some pre-existing? Which portions and where?
6. Will there be any improvements to pre-existing roads (going from dirt to paved)? And if so what is the expected ground disturbance related to this work?
7. Please provide me with pictures of OVSA-3 and OVSA-4 and the road cutting through the sites.
8. What year was the Owens Valley Solar Array built?
9. To clarify for me, Alternative 1 (the chosen alternative) has elected to have the cable trench avoid site OVSA-1
10. To confirm, since you never formally request it in your transmittal letter: you are seeking a consensus on a determination of not eligible for site OVSA-2 and a determination of eligible for sites OVSA-1, OVSA-3, OVSA-4, OVSA-5, and OVSA-6.

Please feel free to call or email me if you have any questions, concerns, or wish to discuss this undertaking.

Sincerely,

Trevor Pratt
Assistant State Archaeologist
Office of Historic Preservation
Phone: (916) 445-7017

The Office of Historic Preservation has moved to a new location as of July 14, 2010. The new address for the office is 1725 23rd Street, Suite 100, Sacramento CA 95816. The entire office also received new phone numbers which are available at www.ohp.parks.ca.gov.

Response from National Science Foundation, September 3, 2010:

From: Phelps, Randy L.
Sent: Friday, September 03, 2010 12:27 PM
To: 'Pratt, Trevor'
Cc: Henderson, Craig C.; Phelps, Randy L.; Blanco, Caroline M
Subject: Owens Valley Solar Array review: Responses to questions by California Historical Preservation Office
Importance: High

Hi Trevor,

Please find attached the responses to the questions you sent regarding the proposed Owens Valley Solar Array (OVSA) expansion project. I have also extracted the responses from the attachment and included them below. We were able to turn this around with input from the project proponent , staff at the OVSA site and the contract archaeologist.

It is my hope that these responses address your questions so that the California State Historical Preservation Office can concur with our determination of "no adverse effects." However, if you have further questions, please do not hesitate to call or contact me (or my colleague Craig Henderson) by phone or email.

Regards,

Randy

Cc: Caroline Blanco, NSF Office of the General Counsel
Craig Henderson, NSF Office of Integrative Activities

Responses to questions by California Historical Preservation Office

1. When working within site boundaries trenching is considered an adverse effect, unless the part of the site has been determined a non-contributor. The best, and fastest way to resolve this would be to perform testing along the planned trench route within site boundaries (OVSA-3 and OVSA-4). Otherwise the appropriate finding as of now, under NHPA would be a Finding of Adverse Effects, which requires an MOA to resolve. Monitoring is not a mitigation to an adverse effect. If you have previously performed trenching within these portions of the test route, please provide me with documentation and results of the testing.

   We have contacted the archaeologist who performed the survey to confirm our understanding of his analysis and the completeness of the data in the report. The results and analyses from the archeological survey of OVSA-3 and OVSA-4 determined that the existing paved road through these sites had been constructed with a road-bed cut (within which the trenching will occur) that

*was **well below** the level of the cultural resources. In fact material from the road-bed cuts was apparently used for road fill to the west (OVSA-2) which is not considered to be eligible for the National Register and no further archeological work is recommended. The paved road and the road-bed cut is previously disturbed to the extent that the trenching areas reasonably could be considered as non-contributing and the archeologist concluded that the plan to trench only along the road within the existing road-bed cut would have no adverse effect on the intact cultural resources. This is very different than OVSA-1 where the survey determined that the existing dirt road was constructed by blading through the cultural deposit leaving cultural resources beneath and along the roadside, and the determination was made that trenching across the OVSA-1 boundaries would have an adverse effect on its cultural resources. The final plan avoids OVSA-1 entirely.*

2. What are the dimensions of the cable trenching required for the undertaking (depth, width, and length)?

   The total length to be trenched is 3560 m. The trenches will contain both power and optical fiber cables in conduit, and by code must be 18 inches deep. Thus, the trench depth will be 18 inches. The width will typically be 6-8 inches on straight sections, although at the few locations where there are curves/corners short (10-ft) sections of slightly greater width (12-24 inches) may be necessary to accommodate the stiff conduit.

3. What extent of ground disturbance (depth of excavation) required for the concrete pads for the telescopes?

   The concrete pads will require excavation to about 18-inch depth along each edge for footings, and about 6-inch depth elsewhere.

4. What extent of ground disturbance (depth of excavation) will be caused by the clearing for the Modular Building and the temporary construction trailer?

   The modular building will be placed on a concrete or asphalt paved area only slightly larger than the 24x60 ft footprint, which will require no more than 6-inch depth.

5. Are all the roads marked on the maps new, or are some pre-existing? Which portions and where?

   More than 2/3 of the road length is pre-existing road. The photo below shows the extent of new roads, which all follow the trench lines and do not represent new disturbance beyond the trenching itself.

This Figure Intentionally Omitted

(Not For Public Distribution)

Fig. 1: Layout showing the locations of new segments of unimproved road. Total length of new roads is about 900 m.

6. Will there be any improvements to pre-existing roads (going from dirt to paved)? And if so what is the expected ground disturbance related to this work?

   No pre-existing roads will be improved by paving. All new roads are unpaved.

7. Please provide me with pictures of OVSA-3 and OVSA-4 and the road cutting through the sites.

   The photos below show a view along the existing road cut through the OVSA-3 and OVSA-4 sites. The existing road is well below the surrounding soil level in most areas, and was determined by the archaeologist to be below the cultural deposits. In addition, the road bed itself was built on disturbed soil and stone fill to a considerable depth. Our trenching along the shoulder of the road to a depth of 18 inches cannot have an adverse effect on cultural deposits, which are absent from the road bed.

Fig. 2: Photos showing the existing road cut through OVSA-3 (left) and OVSA-4 (right). The OVSA-3 photo has lines indicating the approximate location and extent of the trench relative to the road and road bed.

8. What year was the Owens Valley Solar Array built?

   The site was initially constructed in the mid-1950s, with the first two antennas operating beginning in 1958.

9. To clarify for me, Alternative 1 (the chosen alternative) has elected to have the cable trench avoid site OVSA-1.

   Yes, the final plan avoids OVSA-1 entirely.

10. To confirm, since you never formally request it in your transmittal letter: you are seeking a consensus on a determination of not eligible for site OVSA-2 and a determination of eligible for sites OVSA-1, OVSA-3, OVSA-4, OVSA-5, and OVSA-6.

    To clarify the request for concurrence relative to the proposed project, we are asking for concurrence from the CA SHPO with our determination that, although there may be National Register eligible resources in the Area of Potential Effects, the planned activities will avoid disturbances to those resources, and, as such, a finding of no adverse effects is appropriate.

Dr. Randy L. Phelps
Staff Associate
Office of Integrative Activities (OIA), Suite 1270
National Science Foundation
4201 Wilson Blvd
Arlington, VA 22230 U.S.A.
Phone: 703-292-8040
Email: rphelps@nsf.gov
URL: http://www.nsf.gov/od/oia/

***Information relating to the Major Research Instrumentation (MRI) program* can be found through the link at *www.nsf.gov/od/oia/programs/mri*.**

Comment from California Office of Historic Preservation, September 9, 2010:

STATE OF CALIFORNIA – THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, *Governor*

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
1725 23rd Street, Suite 100
SACRAMENTO, CA 95816-7100
(916) 445-7000 Fax: (916) 445-7053
calshpo@parks.ca.gov
www.ohp.parks.ca.gov

September 9, 2010 Reply in Reference To: NSF100901A

Randy L. Phelps
Office of Integrative Activities, Suite 1270
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230

Re: Owens Valley Solar Array Expansion Project, Big Pine, California

Dear Dr. Phelps,

Thank you for seeking my consultation regarding the above noted undertaking. Pursuant to 36 CFR Part 800 (as amended 8-05-04) regulations implementing Section 106 of the National Historic Preservation Act (NHPA), the National Science Foundation (NSF) is seeking my comments on the effects the proposed undertaking will have on historic properties.

The project consists of the expansion of the Owens Valley Solar Array (OVSA). This will include adding eight new antennas and the relocations of five existing two meter antennas. This would also require the installation of 13 new antenna pads, a new modular control building, access roads, and cable trenching along the access roads. The total length to be trenched is 3560 meters with a depth of 18 inches and a width ranging between eight and 24 inches in places. The concrete footings will require a maximum depth of 18 inches for footings, with some places shallower at six inches and will be 16 feet by 16 feet surrounded by a chain link fence. Roughly 2500 square feet of ground will be cleared, effected to a depth of six inches for a new modular building and temporary construction trailer. The new modular building will use existing connections to utilities. The total length of new roads is roughly 900 meters and will be roughly 10 meters wide with no planned improvements or alterations for existing roads. The Area of Potential Effects totals roughly 65 acres in areas spanning the project footprint. In addition to your letter received September 1, 2010, you have submitted the following documents as evidence of your efforts to identify historic properties in the APE:

- *An Archaeological Survey of the Proposed Owens Valley Solar Array Expansion Inyo County, California* (Jeffrey Burton, Trans-Sierran Archaeological Research, June 2010)

The NSF has performed a records search and found that no previous surveys or historic properties have been recorded in the vicinity of the APE. Six historic properties were located during a pedestrian survey, however only four are within the APE. OVSA-1, a dense prehistoric artifact scatter, was found to contain subsurface deposits and determined to be eligible for the National Register of Historic Properties by the NSF under criterion D. OVSA-2 was determined to be redeposited spoils from scrapes to construct the roads in the vicinity of the site and was determined to be not eligible

because of its disturbed nature. OVSA-3 and OVSA-4 are both prehistoric artifact scatters bisected by a road and are overlooking a meander of the Owens River. Both OVSA-3 and OVSA-4 have not been evaluated for NRHP eligibility in spite of effects to these sites and the recommendation of the consultant. OVSA-5 and OVSA-6 are both outside the APE and will not be affected by the undertaking, and were not formally evaluated by the NSF; however the consultant did make an eligibility recommendation. Native American consultation was undertaken with meetings with the Big Pine Band of the Owens Valley Paiute-Shoshone first occurring on July 8, 2010 which concluded in an agreement on the NSF's finding on August 18, 2010.

The NSF has yet to adequately test the trenching route bisecting sites OVSA-3 and OVSA-4. There is no guarantee that the road fill is 18 inches or more in depth (the depth of the trench), additionally because no testing has been performed it cannot be adequately discerned that no cultural materials will be affected by the trenching. The native ground level slopes and changes from one side of the road to the other, suggesting that the road cut may not have destroyed all cultural materials within the road base. Additionally no effort has been made to evaluate the eligibility of and effects to the Owens Valley Solar Array which is of historic age (it is currently 52 years old).

Based on your identification efforts the NSF has determined that site OVSA-2 is not eligible and OVSA-1 is eligible for the NRHP and that there will be No Adverse Effects to historic properties. Pursuant to 36 CFR 80.4(c), I concur with your determination of eligible for site OVSA-1 and not eligible for site OVSA- 2. Pursuant to 36 CFR 800.4(b), at present I cannot concur with your finding because your identifications efforts have not been completed until archaeological testing of the trenching routes within sites OVSA-3 and OVSA-4 proves that there are no cultural materials within the trench route and the Owens Valley Solar Array has been evaluated for the National Register of Historic Places.

I look forward to continuing this consultation. Thank you for seeking my comments and considering historic properties as part of your project planning. If you have any questions or concerns, please contact Trevor Pratt of my staff at (916) 445-7017 or at email at tpratt@parks.ca.gov.

Sincerely,

Susan K Stratton for

Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

The Office of Historic Preservation has moved to a new location as of July 14, 2010. The new address for the office is 1725 23rd Street, Suite 100, Sacramento CA 95816. Please update your records accordingly. The entire office also received new phone numbers, and those numbers are posted on our website at www.ohp.parks.ca.gov

Response from National Science Foundation:

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD, Room 1270
ARLINGTON, VIRGINIA 22230
Tel. 703-292-8040 ~ Fax. 703-292-9040

OFFICE OF
INTEGRATIVE
ACTIVITIES

September 15, 2010

Mr. Trevor Pratt, Assistant State Archeologist
Office of Historic Preservation
Department of Parks and Recreation
1725 23rd Street, Suite 100
Sacramento, CA 95816-7100

Re: Owens Valley Solar Array Expansion Project, Big Pine, California

Dear Mr. Pratt,

Trans-Sierran Archaeological Research (TSAR) has completed their report (attached) on the additional archaeological inventory and historic properties assessment requested by the California State Historic Preservation Office (SHPO) for the proposed Owens Valley Solar Array (OVSA) expansion project. In summary:

- TSAR testing at both OVSA-3 and -4 confirm that the construction for the existing roadbed, in which the trenching would occur, entailed grading through and below the cultural deposits of the sites. The roadbed through both sites is considered to be "non-contributing" and the conclusion is therefore that the proposed trenching would have No Adverse Effect on the sites.
- NSF has determined that, because of its association with events important in the development of radio astronomy and because aspects of its design embody distinctive and creative engineering, the OVRO/OVSA facility should be considered eligible for the National Register under criteria A and C.
- TSAR concludes that the proposed OVSA upgrade would have No Adverse Effect on the characteristics of the array that make it eligible for the National Register of Historic Places.
- The TSAR report concludes that a finding of "No Adverse Effect" is recommended for the proposed OVSA expansion project.

We hope that by providing the information requested by the California State Historical Preservation Office your office will be able to concur with the NSF determination of "no adverse effects" for the Owens Valley Solar Array expansion project.

Given the short time remaining for NSF to make this potential Recovery-Act-funded award we respectfully ask that the CA SHPO convey a decision on concurrence by the end of the day on Thursday, September 16th.

Again I want to thank you for working with us on the expedited review of this proposed project. A hardcopy of this correspondence and report is being sent by regular mail.

With best regards,

Randy L. Phelps

Dr. Randy L. Phelps, Staff Associate
Office of Integrative Activities

cc: Mr. Bill Helmer, THPO, Big Pine Paiute Tribe of the Owens Valley

TRANS-SIERRAN ARCHAEOLOGICAL RESEARCH
332 EAST MABEL STREET, TUCSON, ARIZONA 85705 (520) 620-6804

September 15, 2010

TEAM ENGINEERING & MANAGEMENT, INC.
P.O. Box 1265
Bishop, California 93515

RE: Additional NHPA Section 106 compliance work for the proposed Owens Valley Solar Array Expansion.

This letter reports on additional archaeological inventory and historic properties assessment for the proposed Owens Valley Solar Array Expansion to address questions raised by the California State Historic Preservation Office (SHPO) about the project. The work included (1) shovel testing of two prehistoric sites; (2) recommendation for a determination of eligibility and effect for the Solar Array itself; and (3) recommendation for a finding of "No Adverse Effect."

As previously reported (Burton 2010), six prehistoric sites were identified and recorded during the original archaeological surveys undertaken for the project. Surface evidence indicated that five of the six sites were likely eligible for the National Register of Historic Places under criterion (d), for their information potential. Three of the sites considered eligible, OVSA-1, -3 and -4, are located within the proposed project area. The project was modified to avoid adverse impacts to OVSA-1. In the current proposal, the proposed alignment for a buried cable crosses the boundaries of OVSA-3 and OVSA-4 along the edge of a paved road, and the road cut through the sites appeared to be already below the cultural deposit. The road cut is wide enough to accommodate the cable trenching without new disturbance to intact cultural deposits, so a finding of "No Adverse Effect" under 36 CFR 800 was recommended.

However, SHPO correspondence (email dated September 1, 2010) indicated that trenching along the road through the sites could constitute an adverse effect, unless that part of the site was determined to be a non-contributor. Shovel-testing was recommended. The SHPO correspondence also pointed out that the original report did not consider whether the Solar Array itself was historic, and if so, whether the proposed project would affect it. This letter, therefore, describes additional fieldwork undertaken to address the SHPO's concerns about the prehistoric sites, and the results. Then, using information provided by the National Science Foundation, the New Jersey Institute of Technology, the Owens Valley Radio Observatory (OVRO) staff, and additional articles and field inspection and recording, the Solar Array is assessed for its potential to meet the criteria for the National Register of Historic Places and the proposed project is evaluated to determine whether there would be any effects on the array.

Field Methods

Fieldwork to better characterize the nature and vertical extent of prehistoric sites OVSA-3 and OVSA-4, totaling 4 person-days, was conducted September 13 and 14, 2010. At OVSA-3, eight shovel test units (1-8 in Table 1 and Map 1) were excavated within the site boundaries, along the proposed trench alignment adjacent to the existing road. In order to gauge how the roadside unit results compared with the cultural deposit in what was considered to be the intact part of the site, a ninth shovel test unit ("A" in the Table 1 and Figure 1) was excavated away from the road cut and fill in what appeared to be one of the densest parts of the site. At OVSA-4, seven shovel test

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units were excavated in the proposed trench alignment beside the road (1-7 in Table 2 and Map 2), and one was excavated away from the road, in what appears to be the undisturbed and densest part of the site ("A" in Table 2 and Map 2).

Each shovel test pit was 25 cm by 25 cm in plan, dug by hand with a shovel or trowel in 10 or 20 cm levels, and excavated as deep as practicable (Figures 1 and 2). All excavated sediments were screened through 1/4" mesh. All artifacts encountered were identified, counted, and then replaced in the unit, which was then backfilled. In addition, a total station instrument was used to map the location and plot the elevation of the road cut, the units, and the depth of the cultural deposit encountered in the control units excavated in the undisturbed parts of the sites.

Shovel Test Unit Results

At **OVSA-3**, the eight shovel test units along the proposed trench alignment were excavated to between 30 and 80 cm depth. In most of the units, the road's aggregate base course, dominated by very compacted rocks and gravels, was about 20 cm thick. Its upper surface was exposed at the ground surface in some areas; in other areas it was covered by a layer up to 10 cm thick consisting of colluvial deposits of sands and gravels. Below the aggregate base course were compacted layers of sand and silts, underlain by extremely compact silt that precluded further hand excavation. The shovel test units were extended from 5 to 55 cm below the base course; although hand excavation through the road base course was difficult, it was considered essential to affirm whether there were intact cultural deposits in the strata below the road disturbance that might be affected by the proposed trenching.

Two units had no historic or prehistoric artifacts. In four of the units, obsidian flakes (and an amber glass fragment) were found in the washed-in sediments above the road's aggregate base course; in three of the units, obsidian flakes were found within the gravels of the aggregate base course itself. Both contexts lack integrity. The sediments above the base course postdate the construction of the road, and the flakes were likely washed in from the cultural deposits of OVSA-3 that lie above the road to the north. The flakes within the base course may be from OVSA-3 or from some other, unidentified site where the aggregate base course was quarried; regardless of their original provenience, as part of the road plating they no longer have integrity of location, context, or association. No artifacts were found in any strata below the road base course, indicating that the road construction (in 1957) had cut completely through the cultural deposit to sterile sediments below.

Shovel test unit A in the undisturbed part of the site, in contrast, yielded 47 flakes. All artifacts were found in loose sandy strata from 0 to 50 cm depth. Below 50 cm depth, the proportion of silt increased, and no artifacts were encountered. A total station instrument was used to map the surface elevations of road cut profiles through the site (Map 3). Given the landform and soils of the site, it is fair to assume that the cultural deposit would have extended evenly across the surface. Mapping results place the bottom of the road's aggregate base course below the depth of the cultural deposit, substantiating the results of the shovel testing in the proposed trench alignment.

At **OVSA-4,** the seven shovel test units excavated along the proposed trench alignment were excavated to between 30 and 80 cm deep. Sediments encountered are similar to those at OVSA-3, that is, the road's aggregate base course lies atop compacted sands and silts. In some areas along the road within the site boundaries, loose sands or silts have washed in on top of the road's base course. One glass fragment, and no prehistoric artifacts, were encountered in the roadside units. The control unit was excavated in a relatively undisturbed area of the site where artifact density was greatest. There, the sediments were similar to those encountered in the undisturbed

area of OVSA-3, that is, sands and silts extended to 80 cm depth. Ten flakes were encountered in the 0-10 cm level of the control unit and two flakes were encountered in the 10-40 cm levels; no artifacts were found below 40 cm. As at OVSA-3, the locations of the shovel test units and a road cut profile were mapped with a total station instrument. Test unit results and mapping results confirm that there is no cultural deposit at or below the level of the road (Map 4).

In summary, the testing and profile mapping conducted at both OVSA-3 and -4 confirm that the construction for the existing road entailed grading through and below the cultural deposits of the sites. Therefore, the road alignment and the proposed trench location are in areas without the potential to contribute important information to history or prehistory, per criterion D of the National Register of Historic Places. The road alignment through both sites is considered to be "non-contributing" to the significance of the prehistoric sites, and therefore the proposed trenching would have No Adverse Effect on the sites.

Owens Valley Solar Array

Because construction of the Owens Valley Solar Array (OVSA) began in the late 1950s, at least parts of it meet the 50-year minimum age requirement for a site to be eligible for listing on the National Register of Historic Places. The Solar Array is part of the Owens Valley Radio Observatory (OVRO), and to help assess the Solar Array as a historic property, the following information about the construction and use of OVRO and OVSA was provided by Drs. Dale Gary, Randy Phelps, and Caroline Blanco (email September 10, 2010):

> A radio telescope array consists of free standing, independently driven antennas that are widely separated and are connected using some form of a transmission line. The 27-m antennas were first built during 1958 by John Bolton, and became operational in 1959. The other smaller antennas of the solar array are the five 2-m antennas, which were built much later. The first three were completed in 1989-1991, and the last two were added in 2001-2003. The construction of the 27-m antennas was the goal in mind when the Owens Valley site was first selected, and at least three of the buildings on the site date from that time.

Additional background information can be found in articles published by astronomy professor Marshall H. Cohen, who worked at the observatory for many years (Cohen 1994, 2007). Scientific and engineering achievements at OVRO/OVSA have been important in the development of radio astronomy (Gary, Phelps, and Blanco, email September 10, 2010):

> The 27-m antennas were the largest in the United States at the time, and among the early scientific discoveries was the first demonstration of the radiation belts of Jupiter (Radhakrishn an and Roberts 1960), and the fact that most extragalactic radio sources are double lobed (Moffet and Maltby 1961). The 27-m antennas were also important in the training of numerous radio astronomers and in developing the rationale for the Very Large Array (Kellerman and Moran 2001).

Cohen notes that during the 1970s, OVRO's interferometer technology was surpassed by other observatory facilities in Holland, England, Germany, and Puerto Rico, so in 1979, "the decision was made to devote the interferometer to solar physics, where it continues to serve, mapping the sun daily" (Cohen 2007:37). Improvements in technical functioning and design have been made throughout the observatory's history (Cohen 1994, 2007).

Recording to document the current condition of OVRO was completed to provide information to assess its integrity and significance, per the National Register criteria. A detailed site record is in

preparation and will be submitted to the California Historical Resources Information System (CHRIS) clearinghouse when complete. Sixteen features were designated at the site, several of which comprise multiple buildings and structures (Table 3 and Map 5). Scientific research at the site dates back over 50 years, and nine of the recorded features date to the early construction era there. There have been substantial modifications to the equipment, including the replacement of the original steel mesh of the 27-m dishes to solid aluminum in 1964 and the addition of the larger dish in the mid-1960s (Cohen 2007:33, 38). More recently, 2-m antennas and various support buildings have been constructed on the site. Therefore, the OVRO appears to lack integrity of materials and design. It could be argued, however, that OVRO maintains sufficient integrity of association, location, feeling, workmanship, and setting to convey its significance in radio astronomy research. National Register Bulletin 15, section VIII, states that "[a] basic integrity test for a property associated with an important event or person is whether a historical contemporary would recognize the property as it exists today." In its general configuration, OVSA would no doubt be recognized by its original builders, including John Bolton. Bulletin 15 continues:

> The property must retain, however, the essential physical features that enable it to convey its historic identity. The essential physical features are those features that define both *why* a property is significant (Applicable Criteria and Areas of Significance) and *when* it was significant (Periods of Significance).

As Cohen describes, some of the significant discoveries made at the observatory occurred 50 years ago, and so one might argue that OVSA's period of *historical* significance is the late 1950s when OVRO was constructed up until ca. 1960, when the 50-year cutoff for historical properties would apply. However, Bulletin 15 also recommends comparing a potential National Register property with similar properties. The National Register (via the NRIS database, accessed at www.nps.gov/history/nr/research) includes scientific facilities that are still in operation, such as the Zero Gravity Research Facility in Ohio, and the National Astronomy and Ionosphere Center at Arecibo, Puerto Rico. The latter is considered to have nationwide significance under Criterion A, because of its contribution to the history of the sciences of ionosphere studies and the development of radio and radar astronomy in the United States. The property is also listed under Criterion C, as a significant work of engineering. The National Astronomy and Ionosphere Center's dates of significance are listed as 1963 to 2008, indicating that it merited an exception to the standard 50-year age minimum.

Given the above examples, it appears that the OVRO/OVSA facility could well be eligible for the National Register under criterion A, for its association with events important in the development of radio astronomy, and possibly under criterion C, since aspects of its design embody distinctive and creative engineering. The "essential physical features" would include the 27-m antennas (Figure 3), the trackways, the four oldest buildings (Figure 4), and the setting. It is recommended that the property should be considered eligible for the National Register for the purpose of complying with Section 106 of the National Historic Preservation Act, in accordance with 36 CFR 800.4(c)(2). The next step in the Section 106 process, then, is to consider whether the proposed project would have an adverse effect on the characteristics that qualify the property for the National Register.

Assessment of Effects (36 CFR 800.5)

Gary, Phelps, and Blanco (email September 10, 2010) provided the following details about the proposed project:

The OVSA Expansion project includes refurbishment and modernization of the drive control system for the two 27-meter (90-ft) antennas that are currently used in the Owens Valley Solar Array. The OVSA Expansion project does not include any modifications to the existing buildings on the site, but instead calls for the installation of a new modular control building located at the far east end of the site, as detailed in the Environmental Assessment. Proposed modifications to the 27-m antennas would be internal only, and will not affect the outward appearance of the dishes. During the refurbishment the dishes would be repainted and would receive close mechanical inspection. Rusty structural members may be revealed that will need reinforcement to maintain structural integrity. Such reinforcement is expected to be minor, and will be done to modern mechanical standards in a way that will not change the visual appearance. The planned upgrade and refurbishment, including replacement of the control system and maintenance schedule, is standard operation for active scientific instruments, and is needed in order to maintain the scientific usefulness and at the same time preserve the mechanical integrity of these antennas.

The proposed changes would not affect the historical integrity of the "essential physical features" of OVRO, including the 27-m antennas, the trackways, the older buildings, and the setting. In fact, the changes would be consistent with the scientific purpose of the array and its ongoing function.

In summary, the proposed OVSA expansion project would have no adverse effect on the characteristics of the observatory that make it eligible for the National Register of Historic Places. At prehistoric sites OVSA-3 and OVSA-4, the proposed OVSA expansion project would entail disturbance only within the existing roadway, considered to be a non-contributing element of both sites. The proposed project would have no adverse effect on the characteristics of the prehistoric sites that make them eligible for the National Register.

A finding of "No Adverse Effect" is recommended for the proposed OVSA expansion project.

Jeff Burton and Mary Farrell

attachments: References Cited, Maps 1-4, Figures 1-4, Tables 1-3

References Cited

Burton, Jeffery F.
2010 An Archaeological Survey of the Proposed Owens Valley Solar Array Expansion, Inyo County, California, revised final report. Trans-Sierran Archaeological Research, *Contributions to Trans-sierran Archaeology No. 66*, Tucson, AZ.

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1960 "Polarization and Angular Extent of the 960-Mc/sec Radiation from Jupiter," *Physical Review Letters, 4*, 493-494.

This Figure Intentionally Omitted

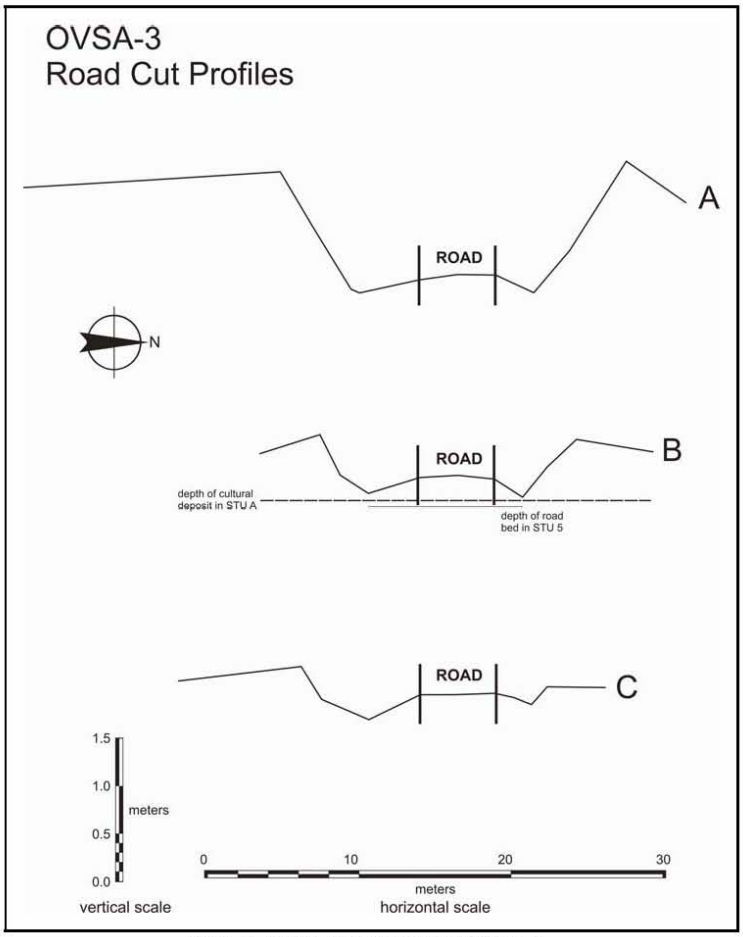
(Not For Public Distribution)

Map 1. STUs at OVSA-3.

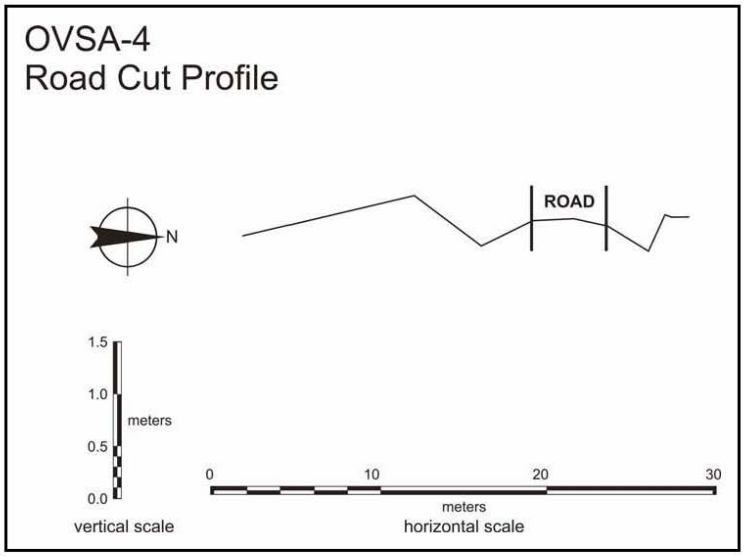
This Figure Intentionally Omitted

(Not For Public Distribution)

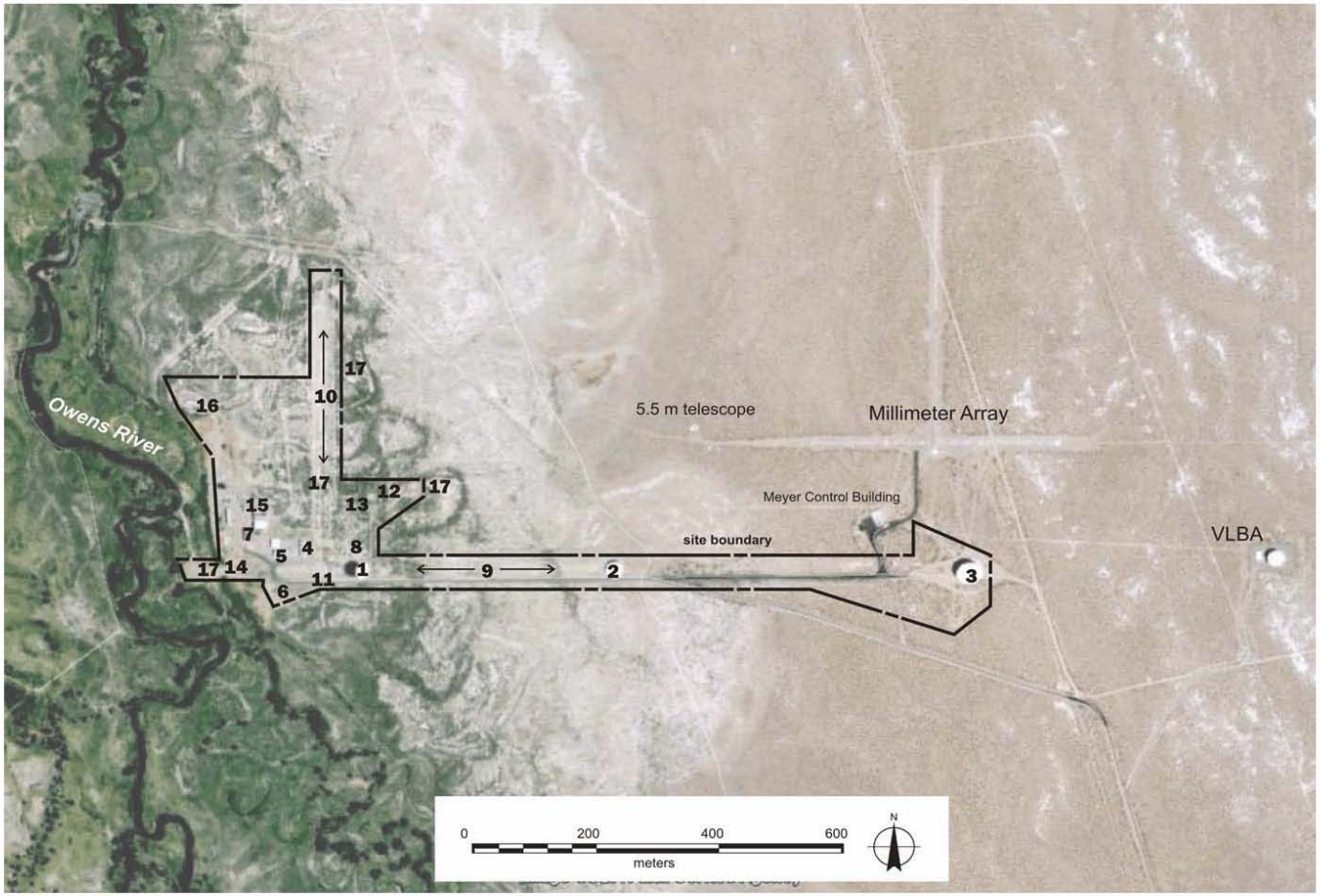
Map 2. STUs at OVSA-4.



Map 3. Road cut profiles at OVSA-3.



Map 4. Road cut profile at OVSA-4.



Map 5. Features recorded at OVRO.

Figure 1. Excavating shovel test unit at archaeological site OVSA-3.

Figure 2. Excavating shovel test unit at archaeological site OVSA-4.

Figure 3. 90-ft radio telescope.

Figure 4. Engineering building.

Table 1. Shovel Test Units at OVSA-3.			
Unit	Level (cm)	Artifacts	Soil Notes
1	0-5	1 obs biface fragment	loose sand and gravels
	5-10	1 amber glass fragment	loose sand, gravels, and rocks
	10-30		compact rocky road base
	30-50		compact sand
	50-80		loose sand
2	0-20		compact rocky road base
	20-30		slightly compact sand
	30-35		compact silt
	35-40		extremely compact silt
3	0-20		compact rocky road base
	20-30		slightly compact sand
	30-40		less compact sand
	40-50		extremely compact silt
4	0-20	1 obs fk	compact rocky road base
	10-50		compact sand
	50		extremely compact silt
5	0-10	1 obs fk	compact rocky road base
	10-30		compact sand
	30-65		slightly compact sand
	65		extremely compact silt
6	0-5	2 obs fks	loose sand
	5-20		compact rocky road base
	20-25	4 obs fks	compact rocky road base
	30-40		compact sand and silt
	40-50		slightly compact sand and silt
	50-80		loose sand
7	0-10	2 obs fks	loose sand and gravels
	10-20		compact rocky road base
	20-24		loose sand
	24-30		extremely compact silt
8	0-10	1 fk	loose sand and gravels
	10-25		compact rocky road base
	25-30		loose sand
	30		extremely compact silt

Table 1. Shovel Test Units at OVSA-3.			
Unit	Level (cm)	Artifacts	Soil Notes
A	0-10	25 obs flakes, 1 chert fk	loose sand
	10-20	7 obs fks	loose sand
	20-30	9 obs fks, 3 basalt fks	loose sand
	30-40	3 obs fks, 1 basalt fk	loose sand
	40-50	3 obs fks	slightly compact sand
	50-60		slightly compact sand with silt
	60-70		compact sand and silt
	70-80		compact silt with sand

Table 2. Shovel Test Units at OVSA-4.			
Unit	Level (cm)	Artifacts	Soil Notes
1	0-28		very compact rocky road base
	28-38		compact sand with gravels
	38		extremely compact silt
2	0-10		loose rocks and sand
	10-25		compact rocky road base
	25-30		loose rocks and loose sand
	30-50		compact sand
	50		extremely compact silt
3	0-10	amber glass fragment	compact rocky road base
	10-20		loose sand
	20-26		loose sand becoming compact silt
	26-30		extremely compact silt
4	0-10		compact rocky road base
	10-20		loose sand with rocks
	20-30		compact silt
	30-50		compact sand
	50		extremely compact silt
5	0-17		loose sand and gravel, few rocks
	17-30		compact sand
	30-40		compact sand with silt
	40-48		compact silt with sand
	48		extremely compact silt
6	0-18		loose rocks, sand, and gravel
	18-40		compact sand
	40		extremely compact silt
7	0-10		loose rocks and sand
	10-30		compact sand with silt
	30		very compact silt
A	0-10	10 obs fks	loose sand
	10-20		loose sand
	20-30	1 obs fk	loose sand
	30-40	1 obs fk	slightly compact sand
	40-60		slightly compact to compact sand
	60-68		extremely compact silt

Table 3. Features recorded at OVRO.			
1	90-ft radio telescope; 1958, 1964	10	North-South trackway and associated building and structures; 1960
2	90-ft radio telescope; 1958, 1964	11	Trackway cental crossing slab and associated buildings and structures
3	130-ft radio telescope and related buildings and structures; 1966	12	Small building
4	Kitchen, office, and library (Building #10); 1958	13	NASA laser pad (concrete slab and associated structures); 1987
5	Engineering Building No. 1 (Building #8); 1958	14	Small slab
6	Residence (Building #9); c. 1960	15	Modern buildings (n=10) and structures (n=5) in OVRO compound
7	Shop (Building #3); c. 1960	16	Bone yard and small building
8	Small building	17	Five small modern radio telescopes
9	East-West trackway and associated buildings and structures; 1957		

Comment from California Office of Historic Preservation, September 20, 2010:

STATE OF CALIFORNIA – THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, *Governor*

OFFICE OF HISTORIC PRESERVATION
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September 20, 2010 Reply in Reference To: NSF100901A

Randy L. Phelps
Office of Integrative Activities, Suite 1270
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230

Re: Owens Valley Solar Array Expansion Project, Big Pine, California

Dear Dr. Phelps,

Thank you for seeking my consultation regarding the above noted undertaking. Pursuant to 36 CFR Part 800 (as amended 8-05-04) regulations implementing Section 106 of the National Historic Preservation Act (NHPA), the National Science Foundation (NSF) is seeking my comments on the effects the proposed undertaking will have on historic properties.

The project consists of the expansion of the Owens Valley Solar Array (OVSA). This will include adding eight new antennas and the relocations of five existing two meter antennas. This would also require the installation of 13 new antenna pads, a new modular control building, access roads, and cable trenching along the access roads. The total length to be trenched is 3560 meters with a depth of 18 inches and a width ranging between eight and 24 inches in places. The concrete footings will require a maximum depth of 18 inches for footings, with some places shallower at six inches and will be 16 feet by 16 feet surrounded by a chain link fence. Roughly 2500 square feet of ground will be cleared, effected to a depth of six inches for a new modular building and temporary construction trailer. The new modular building will use existing connections to utilities. The total length of new roads is roughly 900 meters and will be roughly 10 meters wide with no planned improvements or alterations for existing roads. The Area of Potential Effects totals roughly 65 acres in areas spanning the project footprint. In addition to your letters received September 1, 2010 and September 15, 2010, you have submitted the following documents as evidence of your efforts to identify historic properties in the APE:

- *An Archaeological Survey of the Proposed Owens Valley Solar Array Expansion Inyo County, California* (Jeffrey Burton, Trans-Sierran Archaeological Research, June 2010)
- *Additional NHPA Section 106 Compliance Work for the Proposed Owens Valley Solar Array Expansion* (Jeffrey Burton, Trans-Sierran Archaeological Research, September 2010)

The NSF has performed a records search and found that no previous surveys or historic properties have been recorded in the vicinity of the APE. Six historic properties were located during a pedestrian survey, however only four are within the APE. OVSA-1, a

dense prehistoric artifact scatter, was found to contain subsurface deposits and determined to be eligible for the National Register of Historic Properties by the NSF under criterion D. OVSA-2 was determined to be redeposited spoils from scrapes to construct the roads in the vicinity of the site and was determined to be not eligible because of its disturbed nature. OVSA-3 and OVSA-4 are both prehistoric artifact scatters bisected by a road and are overlooking a meander of the Owens River. Both OVSA-3 and OVSA-4 have not been evaluated for NRHP eligibility in spite of effects to these sites and the recommendation of the consultant. OVSA-5 and OVSA-6 are both outside the APE and will not be affected by the undertaking, and were not formally evaluated by the NSF; however the consultant did make an eligibility recommendation. Native American consultation was undertaken with meetings with the Big Pine Band of the Owens Valley Paiute-Shoshone first occurring on July 8, 2010 which concluded in an agreement on the NSF's finding on August 18, 2010.

Based on previous consultation with my office the NSF performed testing on the trenching route bisecting sites OVSA-3 and OVSA-4. The road fill was measured as approximately 20 cm thick, with a colluvial layer approximately ten cm thick atop it. Both of these top layers are heavily disturbed contexts. Test excavations below these layers found no cultural materials beneath the road bed in these areas. The NSF has also evaluated that the Owens Valley Solar Array is eligible, specifically four of the buildings and the two 27-meter antennas.

Please be aware that, pursuant to 36 CFR 800.3(c)(4), the SHPO has up to 30 days to respond to a project and that expedited consultation, pursuant to 36 CFR 800.3(g), requires agreement by the SHPO and only collapses steps of the process, rather than minimizing the time for the SHPO's opportunity to comment (especially down to one day). Please allow enough time in your future project planning and funding schedules for proper consultation.

Based on your identification efforts the NSF has determined that there will be No Adverse Effects to historic properties. I have previously commented on the eligibility of sites OVSA-1 and OVSA-2. The NSF has determined that the trenching routes within the boundaries of OVSA-3 and OVSA-4 are non-contributors to the sites potential eligibility. Additionally, the NSF has determined that the Owens Valley Solar Array is eligible under criteria A and C for its association with the development of radio astronomy and its design embodies distinctive and creative engineering.

Pursuant to 36 CFR 800.4(c), at present I cannot concur with your finding of eligible for the Owens Valley Solar Array because not enough information (i.e. context) was provided for a determination of eligibility. I can, however, assume eligibility of the OVSA for the purposes of this undertaking as long as no changes are made to the configuration or exterior (paint is acceptable as part of proper maintenance) of the historic (50 years or older) portions of the OVSA. Therefore, pursuant to 36 CFR 800.5(c)(1), I concur with your determination of No Adverse Effects for this undertaking on the condition of no alterations being made to the configuration or exterior of the historic portions of the OVSA.

It is advisable to complete a determination of eligibility for the OVSA for potential future undertakings at the facility.

If you agree with the conditions that I have proposed (no modifications to the historic portions of the OVSA), please evidence your agreement by signing the signature block below. Please return the letter to me as soon as possible. Alternatively, you may provide me with a separate letter concurring in the proposed conditions.

Be advised that under certain circumstances, such as unanticipated discovery or a change in project description, the NSF may have additional future responsibilities for this undertaking under 36 CFR Part 800. Thank you for seeking my comments and considering historic properties as part of your project planning. If you have any questions or concerns, please contact Trevor Pratt of my staff at (916) 445-7017 or at email at tpratt@parks.ca.gov.

Sincerely,

Susan K Stratton for

Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

AGREED Randy L. Phelps DATE: 09/21/2010

Randy Phelps
National Science Foundation
Office of Integrative Activities